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Ute Kunzmann

Being and Feeling in Control

Two Sources of Older People's Emotional Well-Being

Max-Planck-Institut
für Bildungsforschung

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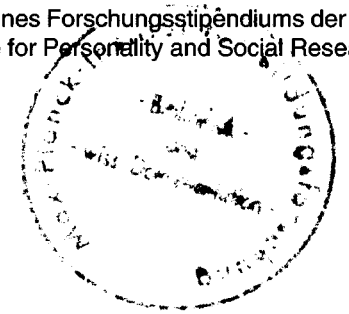

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Abstract

Interindividual differences and *intra*individual changes in emotional well-being (i.e., the experience of positive and negative affect) of older individuals were investigated, both cross-sectionally and longitudinally, using data from the Berlin Aging Study (Mayer & Baltes, 1996). Two sources of possible variability in emotional well-being were examined: constraints in functional health as indicators of older people objective control potential and generalized beliefs about control. In old age, poor functional health (constraints in vision, hearing, and mobility) pose a serious threat to individuals' sense of emotional well-being. Poor functional health was predicted to be a risk factor for both low levels of concurrent emotional well-being and long-term decline in emotional well-being. In contrast, it was predicted that generalized beliefs about control might be either resources or risk factors for emotional well-being depending on (a) the dimension of perceived control (e.g., personal vs. others' control) and (b) the dimension of emotional well-being (positive versus negative affect). In addition, it was expected that beliefs about control would be most adaptive if they match older people's objective control competencies (i.e., in the present study, individuals' functional health status). Thus, the present study investigated the separate effects of functional health constraints and beliefs of control on emotional well-being and the interactive effects of these two factors.

The first wave of data collection, which took place between 1990 and 1993, involved a heterogeneous sample, stratified by age and sex, consisting of 516 individuals aged between 70 and 103 years (*M* age = 85). 206 members of this sample (*M* age = 80) participated in a longitudinal follow-up (*M* interval = 3.8 years). Positive and negative affect were assessed using the Positive Affect Negative Affect Schedules (Watson, Clark, & Tellegen, 1988). The three facets of functional health (visual acuity, hearing thresholds, and gait/balance mobility) were measured employing performance-based tests (Steinhagen-Thiessen & Borchelt, 1996). Perceived control was operationalized by a measure that has been developed after Levenson (1981) to assess three generalized dimensions of perceived control (personal control over desirable outcomes, personal responsibility for undesirable outcomes, and perceived others' control; Smith & Baltes, 1996). Analyses involved structural equation modeling techniques.

Consistent with predictions, the more constraints in functional health individuals experienced at the first measurement occasion, the more likely they experienced low concurrent positive affect and decline in positive affect over time. Unexpectedly, individuals' experience of negative affect was not related to functional health. Thus, functional health constraints appear to be a risk factor only for low levels of positive affect. As predicted, three dimensions of perceived control were shown to be important contributors to positive and negative affect. The relationship between perceived control and emotional well-being was complex. No general answer was found to the question whether perceived control is a dysfunctional or an adaptive personality feature. The cross-sectional and longitudinal analyses showed that personal control over desirable outcomes is related to high positive and low negative affect. Perceived others' control was demonstrated to be associated with high negative and low positive affect.

Results regarding the relationship between personal responsibility for undesirable outcomes and emotional well-being were less clear. This facet of perceived control predicted high levels of concurrent negative affect and long-term increases in positive affect. Counter to predictions, the relationships between the three dimensions of perceived control and emotional well-being were not moderated by functional health. The results suggest that generalized beliefs about control regulate positive and negative affect, independent of older individuals' functional health status.

This study points to important qualifications of a finding that is often viewed as paradoxical, namely, that subjective well-being shows age-related stability well into very old age. The present findings suggest that this paradox does not hold for all components of subjective well-being and is only true for some rather than for all old people. Older individuals confronted with constraints in functional health are at risk of experiencing decline in positive affect. This study also provides evidence for the notion that personality characteristics are important to the maintenance of subjective well-being in old age. Beliefs about control were shown to be substantial contributors to older people's positive and negative affect. In old age, emotional well-being depends on both objective control competencies (such as functional health) and subjective perceptions of control.

Zusammenfassung

Diese Arbeit untersucht die Stabilität und Veränderung subjektiven Wohlbefindens in der Lebensphase des hohen Alters. Eine Reihe von Forschungsergebnissen deuten darauf hin, daß subjektives Wohlbefinden—wie auch andere subjektive Indikatoren erfolgreichen Alterns—bis ins hohe Erwachsenenalter stabil ist oder sich nur geringfügig verschlechtert (George, George, & Maddox, 1977; Herzog & Rogers, 1981; Horley & Lavery, 1995; Larson, 1978; Kunzmann, 1994; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996; Stock, Okun, Haring, & Witter, 1983). Diese Befundlage löst oft Erstaunen aus (Baltes & Baltes, 1990; Brandtstädter & Greve, 1994; Filipp, 1996; Staudinger, Marsiske, & Baltes, 1995), denn das Alter und besonders das hohe Alter ist durch eine Zunahme an Verlusten und Risiken charakterisiert (Baltes, 1991; Finch, 1990; Fries, 1990; Mayer & Baltes, 1996; Schaie, 1989). Ziel dieser Arbeit ist es, einige Erklärungen und Qualifikationen für den in der Literatur manchmal als paradox bezeichneten Befund der altersbezogenen Stabilität subjektiven Wohlbefindens (Stabilitätsparadox) zu finden.

(1) *Die altersbezogene Stabilität gilt möglicherweise nicht für alle Dimensionen subjektiven Wohlbefindens gleichermaßen.* Subjektives Wohlbefinden ist ein sehr breites und heterogenes Konstrukt. Es umfaßt eine Vielzahl von Dimensionen wie Zufriedenheit, positive Emotionalität, persönliches Wachstum, Autonomie und Selbstbestimmtheit (z.B. Diener, 1984, 1994; George, 1981; Lawton, 1975; Mayring, 1987; Ryff, 1989a; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). Eine erste Qualifikation des Stabilitätsparadoxes subjektiven Wohlbefindens besteht in der Annahme, daß es nur für einige, nicht aber für alle Dimensionen subjektiven Wohlbefindens gilt.

Die vorliegende Arbeit befaßt sich mit der emotionalen Seite subjektiven Wohlbefindens. Watson und Tellegen (1985) haben ein Zweikomponentenmodell emotionalen Wohlbefindens vorgeschlagen, das auch dieser Arbeit zugrunde liegt. Nach diesem Modell besteht emotionales Wohlbefinden in der Abwesenheit von negativen Emotionen (z.B. Bedrücktheit, Ängstlichkeit, Feindseligkeit) und in der Anwesenheit von positiven Emotionen (z.B. Glück, Interesse, Begeisterung). Faktorenanalytische Studien haben belegt, daß positive und negative Emotionalität zwei Dimensionen emotionalen Wohlbefindens bilden und nicht zwei Pole eines bipolaren Konstruktes (Holland-Benin, Stock, & Okun, 1988; Kercher, 1992; Kunzmann, 1994; Lawton, Kleban, Dean, Rajagopal, & Parmelee, 1992; Watson, 1988; Watson & Clark, 1984).

Gilt die altersbezogene Stabilität also möglicherweise nur für eine der beiden Komponenten emotionalen Wohlbefindens? Es gibt einige erste Hinweise darauf, daß das Erleben von positiven Emotionen im Alter und im Angesicht von Verlusten schwieriger ist als die Regulierung negativer Emotionen (Smith & Baltes, 1996; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). Möglicherweise zeigt das Erleben von positiven Emotionen also mehr altersbezogene Veränderungen als das Erleben von negativen Emotionen. Um diesen Hinweisen weiter nachzugehen, werden positive und negative Emotionalität in dieser Arbeit getrennt betrachtet.

(2) *Die altersbezogene Stabilität subjektiven Wohlbefindens schließt nicht aus, daß einzelne Implikationen des Alters einen substantiellen Beitrag zur Veränderung subjektiven Wohlbefindens beitragen.* Eine zweite Qualifikation der altersbezogenen Stabilität subjektiven Wohlbefindens ist die Annahme, daß Alter nur ein ungenauer Indikator für Verluste ist. Obgleich es außer Frage steht, daß Verluste im Alter deutlich zunehmen (Baltes, 1991, 1997; Finch, 1990; Fries, 1990; Mayer & Baltes, 1996; Schaie, 1989), impliziert das Alter mehr als das. Das Alter ist nicht nur ein "Stellvertreter" für Verluste, es bringt—wenn auch vielleicht in geringerem Ausmaß als frühere Lebensphasen—Gewinne und positive Erfahrungen mit sich. Persönliche Reife, Expertise, Erfahrung und vielleicht sogar Weisheit sind einige Beispiele hierfür (Carstensen & Freund, 1994; Heckhausen, Dixon, & Baltes, 1989; Staudinger et al., 1995). Folglich kann das Alter als ein höchst heterogenes Konstrukt betrachtet werden. Es beinhaltet alles, was ein Mensch erlebt, gewonnen, erlitten und bewältigt hat. Aus dieser Perspektive ist die Stabilität subjektiven Wohlbefindens weniger erstaunlich. Der geringe Zusammenhang zwischen Alter und subjektivem Wohlbefinden schließt aber keineswegs aus, daß die positiven und negativen Implikationen des Alters einen substantiellen Beitrag zur Veränderung subjektiven Wohlbefindens leisten.

Diese Arbeit beschäftigt sich mit einer negativen Implikation des hohen Alters im gesundheitlichen Bereich, mit Einschränkungen der funktionellen Gesundheit. Es werden drei Facetten der funktionellen Gesundheit untersucht: Einschränkungen der Seh- und Hörfähigkeit sowie der Mobilität. Obgleich das Alter per se nur einen geringfügigen Einfluß auf die beiden Komponenten emotionalen Wohlbefindens haben sollte, wird die Hypothese aufgestellt, daß sich altersbezogene Einschränkungen in der funktionellen Gesundheit nachträglich auf das Erleben von positiven und negativen Emotionen auswirken. Diese Hypothese wird sowohl querschnittlich als auch längsschnittlich untersucht.

(3) *Die Stabilität subjektiven Wohlbefindens ist möglicherweise auf das Wirken der Persönlichkeit zurückzuführen.* Eine dritte Annäherung an die altersbezogene Stabilität subjektiven Wohlbefindens erfolgt durch die Annahme, daß subjektives Wohlbefinden viel weniger von sich objektiv verschlechternden Lebensbedingungen geprägt ist, als es von der Persönlichkeit alter Menschen bestimmt ist (z.B. Campbell, Converse, & Rodgers, 1976; Costa & McCrae, 1984, McCrae & Costa, 1991; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). Aspekte des Selbst und der Persönlichkeit werden in der gerontologischen Literatur oft als Ressourcen bezeichnet, die bis ins hohe Alter hinein unvermindert wirksam sind und das subjektive Befinden eines Menschen maßgeblich bestimmen (z.B. Abeles, 1991; Brandtstädter & Greve, 1994; Smith & Baltes, 1996; Staudinger & Fleeson, 1996).

Das "Wirken" der Persönlichkeit alter Menschen wird in dieser Arbeit beispielhaft anhand dreier generalisierter Kontrollüberzeugungen untersucht: (a) der persönlichen Kontrolle über erwünschte Ereignisse (z.B. "Das Gute und Schöne im Leben kann ich selbst beeinflussen"), (b) der persönlichen Verantwortung für unerwünschte Ereignisse (z.B. "Wenn ich Probleme im Leben habe, sind sie meistens auf mein eigenes Verhalten zurückzuführen") und (c) der sozialen Kontrolle über erwünschte und unerwünschte Ereignisse (z.B. "Im allgemeinen sorgen andere Leute dafür, daß in meinem Leben nichts schiefgeht").

Aufgrund theoretischer Annahmen und empirischer Befunde früherer Arbeiten (Baltes & Baltes, 1986; Bandura, 1996; Haidt & Rodin, 1995; Heckhausen & Schulz, 1995; Little, in press; Lopez & Little, 1996; Skinner, 1995) geht die vorliegende Arbeit davon aus, daß subjektive Kontrollüberzeugungen einen wichtigen Beitrag zur Regulierung von sowohl positiver als auch negativer Emotionalität leisten. Allerdings ist der Zusammenhang zwischen subjek-

tiver Kontrolle und emotionalem Wohlbefinden vermutlich komplex und durch die spezifischen Dimensionen dieser Konstrukte bestimmt.

Personen, die glauben, daß sie Kontrolle über erwünschte Ereignisse im Leben haben, setzen sich im allgemeinen höhere Ziele und zeigen mehr Ausdauer, wenn es darum geht, diese Ziele zu erreichen, als Personen, die dies weniger glauben (z.B. Bandura & Wood, 1989; Flammer, 1990; Locke & Latham, 1990; Skinner, 1995). Die Überzeugung von persönlicher Kontrolle über erwünschte Ereignisse wird aber vermutlich auch ganz unabhängig davon, ob man diese Ziele erreicht oder nicht, als positiv erlebt. Folglich sollte die wahrgenommene persönliche Kontrolle über erwünschte Ereignisse eine Ressource für das emotionale Wohlbefinden alter Menschen sein. Wahrgenommene soziale Kontrolle reflektiert Gefühle der Abhängigkeit von mächtigen anderen, die hauptsächlich im eigenen Interesse und weniger im Interesse des Betroffenen handeln (z.B. Levenson, 1981; Rotter, 1966, 1990; Smith & Baltes, 1996). Diese Facette subjektiver Kontrolle sollte deshalb ein Risikofaktor für das emotionale Wohlbefinden älterer Menschen sein. Persönliche Verantwortung für unerwünschte Ereignisse bezieht sich auf das Gefühl, unerwünschte Ereignisse im allgemeinen nicht beeinflussen zu können, und sollte deshalb auch ein Risikofaktor für emotionales Wohlbefinden darstellen (z.B. Peterson, Seligman, & Vaillant, 1988; Skinner, 1995; Sweeney, Anderson, & Bailey, 1986).

Ausgehend von einem Zweikomponentenmodell emotionalen Wohlbefindens stellt sich die Frage, ob positive und negative Emotionalität gleichermaßen von subjektiven Kontrollüberzeugungen bestimmt sind. Dieser Frage wurde in früheren Arbeiten keine Aufmerksamkeit geschenkt. Diesbezügliche Hypothesen können aber von der Forschung zu "Täglichen Sorgen und Freuden" abgeleitet werden (Neale, Hooley, Jandorf, & Stone, 1987; Reich & Zautra, 1983; Zautra & Reich, 1983; Zautra, Affleck, & Tennen, 1994). Diese Forschung hat gezeigt, daß sich positive Ereignisse auf das Erleben von positiven Emotionen auswirken, nicht aber auf das Erleben von negativen Emotionen. Negative Ereignisse scheinen hingegen vor allem eine Rolle für das Erleben von negativen Emotionen zu spielen, nicht aber für das Erleben von positiven Emotionen (Kennedy-Moore, Greenberg, Newman, & Stone, 1992; MacLeod, Byrne, & Valentine, 1996). Überträgt man diese Befunde auf den Bereich der Kontrollüberzeugungen, sollte sich persönliche Kontrolle über *erwünschte* Ereignisse vor allem auf das Erleben von positiven Emotionen auswirken. Persönliche Verantwortung für *unerwünschte* Ereignisse sollte hingegen vor allem zu negativen Emotionen führen.

Zusammenfassend werden folgende Hypothesen aufgestellt: (a) Persönliche Kontrolle über erwünschte Ereignisse geht mit einer Erhöhung von positiver Emotionalität einher. (b) Persönliche Verantwortung über unerwünschte Ereignisse führt zu einer Erhöhung von negativer Emotionalität. (c) Wahrgenommene soziale Kontrolle über erwünschte und unerwünschte Ereignisse führt zu einer Erhöhung von negativer Emotionalität und zu einer Verringerung von positiver Emotionalität. Diese Hypothesen werden sowohl querschnittlich als auch längsschnittlich untersucht.

(4) *Wird die Wirksamkeit von Persönlichkeit durch altersbezogene Verluste verstärkt oder beeinträchtigt?* In vielen Arbeiten wird die altersbezogene Stabilität subjektiven Wohlbefindens mit der Annahme erklärt, daß die meisten alten Menschen ein Persönlichkeitsprofil haben, welches sie vor den Auswirkungen altersbezogener Verluste schützt, indem diese abgemildert oder kompensiert werden (z.B. Brandtstädter & Rothermund, 1994; Freund, 1995; Kunzmann, Staudinger, Little, & Smith, 1996; Staudinger, Freund, Linden, & Maas, 1996). Eine Frage, die sehr viel seltener untersucht wurde, ist, ob sich die Funktionsfähig-

keit der Persönlichkeit alter Menschen angesichts von Verlusten und Bedrohungen verändert. Verstärkt oder vermindert sich die Wirkungsweise der Persönlichkeit angesichts von altersbezogenen Verlusten? Das Stabilitätsparadox subjektiven Wohlbefindens legt nahe, daß die Effektivität persönlichkeitsbezogener Ressourcen nicht geringer wird und sich vielleicht sogar noch erhöht, wenn alte Menschen von Verlusten und Bedrohungen betroffen sind. Diese Arbeit untersucht die Frage, ob sich die Effektivität von subjektiven Kontrollüberzeugungen bei der Regulierung emotionalen Wohlbefindens in Abhängigkeit von Einschränkungen in der funktionellen Gesundheit verändert. Somit beschäftigt sich diese Arbeit nicht nur mit den linearen Einflüssen funktioneller Gesundheit und subjektiver Kontrolle auf emotionales Wohlbefinden, sondern auch mit den interaktiven Effekten dieser beiden Einflußgrößen.

In der Literatur zu subjektiven Kontrollüberzeugungen wurden zwei Modelle vorgeschlagen, die für die vorliegende Fragestellung relevant sind: das sogenannte Realitäts-Fit-Modell (z.B. Baumeister, 1989; Colvin & Block, 1994; Heckhausen & Schulz, 1995; Skinner, 1995) sowie das Modell positiver Illusionen (z.B. Alloy & Clements, 1992; Taylor & Brown, 1988, 1994). Beide Modelle gehen davon aus, daß die Wirksamkeit oder Adaptivität subjektiver Kontrollüberzeugungen von der objektiv vorhandenen Kontrollkompetenz eines Menschen bestimmt wird. Das Realitäts-Fit-Modell postuliert, daß subjektive Kontrollüberzeugungen dann am adaptivsten sind, wenn sie der objektiven Kontrollkompetenz einer Person angepaßt sind. Somit sollte beispielsweise die wahrgenommene persönliche Kontrolle über erwünschte Ereignisse weniger adaptiv sein, wenn ein alter Mensch durch gesundheitliche Verluste so stark betroffen ist, daß seine objektive Kontrollkompetenz sehr eingeschränkt ist. Diese Überzeugung ist dann nicht mehr realistisch und entsprechend dem Realitäts-Fit-Modell dysfunktional. Das Modell positiver Illusionen geht vom Gegenteil aus: Gerade wenn alte Menschen eine geringe Kontrollkompetenz besitzen, wenn sie beispielsweise von vielen Verlusten betroffen sind, sollten sie ihr Potential und ihre Möglichkeiten optimistisch einschätzen, selbst wenn dieser Optimismus illusorisch ist.

Die vorliegende Arbeit kommt nach einer Durchsicht der empirischen Literatur zu dem Schluß, daß die Fehleinschätzung von Kontrolle nur in einigen, wenigen Situationen adaptiv sein kann, vor allem in solchen Situationen, in denen nicht viel auf dem Spiel steht, in Situationen also, die hinsichtlich der Konsequenzen für das tägliche Leben ungefährlich sind. Im allgemeinen scheint es jedoch adaptiv zu sein, seine Kontrollkompetenzen richtig einzuschätzen. Dies wurde in einer Reihe von Feldstudien bestätigt (z.B. Christensen, Turner, Smith, Holman, & Gregory, 1991; Helgeson, 1992; Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Cruzen, 1993).

Davon ausgehend, daß der funktionelle Gesundheitszustand eines alten Menschen als Proxivariable für die objektive Kontrollkompetenz angesehen werden kann, werden in Anlehnung an das Realitäts-Fit-Modell die folgenden drei interaktiven Hypothesen aufgestellt: (a) Da persönliche Kontrolle über erwünschte Ereignisse für alte Personen mit wenigen gesundheitsbedingten Einschränkungen realistischer ist, sollten diese in emotionaler Hinsicht mehr von dieser Überzeugung profitieren als sehr eingeschränkte alte Menschen. (b) Da persönliche Verantwortung für unerwünschte Ereignisse für alte Menschen mit vielen Einschränkungen in der funktionellen Gesundheit realistischer ist, sollte diese Kontrollüberzeugung für das emotionale Wohlbefinden dieser Menschen weniger unvorteilhaft sein als für gesunde Menschen. (c) Da wahrgenommene soziale Kontrolle für alte Menschen mit vielen Einschränkungen in der funktionellen Gesundheit realistischer ist, sollte diese Kontrollüber-

zeugung für das emotionale Wohlbefinden dieser Menschen ebenfalls weniger unvorteilhaft sein als für gesunde Menschen.

Die Hypothesen dieser Arbeit wurden im Rahmen der Berliner Altersstudie (BASE) überprüft. BASE ist eine multidisziplinäre, längsschnittliche Studie mit alten und sehr alten Menschen (Mayer & Baltes, 1996). Die erste Erhebungswelle, which took place between 1990 and 1993, basierte auf einer heterogenen, nach Alter und Geschlecht stratifizierten Stichprobe von 516 alten und sehr alten Berlinern (M = 84.91 Jahre; SD = 8.66; *Altersbereich* = 70–103). 206 Teilnehmer der ersten Untersuchungswelle nahmen an den Datenerhebungen der zweiten Welle teil, die ungefähr vier Jahre später stattfand (M = 3.77 Jahre; *Zeitspanne* = 2.37–5.18). Diese Studie bezieht sich auf die Daten der ersten und zweiten Erhebungswelle. Die Hypothesen wurden durch die Berechnung querschnittlicher und längsschnittlicher Strukturgleichungsmodelle geprüft.

Die Ergebnisse dieser Studie bestätigen das von Watson und Tellegen (1985) vorgeschlagene Zweikomponentenmodell emotionalen Wohlbefindens. Positive Emotionen und negative Emotionen bildeten zwei voneinander unabhängige Emotionsdimensionen. Dies ist ein erster Hinweis darauf, daß positive und negative Emotionalität getrennt betrachtet werden sollten. Die Ergebnisse bestätigten auch, daß die beiden Komponenten emotionalen Wohlbefindens multikausal sind. Einschränkungen in der funktionellen Gesundheit und wahrgenommene Kontrolle wirkten sich differentiell auf positive und negative Emotionen aus. Das ist ein weiterer Hinweis auf die Sinnhaftigkeit, die beiden Komponenten emotionalen Wohlbefindens getrennt zu konzeptualisieren.

Die Effekte funktioneller Gesundheitseinschränkungen auf emotionales Wohlbefinden. Gemäß der Vorhersage dieser Arbeit, zeigten Einschränkungen in der funktionellen Gesundheit einen negativen Zusammenhang zu positiver Emotionalität (r = –.40). Gesundheitliche Einschränkungen klärten also 16 Prozent der Varianz in positiver Emotionalität auf. Dieser querschnittliche Effekt erwies sich als ausgesprochen robust, er blieb auch nach der Kontrolle einer Vielzahl von alternativen Prädiktoren positiver Emotionalität bestehen (z.B. Geschlecht, Bildung, Bewältigungsstile, Aktivitätsniveau, Zufriedenheit mit sozialen Beziehungen).

Die längsschnittlichen Analysen ergaben, daß Einschränkungen in der funktionellen Gesundheit auch längerfristige Veränderungen in positiver Emotionalität über das Zeitintervall von durchschnittlich 3.77 Jahren vorhersagen. Für Personen mit vielen Einschränkungen war die Abnahme positiver Emotionalität wahrscheinlicher als für Personen mit wenigen Einschränkungen. Gesundheitliche Einschränkungen klärten 15 Prozent der Veränderungsvarianz in positiver Emotionalität auf. Diese quer- und längsschnittlichen Befunde sind ein Hinweis auf die Grenzen der Anpassungsfähigkeit an alterstypische Verluste und Bedrohungen (Smith & Baltes, 1996). Das Erleben von positiven Emotionen scheint ein relativ schwer zu erreichendes Kriterium psychologischer Anpassung an funktionelle Gesundheitseinschränkungen zu sein. Die interindividuellen Differenzen in funktionellen Gesundheitseinschränkungen waren von beträchtlicher Stabilität (r = .80). Es verwundert daher nicht, daß kein Hinweis für die Bestätigung der Hypothese gefunden wurde, daß differentielle Veränderungen in funktioneller Gesundheit mit differentiellen Veränderungen in positiver und negativer Emotionalität einhergehen.

Entgegen der Annahme ergaben die quer- und längsschnittlichen Analysen keinen Zusammenhang zwischen Einschränkungen in der funktionellen Gesundheit und negativer Emotionalität. Dieser Befund wurde durch zwei Folgeanalysen qualifiziert: (a) Das Alter unterdrückte die aversiven Konsequenzen funktioneller Gesundheitseinschränkungen auf negative

Emotionalität. Dieses Ergebnis deutet darauf hin, daß Einschränkungen in der funktionellen Gesundheit, die über ein altersnormatives Maß hinausgehen, mit dem vermehrten Erleben von negativen Emotionen verbunden sind. (b) In einer Gruppe von jungen Alten führten funktionelle Gesundheitseinschränkungen zum vermehrten Erleben von negativen Emotionen, nicht aber in einer Gruppe von alten Alten. Dieses Ergebnis ist als ein Hinweis zu verstehen, daß sich die emotionale Wichtigkeit altersbezogener Gesundheitseinschränkungen im hohen Alter verändert und möglicherweise geringer wird.

In der Diskussion werden zwei Erklärungsansätze für die differentiellen Effekte von Gesundheitseinschränkungen auf die beiden Komponenten emotionalen Wohlbefindens erörtert. Zum einen wird ein Modell vorgeschlagen, daß zwei Gruppen von Konsequenzen altersbedingter Verluste annimmt: Limitationen in der Interaktion mit der Umwelt und negative Selbstbewertungen. Diese beiden Konsequenzen könnten differentiell auf positive und negative Emotionalität wirken. Zum anderen werden Bewältigungsmodelle (Brandtstädter & Greve, 1994; Heckhausen & Schulz, 1995) dahingehend geprüft, ob die Bewältigung der Auswirkungen altersbedingter Verluste auf positive Emotionen weniger erfolgreich sein könnte als die Bewältigung der Auswirkungen altersbedingter Verluste auf negative Emotionen.

Die Effekte subjektiver Kontrollüberzeugungen auf emotionales Wohlbefinden. Die Ergebnisse bestätigten die Vorhersage, daß subjektive Kontrollüberzeugungen einen wichtigen Beitrag zum emotionalen Wohlbefinden alter Menschen beisteuern. Zusammen klärten die drei untersuchten Dimensionen subjektiver Kontrolle 17 Prozent der Varianz in positiver Emotionalität und 10 Prozent der Varianz in negativer Emotionalität auf. Auch die Zusammenhänge zwischen Kontrollüberzeugungen und den beiden Komponenten emotionalen Wohlbefindens erwiesen sich als robust, wenn für alternative Prädiktoren kontrolliert wurde.

Die interindividuellen Differenzen in den drei Kontrollüberzeugungen waren relativ instabil (zwischen $r = .50$ und $r = .57$). Dies könnte ein Grund dafür sein, daß sie keine längerfristigen differentiellen Veränderungen in positiver oder negativer Emotionalität vorhersagten. Hypothesenkonform waren aber differentielle Veränderungen in den drei Kontrollüberzeugungen mit differentiellen Veränderungen in beiden Komponenten emotionalen Wohlbefindens verbunden.

Wie vorhergesagt, war der Zusammenhang zwischen Kontrollüberzeugungen und emotionalem Wohlbefinden komplex. Somit können keine generellen Aussagen wie etwa "subjektive Kontrolle ist adaptiv" oder "subjektive Kontrolle ist dysfunktional" gemacht werden. Hypothesenkonform ergaben die quer- und längsschnittlichen Analysen, daß persönliche Kontrolle über erwünschte Ereignisse eine Ressource für emotionales Wohlbefinden ist. Im Gegensatz hierzu—und ebenfalls wie erwartet—erwies sich die wahrgenommene soziale Kontrolle als Risikofaktor.

Die Befunde hinsichtlich der Adaptivität persönlicher Verantwortung für unerwünschte Ereignisse waren weniger eindeutig. Gemäß der Vorhersage zeigten die querschnittlichen Analysen, daß *persönliche Verantwortung für unerwünschte Ereignisse* mit erhöhter negativer Emotionalität einhergeht. Allerdings deuten Folgeanalysen darauf hin, daß die Auswirkungen dieser Facette subjektiver Kontrolle von der Ressourcenverfügbarkeit abhängig sein könnten. Für Personen mit relativ vielen Ressourcen (z.B. hohe Bildung, guter allgemeiner Gesundheitsstatus, vorteilhaftes Persönlichkeitsprofil) scheint sich die Wahrnehmung von Verantwortung über unerwünschte Ereignisse nicht negativ auszuwirken, wohl aber für Personen, die über diese Ressourcen nicht oder in weniger großem Ausmaß verfügen.

Die längsschnittlichen Analysen ergaben, daß differentielle Veränderungen in persönlicher Verantwortung für unerwünschte Ereignisse mit differentiellen Veränderungen in positiver Emotionalität einhergehen. Für Personen, deren Überzeugung von persönlicher Verantwortung für unerwünschte Ereignisse sich über das Test-Retest Intervall erhöhte, war es relativ zu anderen Personen wahrscheinlicher, daß sie eine Zunahme in positiver Emotionalität erlebten. Es kann somit keine eindeutige Aussage gemacht werden, ob persönliche Verantwortung für negative Ereignisse ein Risikofaktor, ein neutraler Faktor oder eine Ressource für emotionales Wohlbefinden ist.

Die Ergebnisse bezüglich der Frage, ob Kontrollüberzeugungen differentielle Prädiktoren positiver und negativer Emotionalität darstellen, waren widersprüchlich. Die querschnittlichen Befunde entsprachen der Hypothese, daß persönliche Kontrolle über *erwünschte* Ereignisse hauptsächlich mit positiver Emotionalität einhergeht, während die Verantwortung für *unerwünschte* Ereignisse negative Emotionalität bestimmt. Die längsschnittlichen Befunde standen hingegen im Widerspruch zu dieser Hypothese. In der Diskussion dieser Arbeit werden Vorschläge gemacht, wie man die Definition und Operationalisierung der Dimensionen von subjektiver Kontrolle verbessern könnte, um zu eindeutigeren Ergebnissen zu gelangen. Des weiteren wird ein Prozeßmodell vorgeschlagen, das in zukünftigen Arbeiten überprüft werden sollte. Dieses Modell beschreibt aus einer handlungstheoretischen Perspektive verhaltensbezogene Mediatoren, welche die Effekte von Kontrollüberzeugungen auf positive und negative Emotionalität erklären könnten.

Die interaktiven Effekte funktioneller Gesundheitseinschränkungen und subjektiver Kontrolle. Die Hypothese, daß die Adaptivität subjektiver Kontrollüberzeugungen vom funktionellen Gesundheitszustand alter Menschen (einem Indikator für deren objektives Kontrollpotential) abhängig ist, wurde widerlegt. Die querschnittlichen und längsschnittlichen Analysen ergaben, daß die drei Dimensionen subjektiver Kontrolle emotionales Wohlbefinden unabhängig vom funktionellen Gesundheitsstatus regulieren. In der Diskussion dieses Befundes werden vier Faktoren erörtert, die ein hypothesenkonformes Ergebnis möglicherweise verhindert haben: (a) Funktionelle Gesundheit ist ein ungenauer Indikator für objektiv vorhandene Kontrollkompetenzen, (b) zur genaueren Bestimmung von objektiven Kontrollkompetenzen sind wiederholte Performanzmessungen notwendig, (c) ob generelle Kontrollüberzeugungen realistisch sind oder nicht, wird nicht nur von der objektiven Kontrollkompetenz bestimmt, sondern auch von den Zielen alter Menschen sowie (d) von Kompensationsmöglichkeiten der Umwelt.

Basierend auf den Ergebnissen dieser Studie wird ein Modell vorgeschlagen, welches die Annahmen des Realitäts-Fit-Modells und des Modells positiver Illusionen integriert. Dieses Modell geht davon aus, daß der Weg zu emotionalem Wohlbefinden nicht entweder darin liegt, möglichst realistisch zu sein, oder darin, möglichst optimistisch zu sein. Emotionales Wohlbefinden ist vielmehr dann am wahrscheinlichsten, wenn eine Person die ganze Spanne von realistischen bis positiv-illusorischen Überzeugungen gleichermaßen erleben kann. Der Schlüssel zu emotionalem Wohlbefinden liegt somit im Facettenreichtum wahrgenommener Kontrolle. Zukünftige Studien sollten der Frage nachgehen, ob alte Menschen von der Verfügbarkeit multipler Kontrollüberzeugungen profitieren.

Inwiefern tragen die Befunde dieser Arbeit zu einer Erklärung des Stabilitätsparadoxes subjektiven Wohlbefindens bei? Mit der empirisch bestätigten Unterscheidung zwischen positiver und negativer Emotionalität fügt die vorliegende Arbeit einen möglicherweise wichtigen, differenzierenden Aspekt zum Bild der altersbezogenen Stabilität subjektiven Wohlbefindens bei.

Die Stabilität angesichts altersbezogener Verluste gilt nach den Befunden dieser Arbeit zwar für negative, nicht aber für positive Emotionalität. Des weiteren konnte gezeigt werden, daß ein geringer Zusammenhang zwischen dem Lebensalter und subjektivem Wohlbefinden keineswegs ausschließt, daß negative Implikationen des Alters selbst einen substantiellen Beitrag zur Veränderung subjektiven Wohlbefindens leisten. Einschränkungen der funktionellen Gesundheit gehen mit einer Verringerung positiver Emotionalität einher. Schließlich konnte die Bedeutsamkeit der Persönlichkeit alter Menschen für das Erleben subjektiven Wohlbefindens demonstriert werden. Am Beispiel subjektiver Kontrollüberzeugungen wurde gezeigt, daß positive und negative Emotionalität maßgeblich von generellen Überzeugungssystemen alter Menschen bestimmt werden. Die Befunde dieser Arbeit zeigen, daß objektive und subjektive Kontrolle gleichermaßen wichtige Einflußfaktoren für das emotionale Wohlbefinden alter Menschen sind.

Introduction

The maintenance and regulation of subjective well-being—such as positive affect, happiness, or life satisfaction—has often been described as a salient motivational force and important concern in life, particularly in old and very old age (e.g., Baltes & Baltes, 1990; Carstensen, 1991; Freund, 1995; Labouvie-Vief, Hakim-Larson, DeVoe, & Schoeberlein, 1989; Smith, Fleeson, Geiselmann, Settersten, Nitsche, & Kunzmann, 1996; Staudinger et al., 1995). The present study aims at providing some insights into the potential challenges and risks for subjective well-being in old age as well as into some of the potential resources that serve to protect subjective well-being in this life period.

In the gerontological literature, old age is portrayed as a period of life characterized by multiple losses that frequently occur simultaneously or within a short period of time (e.g., Baltes, 1991; Baltes & Baltes, 1990; Finch, 1990; Fries, 1990; Mayer & Baltes, 1996; Schaie, 1989). Negative events, such as the death of a spouse or friend (Lee & Markides, 1990; Palmore, 1981) or declines in physical health and physical functioning (Manton, 1990), all become increasingly prevalent in late life. Given this negative view, the question arises whether it is particularly difficult to maintain subjective well-being in the last period of life. Are older individuals more vulnerable to decline in subjective well-being compared to younger individuals? Is the multitude of age-related losses reflected in the subjective well-being of older individuals?

Surprisingly, only small correlations between age and subjective well-being have been found. A number of empirical results suggest that subjective well-being may show stability well into the last phase of life (George et al., 1977; Herzog & Rogers, 1981; Horley & Lavery, 1995; Larson, 1978; Stock et al., 1983). This absence of strong relationships between age and subjective well-being, despite an increase in risks and potential losses with advancing age, has been labeled a "paradox" (P. B. Baltes, 1993; Baltes & Baltes, 1990; Brandtstädter & Greve, 1994; Filipp, 1996; Staudinger et al., 1995). How can one account for the seemingly counterintuitive, paradoxical finding of stable levels of subjective well-being despite subjective and objective losses in functioning? Five complementary approaches to explain the stability-despite-loss paradox of subjective well-being have been advanced in the gerontological literature and are central to the present study.

Five Approaches to the Stability-Despite-Loss Paradox of Subjective Well-Being

First hypothesis: The paradox exists for some but not for all indicators of subjective well-being. That is, although some dimensions of subjective well-being may be influenced by age-associated losses, others might be less vulnerable. Subjective well-being is usually defined as a broad and multidimensional construct consisting of many different facets, such as life satisfaction, positive affect, happiness, and morale. However, most empirical studies that have investigated age-

related changes in subjective well-being have not differentiated between the various dimensions. To date, therefore, it is largely an open question as to whether individual components of subjective well-being show different age-related trends and different degrees of sensitivity to age-related losses. In other words, it has yet to be investigated whether the stability-despite-loss paradox exists for all components of subjective well-being in the same way and to the same degree.

Some empirical findings suggest, for example, that the experience of negative emotions (e.g., anger, anxiety, or sadness) is either stable or decreases in old age (e.g., Costa, McCrae, & Zonderman, 1987; Ferring & Filipp, 1995; Malatesta & Kalnok, 1984; Shmotkin, 1990; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). This stability or even improvement in negative affect is consistent with the stability-despite-loss paradox of subjective well-being. However, the experience of positive emotions (e.g., pride, interest, or enthusiasm) also shows a negative age gradient in late life (Ferring & Filipp, 1995; Filipp, 1996; Shmotkin, 1990; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). The decline in positive affect suggests that the stability-despite-loss paradox may exist only in part and is probably restricted to the more cognitive and negative emotional components of subjective well-being.

Second hypothesis: The paradox is less marked in individuals in the very last life phase. In other words, stronger age-related declines in subjective well-being may appear in advanced old age (i.e., in individuals beyond 80 years). To date, most empirical findings are based on the study of what a World Health Organization expert committee (1989) has called the "young old," covering the age range of approximately 60 to 80 years. Current evidence about the "old old" (beyond 80 years of age) is very limited. Given the sharp increases in losses and decline in very old age, the stability-despite-loss paradox may not emerge when individuals over 80 are investigated. Consistent with theoretical propositions about a "fourth age" and the incomplete architecture of lifespan development (Baltes, 1997; Smith & Baltes, 1997), the oldest old may have a distinct and less desirable psychological and social profile that causes accelerated decline in subjective well-being. This hypothesis is in need of investigation, given that very few studies have examined the very old.

Third hypothesis: The paradox is less pronounced when older individuals are investigated longitudinally. One limitation of almost all studies focusing on subjective well-being in older people is their cross-sectional design. At least three problems arise when examining stability and change of subjective well-being cross-sectionally. First, the cross-sectional method does not get at *intra*individual change (Baltes, Cornelius, & Nesselroade, 1978; Baltes, Mayer, Helmchen, & Steinhagen-Thiessen, 1996). Cross-sectional studies focus on the correlation of subjective well-being with chronological age or on mean-level differences between age groups. The absence of age-related differences in mean level does not, however, exclude the existence of systematic age-related *intra*individual change (Baltes, Reese, & Nesselroade, 1978; Nesselroade, 1988, 1990, 1991). High mean level stability is, for example, consistent with low covariance stability. In fact, the small number of longitudinal studies investigating subjective well-being suggests that people show considerable individual differences in *intra*individual change patterns (e.g., Brief, Butcher, George, & Link, 1993; Costa et al., 1987; Headey & Wearing, 1989, 1991). Thus, although there is some indication that subjective well-being (e.g., the experience of negative emotional states) shows stability on a group level, other evidence suggests that aging people vary greatly regarding the amount of *intra*individual change in subjective well-being. Low to moderate covariance stabilities over several years suggest that the stability-despite-loss paradox might exist for some but not for all aging people.

A second limitation of cross-sectional studies is the impossibility of taking into account selective mortality—the phenomenon that not all individuals of a given cohort are equally likely to survive. One can, for example, easily imagine that individuals experiencing high subjective well-being live longer than individuals low in subjective well-being. One reason for this relationship might be that high subjective well-being may function as a protective buffer against the stress associated with the multiple losses accompanying old age. If the relationship between subjective well-being and survival is, in fact, positive (more individuals of a given cohort with high subjective well-being survive), the outcome is positive selection.[1] This positive selection process would produce an age-related (artificial) stability or even an increase in subjective well-being in cross-sectional data. How to control adequately for survival effects is a problem (e.g., Baltes et al., 1978; Kruse, Lindenberger, & Baltes, 1993), but it is obvious that longitudinal information about the cohort population is required.

A third problem of cross-sectional studies is that age and cohort effects are confounded. The absence of age-related group differences in subjective well-being may in part be due to differences between cohorts, obscuring age-associated changes (Baltes, 1968; Baltes et al., 1978; Schaie, 1996). It might well be that people from older cohorts experience higher subjective well-being than do people from younger cohorts. It is, for example, conceivable that older cohort members are protected against decline in subjective well-being by their stronger attachment to traditions and institutions (e.g., religion, nation, or family) that provide an orienting system of meanings (see Brandtstädter & Greve, 1994). If age-related declines in subjective well-being were present, they would be underestimated when comparing age-cohort groups. Obviously, to explore the relative importance of cohort differences in age-related change functions of subjective well-being, longitudinal studies involving multiple cohorts—cohort-sequential designs—are best suited (e.g., Baltes, 1968; Baltes et al., 1978; Schaie, 1996).

To summarize, longitudinal studies may reveal that the stability-despite-loss paradox only exists for some rather than for all aging people. Moreover, the effects of two factors that may partly be responsible for the low cross-sectional relationship between age and subjective well-being can be estimated in longitudinal studies involving multiple cohorts: positive selection (i.e., more individuals of a given cohort with high subjective well-being survive) and cohort differences (i.e., older cohort members may be better protected against decline in subjective well-being than younger ones).

Fourth hypothesis: The paradox is less pronounced if age-associated risk factors are examined instead of chronological age. Subjective well-being may decline in individuals experiencing age-related losses but not necessarily in individuals "simply" getting older. In many studies, chronological age is used as a proxy variable for all the risks linked to old age. However, age per se, is an imprecise indicator of risks. Not all aging people are confronted by all the risks associated with late life. Moreover, not all aging people encounter more losses than they experienced at earlier ages. Furthermore, for some individuals, the last phase of life encompasses more than just loss and depletion of resources; gains and positive events are also noticeable. For example, Jeanne Calment, who was the oldest woman in the world, received the right to vote—which

[1] If the relationship between subjective well-being and survival is negative (more individuals with low subjective well-being survive) the outcome is negative selection.

she must have experienced as a gain—in 1945 when she was 70 years old (see also Baltes & Baltes, 1990; Carstensen & Freund, 1994; Heckhausen et al., 1989; Staudinger et al., 1995).

Given the heterogeneity of age, it is not surprising that it has been shown to be only weakly associated with subjective well-being. However, the multiple implications of old age itself—positive ones such as personal maturity and negative ones such as physical decline—may influence subjective well-being. While all the adaptive and good facets of old age (e.g., expertise, wisdom, or maturity) are likely to enhance subjective well-being, the less favorable implications of old age (e.g., losses of friends or poor health) may cause decline in subjective well-being. Seen in this light, if it were possible to get older without experiencing losses, old age would probably be associated with *increases* in subjective well-being. Disentangling age-associated gains from losses might reveal that a low association between age and subjective well-being does *not* contradict the sensitivity of subjective well-being to losses and negative events actually occurring in older individuals' lives.

Fifth hypothesis: The paradox is due to the self and personality, which serve to maintain subjective well-being in the face of age-related losses. Many researchers have argued that personality and self-related processes may be more important to subjective well-being than objectively diminished life conditions (e.g., Baltes, 1991; Brandtstädter & Greve, 1994; Brim, 1992; Filipp, 1996; Heckhausen & Schulz, 1995; Myers & Diener, 1995; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996; Staudinger et al., 1995). Contrary to more biologically determined processes and functions, personality traits and self-related characteristics show much stability and even age-related growth. This pattern has, for example, been shown for control beliefs such as perceived personal control (e.g., Aldwin, 1991; Lachman, 1986), adaptive coping strategies such as flexible perspective taking or goal adjustment (e.g., Brandtstädter, Wentura, & Greve, 1993; Heckhausen & Schulz, 1995; McCrae, 1982; Staudinger & Fleeson, 1996), and favorable personality traits such as extraversion or openness to new experiences (Costa & McCrae, 1980, 1988; Costa, McCrae, & Arenberg, 1980).

Assuming that personality characteristics function equally well over the lifespan, they may facilitate coping with age-related losses. As a consequence, the unfavorable implications of losses, such as decline in health and cognitive functioning, may be lessened or even neutralized (e.g., Brandtstädter & Greve, 1994; Heckhausen & Schulz, 1995). One explanation of the stability-despite-loss paradox may be that the functioning of personality characteristics is responsible for maintaining subjective well-being in the face of the many age-related losses.

The Present Study

The present study is embedded in an ongoing interdisciplinary, longitudinal study on old age and aging—the Berlin Aging Study (BASE; Mayer & Baltes, 1996). The first wave of data collection, which took place between 1990 and 1993, involved a heterogeneous sample, stratified by age and sex, comprised of 516 individuals aged between 70 and 103 years. 206 members of this sample participated in the longitudinal study which took place approximately four years later.

Using cross-sectional and longitudinal data, this study aims at providing some answers regarding the five hypotheses about the stability-despite-loss paradox of subjective well-being that were outlined above. Explanations for stability and change in two emotional components of subjective well-being are investigated, namely, in positive and negative affect. Although the

terms positive affect and negative affect might suggest that these two dimensions are opposites, they have in fact emerged as being highly distinctive (i.e., orthogonal; e.g., Bradburn, 1969; Costa & McCrae, 1980; Diener & Larsen, 1993; Lawton, 1983; Watson & Tellegen, 1985). Does the stability-despite-loss paradox exist for positive and negative affect or is it restricted to only one of these dimensions? In order to answer this question, the present study investigates the two dimensions of emotional well-being separately.

Two complementary ideas regarding the stability-despite-loss paradox of subjective well-being are the focus of this study: (a) The age-related stability of subjective well-being may be less paradoxical than is often posited because even old age is a heterogeneous carrier variable for both negative *and* positive events, and (b) part of the age-related stability of subjective well-being may be due to the functioning of older people's personality. In order to investigate these ideas, this study examines two sources of stability and change in positive and negative affect: constraints in functional health and, as examples of older people's personality, generalized beliefs about control. The separate and interactive effects of these two factors potentially contributing to emotional well-being are investigated.

(1) *The effects of constraints in functional health on older people's emotional well-being.* Although a heterogeneous variable such as age may show only small relationships to emotional well-being, age-related losses and adverse events may have considerable negative consequences. The present study is concerned with a negative health-related implication of old age, namely, constraints in functional health. Three facets of functional health constraints are examined: constraints in vision, hearing, and mobility. Given that these constraints potentially have widespread and adverse consequences for older people's lives (e.g., Lawton, 1983; Marsiske et al., 1996; Richtberg, 1990; Tesch-Römer & Wahl, 1996), they should be associated with low positive affect and high negative affect.

(2) *The role of personality in regulating emotional well-being.* Understanding stability and change in older people's emotional well-being requires investigating the functioning of personality. It is often assumed that the personality of older people is as important to feelings of emotional well-being as are objective life conditions (e.g., Baltes, 1991; McCrae & Costa, 1991; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996; Staudinger et al., 1996). As examples of older people's personality, this study investigates three dimensions of generalized control beliefs: personal control over desirable outcomes (e.g., "I can make sure that good things come my way"), personal responsibility for undesirable outcomes (e.g., "If there are problems in my life, then they are my own doing"), and perceived others' control over desirable and undesirable outcomes (e.g., "I depend on others to ensure that there are no problems in my life").

Following earlier research (e.g., Baltes & Baltes, 1986; Bandura, 1996; Haid & Rodin, 1995; Heckhausen & Schulz, 1995; Lopez & Little, 1996), generalized perceptions of control should be important contributors to older people's positive and negative affect. However, the relationship between perceived control and emotional well-being is presumably complex. Feelings of personal control over desirable outcomes most likely are associated with high motivation and persistence in achieving goals (e.g., Bandura, 1989; Bandura & Wood, 1989; Flammer, 1990; Locke & Latham, 1990; Skinner, 1995). In addition, beliefs in personal control over desirable outcomes can be assumed to be pleasant in themselves. As a consequence, personal control over desirable outcomes should be a resource for emotional well-being. Perceived others' control, as operationalized in the present study, reflects the perception that one is dependent on powerful others who primarily act to fulfill their own needs and do not neces-

sarily care about one's own needs (Smith & Baltes, 1996). This facet of perceived control should be a risk factor for emotional well-being. The present definition of personal responsibility for undesirable outcomes most likely implies personal failure and inability to prevent undesirable outcomes. Thus, personal responsibility for undesirable outcomes should also be a risk factor for older people's emotional well-being (e.g., Peterson et al., 1988; Skinner, 1995; Sweeney et al., 1986).

(3) *Does the importance of personality change in the face of age-related losses?* Many researchers argue that older people may possess personality profiles that serve as protective shields in the face of age-related losses. Consistent with this idea, earlier research has shown that personality factors mitigate or even neutralize the unfavorable effects of age-associated losses (Brandtstädter & Rothermund, 1994; Freund, 1995; Kunzmann et al., 1996; Staudinger et al., 1996). A question that has less often been studied is whether the functioning of personality factors changes when older people face age-related losses. The present study addresses this question. The discussion centers on whether the functioning of the three dimensions of perceived control (i.e., examples of personality) depends on constraints in functional health (i.e., an example of age-related losses). Is the functioning of perceived control more or less effective in the face of functional health constraints? Two hypotheses can be advanced that are consistent with the stability-despite-loss paradox of subjective well-being: (a) The generally adaptive facets of perceived control (i.e., resources such as personal control over desirable outcomes) should be equally or even more effective in regulating emotional well-being, when older people face major functional health constraints; and (b) in the face of functional health constraints, the generally dysfunctional facets of perceived control (i.e., risk factors such as perceived others' control) should not become more harmful or might even become less harmful.

Based on earlier research on the adaptivity of perceived control (e.g., Bandura, 1989; Baumeister, 1989; Colvin & Block, 1994; Heckhausen & Schulz, 1995; Skinner, 1995; Thompson, 1993), the present study investigates the following proposition: Although the generally adaptive facet of perceived control (i.e., personal control over desirable outcomes) may become less favorable in the face of functional health constraints, the generally dysfunctional facets (i.e., perceived others' control and personal responsibility for undesirable outcomes) should become less dysfunctional.

This proposition is derived from a reality-fit model of perceived control (e.g., Bandura, 1996; Baumeister, 1989; Colvin & Block, 1994; Skinner, 1995). This model states that perceived control is most adaptive when it is congruent with people's objective control competencies. The functional health status of older people can be considered a proxy variable for the objective control competence they possess. Assuming that personal control over desirable outcomes is more realistic for healthy older people (i.e., for older people with high control competencies) than for those in poor functional health, following the reality-fit model, this facet of perceived control is also more adaptive for healthy people than for functionally impaired people. In contrast, assuming that perceived others' control and personal responsibility for undesirable outcomes are more realistic in older individuals with poor functional health (i.e., for older people with low control competencies), these two facets of perceived control should be less dysfunctional in those individuals.

Overview of the Theoretical Considerations

The hypotheses of the present study are derived from a review of the relevant literature in four scientific fields. That is, research on subjective well-being, research on risk factors and resources in general, research on the effects of health on emotional well-being, and research on the adaptivity of perceived control.

The *first section* of the theoretical considerations (see Section "The Concept of Emotional Well-Being") relates emotional well-being to the broader and superordinate construct, subjective well-being. Thereafter, more specific questions about the definition of emotional well-being will be discussed. Finally, the implications of defining emotional well-being in terms of positive and negative affect for studying risk factors and resources are outlined. The *second section* (see Section "Some General Remarks About Resources and Risk Factors") provides a general framework for the study of risk factors and resources for older people's emotional well-being. One of the central conclusions of this chapter is that resources and risk factors may be context, outcome, and time specific. The *third section* (see Section "Poor Functional Health: A Risk Factor for Emotional Well-Being in Old Age?") introduces poor functional health as a common risk factor for older people's emotional well-being. Based on theoretical considerations and empirical evidence, it is concluded that poor functional health is a risk factor for both low positive affect and high negative affect. The *fourth section* (see Section "Perceived Control: A Resource for Emotional Well-Being in Old Age?") focuses on the effects of perceived control on older people's emotional well-being. Perceived control is defined as a multidimensional construct. Based on theoretical and empirical investigations, it is concluded that perceived control can be viewed as resource or risk factor for emotional well-being, depending on the dimensions considered. While the third and fourth sections focus on the separate effects of functional health constraints and perceived control, the *fifth section* (see Section "The Interactive Effects of Functional Health Constraints and Perceived Control: Does the Adaptiveness of Perceived Control Depend on Functional Health Status?") addresses the combined effects of these two sources of emotional well-being. The discussion centers on the question whether the functional health status of older individuals may have an influence on the adaptiveness of perceived control. The theoretical considerations close with a general summary and conclusions derived from the literature.

Theoretical Considerations

The Concept of Emotional Well-Being

What do people mean when they report feeling emotionally well? What are the factors that produce change in emotional well-being, and what can a person do to maintain or enhance his or her emotional well-being? The present study focuses on the experience of emotional well-being in old age and examines two potential sources of both stability and change in emotional well-being in the last phase of life: functional health constraints and perceived control. As a first step in understanding the processes that underlie emotional well-being, a precise definition of this concept is critical.

Emotional Well-Being: A Central Facet of Subjective Well-Being

Emotional well-being is often viewed as a key facet of the broader and superordinate construct "subjective well-being" (e.g., Diener, 1984, 1994; George, 1981; Headey & Wearing, 1989, 1991; Horley, 1984; Ryff, 1989a; Veenhoven, 1991). Although there is general agreement that subjective well-being is more than *feeling* emotionally well, definitions of subjective well-being differ in how many and which other dimensions are also subsumed. Two broad scientific fields inform the conceptualization and measurement of subjective well-being: research on old age and aging and the social indicator research. In these two scientific fields, rather different definitions of subjective well-being have been developed. The most salient difference between disciplines in the definitions of subjective well-being is broadness or narrowness.

Definitions of subjective well-being that are prominent in gerontological research are usually relatively broad. In these definitions, subjective well-being comprises a wide range of distinct facets including—besides pleasurable feelings—such diverse concepts as good social relationships, purpose in life, personal growth, self-esteem, and everyday competence (e.g., Lawton, 1975; Neugarten, Havighurst, & Tobin, 1961; Ryff, 1989a, 1989b, 1989c; Ryff & Essex, 1991a). To gain insight into the meaning of subjective well-being in broad definitions, those proposed by Lawton (1972) and Neugarten, Havighurst, and Tobin (1961) are cited below. According to Lawton, subjective well-being can be described as follows:

> A basic sense of satisfaction with oneself (...) a feeling that there is a place in the environment for oneself (...) that people and things in one's life offer some satisfaction to the individual (...) a fit between personal needs and what the environment offers (...) (and) a certain acceptance of what cannot be changed. (p. 148)

Neugarten and her colleagues (1961) describe an older person who feels well as one who

> takes pleasure from whatever round of activities that constitute his everyday life; regards his life as meaningful and accepts responsibility for what his life has been; feels he has succeeded in achieving his major life goals; holds a positive self-image and regards himself as a worthwhile person, no matter what his present weaknesses may be; and maintains optimistic attitudes and moods. (p. 137)

Consistent with these definitions of subjective well-being, measures have been developed that attempt to assess this broad spectrum of subjective well-being dimensions. The most prominent measures are the Life Satisfaction Index (Neugarten et al., 1961), and the Philadelphia Geriatric Center Morale Scale (Lawton, 1972, 1975). More recently, Ryff (1989a) has developed a multidimensional measure of subjective well-being that also explicitly acknowledges the broadness of subjective well-being and is also commonly used in gerontological research.

As mentioned, broad definitions of subjective well-being are very popular in current gerontological research. However, these definitions have also been criticized by several researchers (e.g., Diener, 1984; Horley, 1984; Pavot, Diener, Colvin, & Sandvik, 1991; Stock, Okun, & Benin, 1986). The critics argue that there are several potential pitfalls in defining subjective well-being as synonymous with almost everything that is positive and potentially desirable. For example, this approach is likely to result in putative causes of subjective well-being being conceptualized as indicators of subjective well-being. To the extent that concepts such as cognitive processes (e.g., acceptance of the status quo) or personality traits (e.g., openness to experience) are sometimes conceptualized as causes of subjective well-being and other times are subsumed under the construct of subjective well-being itself, refinement of our understanding of subjective well-being is less likely.

Given the potential problem of broad conceptualizations of subjective well-being, an alternate approach is to restrict its indicators to a relatively narrow range of concepts. Narrow definitions of subjective well-being are most prominent in social and epidemiological surveys (e.g., Bradburn, 1969; Campbell et al., 1976; Veenhoven, 1991). In this research context, a distinction has been drawn between cognitive and emotional judgments of one's life quality. Specifically, it is proposed that subjective well-being comprises one cognitive dimension, often labeled as life satisfaction, and two emotional dimensions, characterized as positive and negative affect. Life satisfaction is typically assumed to be based on a cognitive evaluation process of whether the life a person leads corresponds to his or her expectations and goals. In contrast, the emotional side of subjective well-being is generally believed to be more spontaneous. A person who feels emotionally well is believed to frequently experience positive emotions and seldom experience negative ones over time (e.g., Bradburn, 1969; Diener & Larsen, 1993; Headey & Wearing, 1991; Stock et al., 1986; Veenhoven, 1991).

This narrow definition of subjective well-being allows researchers to investigate personality characteristics and life circumstances as precursors, concomitants, and consequences that are conceptually distinct from the concept of subjective well-being itself. Given this advantage, narrow definitions of subjective well-being, originally developed in social indicators research, become more and more prevalent in research on old age and aging (e.g., Kercher, 1992; Lawton, Kleban, & Dean, 1993; Lawton, Kleban, Dean, Rajagopal, & Parmelee, 1992; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). The present dissertation is also in the tradition of narrow definitions of subjective well-being. Specifically, this study focuses on the two emotional components of subjective well-being—positive and negative affect. Questions about defining and measuring these two components of subjective well-being are elaborated below.

Defining Emotional Well-Being as Positive and Negative Affect

Individuals usually experience a wide range of feelings in their everyday lives. Sometimes they are happy, feel interested, or are enthusiastic and excited. On the other hand, certainly every person can remember times and situations that were characterized by feelings of unhappiness, depression, sadness, or anxiety. Emotional well-being is usually defined by the presence of positive feelings (e.g., pride, interest, or happiness) and the absence of negative feelings (e.g., sadness, anger, or anxiety). Three aspects of definitions of emotional well-being deserve special mention; these are elaborated below.

Positive and Negative Affect Constitute Two Dimensions of Emotional Well-Being Rather Than One Bipolar Dimension

Although the terms positive affect and negative affect might suggest that these two aspects of emotional well-being are opposites (i.e., strongly negatively correlated), they have in fact emerged as distinctive dimensions (e.g., Bradburn, 1969; Diener & Emmons, 1985; Kercher, 1992; Watson & Tellegen, 1985). One implication of this two-component model is that knowledge of a person's standing on one component does not help to predict his or her position on the other: A person can be high on both positive and negative affect, low on both components, or low on one component and high on the other.

Because the two dimensions of emotional well-being are independent of one another, Bradburn (1969) suggested that the difference between positive and negative affect might be a good indicator of a person's general well-being. However, combining positive and negative affect presents two problems. First, a difference score of emotional well-being ignores *absolute* levels, and focuses only on the *ratio* of positive over negative affect. An example may make this problem clearer. Consider one person who rarely experiences any emotions at all and another person who very often experiences both positive and negative affect. One would expect differences between these two that make unlikely their both being equally well. However, according to the emotional difference index, both these people would be considered as being equally happy.

Second, many types of experience relate only to one dimension of emotional well-being and influence the sense of emotional well-being only through that one. If the difference between positive and negative affect is used as an indicator of emotional well-being, it would not be possible to reveal such differential effects. For example, if one found a negative association between poor health and affect balance (i.e., the ratio of positive affect over negative affect), this association could be due to three underlying health effects: Poor health might have led (a) to lowered positive affect, (b) to heightened negative affect, or (c) to both. Given these two problems, it appears most useful to conceptualize the two components of emotional well-being—positive and negative affect—separately. This two-component conceptualization allows researchers to investigate more differentiated questions about patterns of emotional well-being and about precursors, concomitants, and consequences.

Emotional Well-Being Research Focuses on General Emotion Dimensions

Following the tradition of dimensional theories of emotion (e.g., Russell, 1980; Russell, Lewicka, & Niit, 1989), emotional well-being researchers typically assume that specific emotions (e.g., happiness, surprise, anger, satisfaction, love, or depression) can be economically

described by two underlying dimensions—positive and negative affect. As Bradburn (1969) pointed out:

> Underlying our strategy (...) is the assumption that people tend to code their experiences in terms of (among other things) their affective tone—positive, neutral, or negative. For our purposes, the particular content of the experience is not important. We are concerned with the pleasurable or unpleasurable character associated with the experience. (p. 54)

It is typically assumed that situations that produce a negative emotion (such as fear) also often produce other negative emotions (such as anger or anxiety). Similarly, situations that produce a positive emotion (such as interest) are believed to often produce other positive emotions (such as enthusiasm or alertness). Moreover, there also appears to be a tendency for individuals who often experience specific negative emotions to experience other negative emotions frequently as well. Similarly, individuals who often experience a positive emotion such as happiness are also likely to experience other positive emotions (e.g., enthusiasm, satisfaction, or interest; Diener & Emmons, 1985; Watson & Clark, 1984). Thus, there seems to be some degree of positive covariation among the specific negative emotions and among the specific positive emotions, which justifies their study at a more global level.

It should be noted, however, that there are two traditions in emotion theory. In contrast to dimensional models, discrete emotions theories posit a number of discrete emotions, with fear, anger, disgust, interest, and joy being the core set that is common to most theories (e.g., Ekman & Davidson, 1994; Frijda, 1986, 1988; Izard, 1977; Levenson, 1988, 1992; Malatesta, 1990; Malatesta & Wilson, 1988). Discrete emotions theories have stressed that these emotions should be investigated separately, because each discrete emotion is thought to have specific causes as well as specific consequences (e.g., Frijda, 1988; Malatesta & Wilson, 1988). Moreover, it is assumed that each discrete emotion has its own autonomic substrate (Levenson, 1988, 1992) and specific facial expression (Ekman, 1992, 1993; Levenson, Ekman, & Friesen, 1990).

Watson and Tellegen (1985) have attempted to integrate the two traditions in emotion research by proposing a hierarchical model of emotional well-being (see also Watson & Clark, 1992a, 1992b). This model comprises positive and negative affect as second order factors, each composed of several first order factors on a more specific level. For example, negative affect consists of seven correlated yet distinct first order factors—fear, sadness, guilt, hostility, shyness, fatigue, and surprise. This hierarchical model covers both broad dimensions, the main focus of dimensional theories, and specific emotions, the target of discrete emotion theories. Although such a hierarchical model offers the possibility of looking at specific emotions and more global dimensions at the same time, usually only the latter are investigated in the well-being research.

Emotional Well-Being Research is Concerned With Long-Term Affective States

Is emotional well-being a stable phenomenon? Or does emotional well-being vary from situation to situation? Emotional well-being research is usually concerned with how a person *typically* feels, with long-term emotional well-being. Consequently, measures of emotional well-being comprise items that assess positive and negative affect within a long time frame comprising several weeks, months or even years. A typical item might read "How frequently have you experienced a positive emotion (e.g., interest) in the last couple of months?" As Campbell (1981) points out:

> The use of these measures is based on the assumption that all the countless experiences people go through from day to day add to (...) global feelings of well-being, that these feelings remain relatively constant over extended periods, and that people can describe them with candor and accuracy. (p. 23)

The interest in emotional well-being as a relatively stable phenomenon stems from the theoretical orientation toward the effects of a person's stable life circumstances and stable personality characteristics on feelings of emotional well-being. Consequently, questions about changes in emotional well-being typically focus on long-term developments that reflect changes in personality or major changes in life conditions (e.g., becoming a mother, or a widow, or being confronted with a severe illness).

Consistent with the conceptualization of emotional well-being as a long-term affective state, a number of longitudinal studies found that individual differences in positive and negative affect remain moderately to highly stable over several years (e.g., Brief et al., 1993; Costa et al., 1987; Headey & Wearing, 1991; Watson & Walker-McKee, 1996). However, there is also another set of findings. Specifically, time-sampling studies clearly indicate that emotions also fluctuate a great deal over time (e.g., Larsen, 1987; Watson, 1988; Zevon & Tellegen, 1982). Moreover, Schwarz and his colleagues have demonstrated that judgments of emotional well-being are influenced by transitory elements such as the weather or one's current mood (e.g., Schwarz, 1987; Schwarz & Clore, 1983; Schwarz & Strack, 1991).

How can we integrate these two sets of findings, on the one hand long-term stability, on the other hand short-term variability of emotional well-being? It might well be that emotional well-being comprises two temporal components. For example, Kozma and his colleagues differentiate between short-term affective and long-term affective components of emotional well-being (e.g., Kozma, Di Fazio, Stones, & Hannah, 1992; Kozma, Stone, Stone, Hannah, & McNeil, 1990). The analogy in personality research that best illustrates this distinction between short-term and long-term emotional well-being is the distinction between personality traits and states (e.g., Fridhandler, 1986; Hertzog & Nesselroade, 1987; Nesselroade, 1988; Usala & Hertzog, 1991; Zuckerman, 1983). At the level of operationalization, these two components are distinguished by their time frames. While the long-term component is assessed by items with a long time frame and broad situational context (e.g., "Looking back, how satisfied are you with your life in general?"), the short-term component is assessed by items that refer to the recent past and to a particular event or situation (e.g., "How satisfied are you currently with your marriage?").

Although the distinction between short-term and long-term emotional well-being appears to be fruitful for future research, as mentioned above, most research to date focuses only on the long-term component of emotional well-being. This component has been described as the mean level around which "momentary" emotions move, a level that differs greatly from one individual to another. As Diener and Larsen (1993) point out:

> life events produce upward and downward shifts in a person's momentary or daily affect, but when moods are averaged over several weeks or months, these shifts average out to reveal the person's mean level of emotion (...). It is this mean level that exhibits a degree of stability over time and across situations, and forms the core of emotional well-being. (p. 406)

In sum, emotional well-being has two components—positive affect and negative affect. Emotional well-being research typically focuses on these two broad dimensions and is less concerned with the specific emotions that constitute the positive sides of emotional well-being (e.g., interest, satisfaction, happiness) and the negative sides (e.g., distress, depression, unhappiness). Moreover, emotional well-being researchers are usually interested in how well individuals typically feel, in their long-term affective states. Levels of emotional well-being are assumed to be relatively stable and are believed to primarily show long-term changes as a reflection of changes in personality characteristics and transitions in life conditions. The fol-

lowing section focuses on the relationship between the two components of emotional well-being, an issue that has received considerable attention in research on emotional well-being.

On the Independence of Positive and Negative Affect

Well-being researchers generally agree that emotional well-being consists of two dimensions rather than one (bipolar) dimension. However, the question of how these components are interrelated is hotly debated. Some researchers emphasize that the independence of positive and negative affect is one of the most important empirical findings in the area of emotional well-being research, indicating that emotional well-being is more than just the absence of negative emotional states (Bradburn, 1969; Mayring, 1987; Stock et al., 1986). Other researchers state that the independence of positive and negative affect is completely counterintuitive (e.g., Diener & Emmons, 1985). Five hypotheses have been advanced that argue against the complete independence of positive and negative affect. Of these, one involves methodological considerations while the other four are theoretical in nature.

The First Hypothesis: The Orthogonality of Positive and Negative Affect Might be a Statistical Artifact

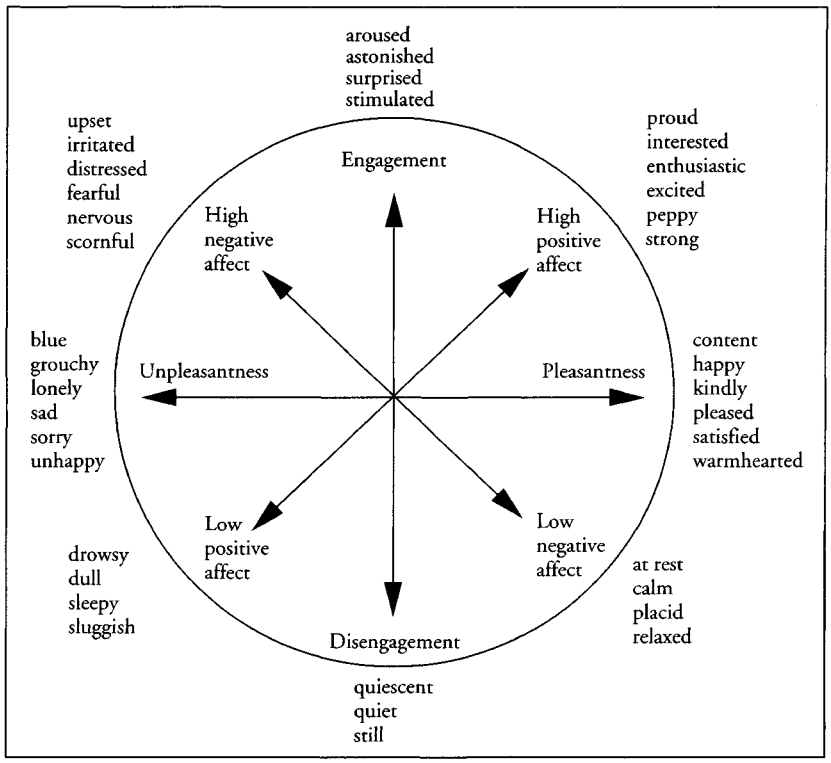
This hypothesis gains plausibility if one takes a closer look at the measures of emotional well-being. The psychometric properties of many measures employed in emotional well-being research have been found to be wanting, especially those of the most popular measure, the Affect Balance Scale (ABS; originated by Bradburn, 1969). The ABS has been criticized on a number of grounds (Kercher, 1992; Perkinson, Albert, Luborsky, Moos, & Glicksman, 1994; Watson, 1988). For example, this measure has a dichotomous yes-no response format. As is well known, dichotomous measures are relatively unreliable and thus likely to produce artificially low correlations between positive and negative affect (see Green, Goldman, & Salovey, 1993). Consistent with this argument, several studies have reported low reliability for the ABS, most often varying between coefficient $\alpha = .50$ to .65 (e.g., Headey & Wearing, 1989; Watson, 1988). Factor analytic studies that have expanded the response options for the ABS items (e.g., by using five-point response formats tapping the degree of affect rather than its presence or absence) or have otherwise adjusted for unreliability (e.g., by using confirmatory factor analyses) were able to consistently demonstrate that positive and negative emotions as measured with the ABS were not orthogonal but inversely interrelated to a moderate degree (e.g., Carp & Carp, 1983; Holland-Benin et al., 1988; Liang, 1985; Stock et al., 1986).

Taken together, the independence of positive and negative affect might be due in part to the unreliability of the measures assessing these two components of emotional well-being. However, even with reliable measures, positive and negative emotions have consistently been demonstrated to constitute two correlated dimensions rather than one.

The Second Hypothesis: The Independence of Positive and Negative Affect Might be Restricted to a Small Number of Specific Emotions

As Watson (1988) points out, part of the confusion about the association between positive and negative affect might be resolved by taking a closer look at the exact definition of the two affective dimensions. Specifically, Watson argues that the strength of the association between positive and negative depends on the specific emotions included in the definitions of emotional well-being. This hypothesis is based on the circumplex model of emotion that was proposed by Watson and his colleagues (see Watson & Tellegen, 1985).

Figure 1
The Two-Dimensional Circumplex Model of Emotion



Note. Figure 1 is a slightly modified version of the circumplex model appearing in Watson and Tellegen (1985).

As depicted in Figure 1, the circumplex model treats emotions as falling within one of eight octants forming a circle. The location of emotions within the circle determines their correlation with each other. Emotions falling into the same octant should be most highly correlated (e.g., active and strong); emotions located in adjoining octants should display more moderate correlations with each other (e.g., distressed and blue); emotions in octants at 90-degree (orthogonal) angles should show little association (e.g., fearful and enthusiastic); and emotions directly opposite each other should indicate a strong inverse relation—they should represent high versus low ends of the same dimension (e.g., happy and sad are opposite ends of the Pleasantness-Unpleasantness dimension).

The circular structure of affect has received considerable empirical support in factor analyses (e.g., Mayer & Gaschke, 1988; Russell, 1980; Watson 1988; Watson & Tellegen, 1985; Zevon & Tellegen, 1982). The results indicate (a) an unrotated orthogonal two-factor solution based on the dimensions of Engagement-Disengagement and Unpleasantness-Pleasantness, or (b) a rotated orthogonal two-factor solution based on the dimensions of Positive Affect and Negative Affect.

As seen in Table 1, the positive side of emotional well-being is often measured by emotions indicating Pleasantness (e.g., happy or content) and High Positive Affect (e.g., proud or interested). Analogously, the negative side of emotional well-being is typically measured by emotions indicating Unpleasantness (e.g., sad or unhappy) and High Negative Affect (e.g., upset or irritated). When defined in this manner, according to the circumplex model of emotion, the two sides of emotional well-being should be inversely associated. In contrast, if one used pure measures of High Positive Affect and High Negative Affect, the two components of emotional well-being should be orthogonal.

Based on the circumplex model of emotions, it is not surprising that scales of "mixed" positive-pleasant and negative-unpleasant emotions were shown to be inversely correlated (e.g., Diener & Emmons, 1985; Lawton, Kleban, Dean, Rajagopal, & Parmelee, 1992). Contrary to the measures included in Table 1, the Positive Affect Negative Affect Schedules (PANAS; Watson et al., 1988) include only high positive and high negative emotions. As would be expected, these two scales of emotional well-being constitute orthogonal dimensions of emotional well-being (e.g., Kercher, 1992; Kunzmann 1994; Watson, 1988).

Taken together, the independence of positive and negative affect might be due in part to the specific emotions underlying the two components of emotional well-being. In particular, pure scales of positive and negative affect should constitute orthogonal dimensions of emotional well-being, while a mixture of positive and pleasant emotions, on the one hand, and negative and unpleasant emotions, on the other, should result in two dimensions that negatively covary to a moderate degree.

Table 1
Measures of Emotional Well-Being

Authors	*Negative affect*	*Positive affect*
Bradburn (1969) Affect Balance Scale	Restless, bored, depressed, very unhappy, lonely, remote, upset	Pleased, "things going your way," proud, excited, interested, on top of the world
Costa, McCrae, & Zonderman (1987) General Well-Being Schedule	Strain, stress, pressure, anxious, worried, upset, emotionally unstable, insecure of yourself, tensed versus relaxed, depressed versus cheerful	Happy, satisfied, pleased, energy, pep, vitality
Diener & Emmons (1985)	Annoyed, frustrated, miserable, sad, depressed, gloomy	Delighted, happy, glad, content, satisfied, pleased
Lawton, Kleban, Dean, Rajagopal, & Parmelee (1992) Philadelphia Geriatric Center Positive Negative Affect Schedules	Worried, sad, depressed, annoyed, irritated	Energetic, interested, happy, warm hearted, content
Warr, Barter, & Brownbridge (1983) Modification of the Affect Balance Scale	Annoyed, lonely, remote, worried, afraid, depressed, very unhappy, tired, restless, feel like crying, bored	"Things were going your way," pleased, excited, interested, full of energy, enjoying yourself, cheerful, on top of the world, confident about the future, pleased

The Third Hypothesis: The Independence of Positive and Negative Affect Might be Restricted to Trait Measures of Emotional Well-Being

Diener and his research group have advanced the hypothesis that the magnitude of the association between positive and negative affect may be a function of time (e.g., Diener & Emmons, 1985). That is, the association may depend on whether the focus is on *current* affect states or on *long-term* affectivity. The authors argue that over a longer period of time the frequency with which a person experiences positive affect would be independent of the frequency with which this person experiences negative affect. In contrast, positive and negative affect should be inversely related at any particular moment in time (i.e., people do not experience positive and negative emotions simultaneously). Diener and Emmons (1985) provided some empirical evidence that confirms the hypothesis that the association between positive and negative affect is moderated by time. Depending on the time frame, the magnitude of the correlation between the two components of emotional well-being differed significantly. However, these differences were not always consistent with the authors' theoretical assumptions. For example, the correlation between positive and negative affect experienced "in the last four weeks" was $r = -.63$,[2] while the correlation between positive and negative affect experienced "in the last three weeks" was $r = -.10$. According to the hypothesis advanced by the authors, the shorter the time interval the higher should be the correlation between positive and negative affect.

Thus, although the "time-frame hypothesis" appears theoretically reasonable, the empirical evidence in favor of this hypothesis is not compelling. Given the theoretical considerations of Diener and colleagues, *long-term* positive and negative affect should possess the highest probability of being orthogonal.

The Fourth Hypothesis: The Independence of Positive and Negative Affect Might be Restricted to Complex Situations

Lazarus (1991) also proposes that the relation between positive and negative affect is not fixed, but may change with the situational context. Folkman and Lazarus (1985) provided some empirical support for this hypothesis. The authors obtained positive and negative affect in college students at three stages of an examination, the period of anticipation, the period just after the exam, and the period just after grades were announced. As expected, the correlation between positive and negative affect was nearly zero in the stage of anticipation, increased after the exam ($r = -.25$), and was strongest after the announcement of grades ($r = -.50$). The authors argue that different degrees of ambiguity and complexity in these three situational contexts might have caused changes in the relation between positive and negative affect. In the relatively unambiguous situation (i.e., after receiving grades), students felt either good or bad, depending on their success or failure. In contrast, the situation just before and just after an exam was rather ambiguous and thus may have given rise to positive as well as to negative affect. As a consequence, positive and negative affect were moderately related in the unambiguous situation but unrelated in the two more ambiguous contexts.

[2] The relatively high correlation between positive and negative affect is probably due to the measure that was employed by Diener and Emmons (1985). This measure includes mainly emotions from the pleasantness-unpleasantness dimension (see circumplex model of emotion, Figure 1).

Thus, the perceived complexity of a situation appears to play a role in the complexity of a person's feeling states. In order to elaborate this hypothesis, a taxonomy of situations according to their complexity would be needed. Based on such a taxonomy, one could examine whether the pattern of findings revealed by Folkman and Lazarus (1985) are generalizable to other situations as well.

The Fifth Hypothesis: The Independence of Positive and Negative Affect Might be Restricted to Younger Individuals

The structure of emotional well-being might change not only in response to situation-specific characteristics but also across the lifespan. Lawton, Kleban, Dean, Rajagopal, and Parmelee (1992) reasoned that in old age the structure of emotional well-being might be less differentiated than in earlier periods of life.

A model of successful aging—the model of selection, compensation, and optimization—proposed by Baltes and Baltes (1990) may explain that de-differentiation process. Following this model, in the face of diminishing resources in old age, it is adaptive to focus one's time, energy, and skills on achieving or maintaining high levels of functioning in selected domains. This proposed selection process, which is aimed at conserving energy, might be reflected in a reduction of emotional complexity. As a result, the two-dimensional structure of emotional well-being may become reduced to a single bipolar dimension, with positive and negative affect being the end points. Although this hypothesis appears to be reasonable, empirical studies generally provide evidence against it. Emotional well-being has been demonstrated to comprise two distinct emotional dimensions, positive and negative affect, in infants (Belsky, Hsieh, & Crnic, 1996), young adults (e.g., Mayer & Gaschke, 1988; Watson, 1988), middle-aged adults (Watson & Pennebaker, 1989), old adults (Holland-Benin et al., 1988), and very old adults (Kercher, 1992; Kunzmann, 1994; Lawton, Kleban, Dean, Rajagopal, & Parmelee, 1992).

Summary

Emotional well-being is often considered to be an important facet of the broader construct, subjective well-being. Definitions of subjective well-being developed in gerontological research comprise, beside pleasurable feelings, a wide range of diverse concepts such as social integration, acceptance of status quo, or self-esteem. In contrast, definitions derived from social indicators research typically include only three dimensions: a cognitive judgment as to whether the life one leads is congruent with one's expectations and goals (i.e., life satisfaction), and two emotional components, positive affect and (the absence of) negative affect. The narrowness of this focus is justified by the increased conceptual clarity and precision it provides. The present study investigates the two *emotional* components of subjective well-being—positive and negative affect. Two foci of emotional well-being research appear most salient: First, this research focuses on broad dimensions and is less concerned with the specific emotions that indicate positive affect (e.g., interest, satisfaction, happiness) and negative affect (e.g., depression, anger, sadness). Second, this research focuses on how good individuals typically feel, in their long-term affective states.

Several hypotheses regarding the magnitude of the relation between positive and negative affect have been advanced in the literature. The strength of the association was assumed to

depend (a) on the psychometric properties of the measures used, (b) on the specific emotions defining positive and negative affect, (c) on the time-frame in which emotions are evaluated, and (d) on the situational complexities that give rise to emotions. Moreover, (e) the emotional well-being structure was assumed to change across the lifespan, becoming more de-differentiated in old age.

The empirical evidence generally suggests that positive and negative affect constitute orthogonal dimensions of emotional well-being across the entire lifespan, if they did not include emotions from the pleasantness-unpleasantness affect dimension (see Figure 1), and if they were measured with psychometrically sound instruments over a longer time span and across many situations.

Implications of the Two-Component Model of Emotional Well-Being for Studying Resources and Risk Factors

The notion of independence between positive and negative affect implies that emotional well-being represents two different phenomena that should be studied separately. As a first step, the two-component model allows more differentiated questions about stability and change. For example, positive and negative affect might show different degrees of age-related change or might even differ in the direction of age-related changes. To date, little empirical attention has been allocated to the question of differential age trajectories. A small number of studies have found negative affect to exhibit age-related stability (Malatesta & Kalnok, 1984; Shmotkin, 1990; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996), while the experience of positive emotions shows a negative age gradient in late life (Ferring & Filipp, 1995; Shmotkin, 1990; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). Multidirectionality, which has been shown in the domain of cognitive aging (e.g., Baltes, 1984, 1987), may also be true in the area of emotional well-being.

The question arises whether positive and negative affect also have different precursors (i.e., whether they are multicausal) and consequences (i.e., whether they are multifunctional). Two lines of research have provided empirical evidence on which a classification of variables as being associated either with positive affect or with negative affect can be based. First, *research on daily hassles and uplifts* suggests that the valence of daily events (positive, negative, or neutral) might be important for the differential effects of life events on positive versus negative affect (Zautra & Reich, 1983; Zautra et al., 1994). In this research context, a growing body of evidence supports the assumption that undesirable events of daily life primarily influence one's level of negative affect, whereas desirable events primarily influence one's level of positive affect (e.g., Kennedy-Moore et al., 1992; MacLeod et al., 1996; Neale et al., 1987; Reich & Zautra, 1983; Weiner, 1986; Zautra & Reich, 1983; Zautra et al., 1994). For example, after receiving a letter from a good friend, being invited on a trip, or achieving a personal goal, a person will most likely experience positive affect (e.g., interest, enthusiasm, or pride), but these events do not necessarily influence his or her level of negative affect. In a similar manner, after receiving a negative diagnosis from one's physician, or being refused for a date, a person will most likely experience negative affect (e.g., sadness, anxiety, or hostility), but his or her level of positive affect might remain unaffected.

Second, *research on mood and emotion* suggests that the source of experiences—whether experiences are caused by external or internal factors—might be important to their differential

effects on positive versus negative affect (e.g., Clark & Watson, 1988; Lawton, 1983). Positive affect is believed to depend on experiences that result from effectively interacting with the external world, for example, with one's friends and family. On the basis of his survey data, for example, Bradburn (1969) concluded "that there was something about social participation and involvement in the world that was conducive to the experience of positive feelings" (p. 123). In contrast, negative affect appears primarily to be a function of sources that lie inside oneself. For example, negative affect has been demonstrated to result from the evaluation of one's health, chronic pain and discomfort, subjective distress, or low self-esteem (e.g., Bradburn, 1969; Watson & Pennebaker, 1989). In brief, while positive affect may be the result of interacting with the external world, negative affect appears to be a function of interacting with one's internal world.

Taking these two lines of research together, a classification of variables as being important either to positive or to negative affect can be based on two characteristics of experiences: their *valence* (desirable or undesirable) and their *source* (internal or external). The contributions of the two lines of research will be taken up again in the following chapters that are concerned with two potential antecedents of positive and negative affect. Specifically, constraints in functional health and perceived control are discussed as resources and risk factors for emotional well-being. However, some general remarks on studying resources and risk factors in emotional well-being are outlined first.

Some General Remarks About Resources and Risk Factors

Defining Resources and Risk Factors

Generally speaking, a resource[3] is any characteristic of a person that facilitates desirable states, events, or outcomes. Resources make desirable outcomes more likely; they help to attain personal goals and to meet desires. In contrast, a risk factor can be any characteristic of a person that makes undesirable states, events, or outcomes more probable. In short, while resources imply the presence of positive and desirable states, risk factors involve the presence of negative and undesirable states.

Resources and risk factors can be differentiated according to whether they refer to *external circumstances* (e.g., having a high income or being institutionalized), or to *personal characteristics* (e.g., being socially anxious or physically attractive). In addition, resources and risk factors can be classified by their specificity or globality. Some resources and risk factors can be regarded as rather *specific* (e.g., expertise in a specific scientific domain or fear of flying); others are relatively *global* (e.g., being a wise person or being paraplegic). Baltes, Lindenberger, and Staudinger (in press) labeled general resources, which are believed to have multiple adaptive consequences in a wide range of life domains, *general purpose mechanisms:*

> With general purpose mechanism we mean (internal and external) resources and capacities that individuals employ to master developmental challenges. General purpose mechanisms in the field of self and personality might help the individual to organize and coordinate the ways in which he/she behaves, experiences, views, and feels with regard to him/herself, others, and the material world, such that the goal of maximizing gains and minimizing losses is approached.

[3] In the present study, the terms resource and protective factor are used interchangeably.

This definition translates to general risk factors that might be labeled as *general deficit mechanisms* in the following way: General deficit mechanisms are internal and external risk factors that impede the mastery of developmental challenges. General deficit mechanisms in the field of self and personality might hinder a person in organizing and coordinating the ways in which he or she behaves, experiences, views, and feels with regard to his or her self, others, and the material world to the point where the goal of maximizing gains and minimizing losses cannot be achieved. Table 2 summarizes the proposed classification of resources and risk factors according to the dimensions personal-environmental and specific-global and provides an example of each.

To define characteristics as resources or risk factors, criteria for adaptation need to be specified. In other words, the question arises: Risk factor for what? Resource for what? On the most general level, the criterion might be described as the goal of maximizing gains and minimizing losses (see Baltes et al., in press). But what is a gain, and what a loss? Defining gains and losses is a complex endeavor. It is not possible to answer this question without invoking values and without a systemic view. Clearly, what constitutes a gain and what a loss depends on personal goals and desires. On the other hand, objective evaluations are involved as well (Baltes & Baltes, 1990; Baltes & Carstensen, 1996).

In the present study, the criteria for defining characteristics as being either resources or risk factors, refer to the two components of emotional well-being—positive and negative affect. Under this two-component model, characteristics that lead to increases in positive affect or to decreases in negative affect or both are considered as resources. In contrast, risk factors are characteristics that lead to decreases in positive affect or to increases in negative affect or to both. In principle, it should be possible to classify each resource and each risk factor according to whether it influences positive affect, negative affect, or both. Empirical evidence for such a classification is scanty. However, based on the research on daily hassles and uplifts and the research on mood and emotion (see Section "Implications of the Two Component Model of Emotional Well-Being for Studying Resources and Risk Factors"), the following hypotheses can be advanced: Characteristics that facilitate or hinder *desirable* outcomes resulting from effectively interacting with the *environment* are probably resources or risk factors for positive affect. Characteristics that hinder or make *undesirable self-evaluations* more likely are probably resources or risk factors for negative affect. Characteristics that involve consequences for self-evaluation and the capacity to effectively interact with the external world most likely have implications for both components of emotional well-being—positive and negative affect.

Table 2
Classification of Resources and Risk Factors With Examples

	Risk factor		*Resource*	
	Specific	*Global*	*Specific*	*Global*
Personal	Fear of flying	Generalized anxiety	Satisfying interaction with one's spouse	Satisfying social relations in general
Environmental	Crime rate in neighborhood	Totalitarian system	High personal income	Social welfare state

Very few risk factors invariably lead to lowered emotional well-being, and very few resources invariably lead to increased emotional well-being. Whether or not resources and risk factors ultimately result in changes in emotional well-being depends on contextual factors. Context can best be defined in terms of all the additional resources and risk factors a person possesses that are not the focus of a particular investigation. As an example, consider the hypothesis that a problem-focused coping style is a protective factor for emotional well-being. If one is interested in the context-specificity of this particular factor, all the other resources and risk factors of a person need to be considered (e.g., age, social class, social network, health status, neuroticism, intelligence). With these contextual factors in mind, we can easily think of individuals in specific situations, for whom giving up and relinquishing control may be the more adaptive response.

In a similar way, the effects of risk factors likely depend on the specific context. For example, a chronic disease might be devastating if the affected person had no supportive social network and lived in disadvantaged circumstances. In contrast, in the absence of additional stressors or in the presence of resources, a particular risk factor is likely to have less deleterious implications for people's emotional well-being.

Thus, the effects of resources and risk factors are rarely fixed; they can be intensified or lessened by contextual factors. It might even be that a protective factor in one context is a risk factor in another, and vice versa. Moreover, if one takes into account that a person typically has multiple goals and desires, the possibility arises that a characteristic is simultaneously a resource for one goal and a risk factor for another. These and similar issues have been subsumed in the lifespan literature under the concept of multifunctionality of development and associated variations in developmental outcomes (e.g., Baltes et al., in press; Staudinger et al., 1995).

A telling empirical example of the context-and-outcome-specificity of resources and risk factors comes from the lifespan comparative study of autonomy versus dependency in children and older adults (Baltes, 1995, 1996; Baltes & Silverberg, 1994). In this research context, dependent behavior in old age was shown to be a risk factor *and* a resource. On the one hand, dependent behavior can involve the risk of increased decline in functioning due to lack of practice and experience. On the other hand, dependent behavior can also imply gains such as the provision of social contact. Moreover, in the face of shrinking resources in very old age, self-initiated dependent behavior can help to conserve energy that can then be invested in other life domains.

These observations suggest that what is labeled as a risk factor may actually be quite adaptive within a certain context and for certain goals. A radical view would posit that there is no resource without costs and no risk without benefits. However, the effects of some resources and risk factors are less dependent on context than are the effects of others. The examples included in Table 2 illustrate that the specificity of a resource or risk factor is of crucial importance in this respect. The more specific a factor, the more its adaptivity is dependent on the specific context in which it occurs. For example, fear of flying can be considered as a relatively specific risk factor. Although there are exceptions, it is usually relatively easy to use another mode of transportation. As a consequence, fear of flying remains a latent risk factor, which has no influence on a person's emotional well-being in everyday life. This risk factor becomes manifest only in the very few situations in which a person is forced to take a plane. Consider,

in contrast, a global risk factor such as generalized anxiety. This personality trait is likely to influence virtually all interactions with a person's environment. Generalized anxiety colors all the ways in which a person behaves, experiences, views, and feels with regard to him or her self, others, and the material world. Generalized traits function as risk factors that are more or less independent of the specific context in which a person lives. The same logic applies to resources. General resources (e.g., problem-focused coping style) facilitate achievements in a wide range of life domains. As a consequence, they should be adaptive for many individuals in numerous contexts. Specific resources, such as expertise in a specific area, might help to achieve goals in that specific life domain, but do not directly facilitate achievements in others.

To summarize, the question of what is a risk factor and what is a resource is conditioned by contextual characteristics and the outcomes considered. What is a risk factor in one context and for one outcome might be a resource in another context and for another outcome. The adaptivity of global resources or risk factors, however, is far less dependent on contextual factors than is the adaptivity of specific resources and risk factors.

The Importance of Time

Resources and Risk Factors Might Have Concurrent and Persistent Effects

Resources and risk factors may not only be context specific, they may also be specific to a particular point in time. One key issue in research on the consequences of resources and risk factors is the extent to which these effects do or do not persist over time (e.g., Labouvie, 1987; Rutter, 1988). Empirical studies that have investigated the adaptation to major life events over time generally suggest that risk factors show profound effects on individuals' concurrent well-being. Follow-up of the same individuals after several years, however, often reveals that these effects do not persist (e.g., Brickman & Campbell, 1971; Brickman, Coates, & Janoff-Bulman, 1978; Headey & Wearing, 1991; Michalos, 1985; Suh, Diener, & Fujita, 1996; Thomae, 1992). For example, Bulman and Wortman (1977) demonstrated that people tend to adapt over time even to extreme occurrences such as an accident that led to spinal cord injury. This observation suggests that the time period since an individual struggled with a stressful event is, in fact, of central importance to its psychological consequences. Some resources and risk factors may well show profound effects on older individuals' concurrent emotional well-being, but over a longer period of time those factors may have a diminishing impact.

There may also exist situations in which the opposite pattern emerges. That is, a risk factor may have no implications for a person's concurrent level of emotional well-being but may show profound effects several years later. Such effects have been characterized as delayed or sleeper effects (e.g., Nesselroade, 1990; Nesselroade & Baltes, 1979). To give an example, avoiding a stressful situation such as an argument with one's spouse might have beneficial short-term effects on one's level of emotional well-being. In the long run, however, avoiding discussions and disputes could result in the dissolution of the marriage, in turn causing long-term emotional distress. In general, some resources and risk factors may affect a person's emotional well-being after a certain time span rather than immediately.

Concurrent and long-term effects of resources and risk factors might not only differ quantitatively (i.e., regarding the degree and direction of the effects) but also qualitatively (i.e., regarding the outcome that is affected). A particular resource or risk factor may influence neg-

ative affect in the short run, but positive affect in the long run, or vice versa. For example, the assurance from a physician that a person was not responsible for getting a life-threatening illness might spontaneously decrease his or her feelings of depression, shame, and guilt. This freedom from negative emotions might facilitate turning attention to desirable experiences such as leisure activities or interactions with friends. These positive experiences could be responsible for long-term increases in the other component of emotional well-being—positive affect.

In sum, short-term consequences of resources and risk factors might differ from long-term consequences both quantitatively (degree and direction of the effects) and qualitatively (outcome that is affected). Investigating people over time (i.e., longitudinally) is crucial in describing contrasting patterns of persistent and nonpersistent consequences of resources and risk factors on emotional well-being.

Resources and Risk Factors Might Change Over Time

Particularly in personality psychology, there is a long tradition of relating indicators of adaptation measured after a long time interval to personality-related precursors at earlier ages (e.g., Caspi & Elder, 1988; Costa & McCrae, 1984). The assumption underlying those investigations is that individual differences in personality characteristics remain relatively stable. However, not all resources and risk factors are stable characteristics. On the contrary, many resources and risk factors such as illnesses, income, family status, or social support may change considerably across the lifespan. If these changes are sufficiently differential, the individual-differences information in the original assessments will no longer be valid. Consequently, when investigating the consequences of resources and risk factors on emotional well-being over time, the question arises whether differential change in the respective predictor attributes might have occurred. Not only may emotional well-being change as a function of prior risk factors and resources, but emotional well-being might also change as a function of differential *intra*individual changes in these putative causal factors.

Very few longitudinal studies have investigated the relationship between resources and risk factors, on the one hand, and emotional well-being, on the other. Studies focussing on individual differences in *intra*individual changes—decline or improvement—in resources and risk factors as predictors of emotional well-being are lacking in particular. This lack of longitudinal research is surprising, because habituation theory provides a theoretical background for hypothesizing that change in putative causes might be more important for emotional well-being than the actual status at a given point in time. Habituation theory is a general theory of perception stating that a person's estimation of quantity depends on the person's recent experience rather than on absolute standards (e.g., Helson, 1964; see also Brim, 1988, 1992). This theory implies that the influence of resources and risk factors on emotional well-being depends on whether these factors have recently changed. Seen from the perspective of habituation theory, the influence of resources and risk factors on emotional well-being is likely to be more pronounced if they are defined as (recent) *intra*individual changes.

Resources and Risk Factors for Emotional Well-Being: Establishing a Causal Link

A defining feature of resources and risk factors is that they precede the outcome of interest (e.g., Kraemer et al., in press; Labouvie, 1987). Given that almost all studies focusing on resources and risk factors for emotional well-being are cross-sectional, this requirement has seldom been put to an empirical test. In cross-sectional correlational studies one cannot dis-

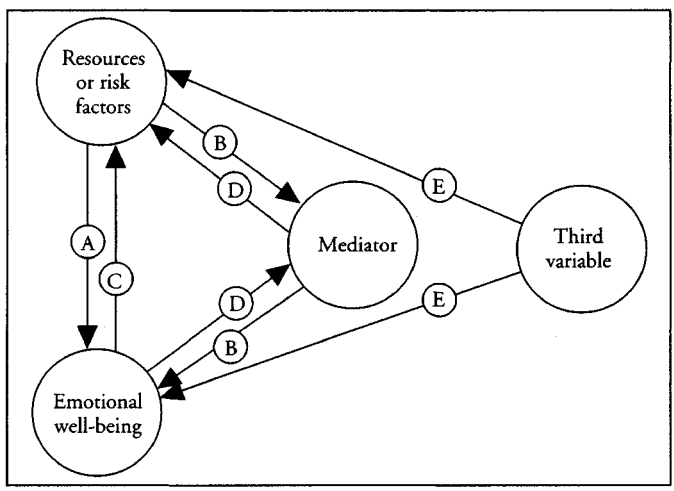
tinguish cause from effect empirically. Does a risk factor such as poor health or generalized anxiety cause emotional well-being? Or does emotional well-being cause the development of resources and risk factors? And what are the mechanisms linking a particular resource or risk factor and emotional well-being? Figure 2 includes five complementary explanations connecting resources or risk factors and emotional well-being.

A specific resource—perceived personal control—may be used to exemplify the possible connections illustrated in Figure 2. One possibility is that perceived personal control is a precursor of higher emotional well-being (i.e., path A), and at the same time, some of the perceived personal control effects on emotional well-being may be mediated through variables such as persistence in coping with difficulties (i.e., path B). Not only may perceived personal control affect emotional well-being, but aspects of emotional well-being may also affect perceived personal control (i.e., path C). Some of the emotional well-being effects on perceived personal control may be mediated through processes such as selective information processing of desirable and undesirable experiences (i.e., path D). Finally, personality characteristics such as neuroticism might affect both perceived personal control and emotional well-being and may explain their association (i.e., path E).

To empirically establish the proposed causal links between resources or risk factors and emotional well-being, longitudinal studies are required, although descriptive longitudinal studies are difficult to interpret because they lack experimental control over antecedent conditions (e.g., Baltes et al., 1978; Kruse et al., 1993, Nesselroade & Baltes, 1984). However, in comparison to cross-sectional studies, longitudinal studies provide more evidence for a directional interpretation of relationships by establishing a temporal sequence in which a putative cause precedes the assumed effect in time.

As Nesselroade and Baltes (1984) have pointed out, establishing causality is always a matter of successive approximation. The authors described four complementary approaches to

Figure 2
Resources and Risk Factors for Emotional Well-Being: Possible Explanations



investigating causal relationships. First, a study might begin with demonstrating a *covariation* between variables. Second, further support for a causal interpretation of relationships (covariation) would be obtained by showing a *temporal sequence,* in which the putative cause precedes the assumed consequence in time. Third, demonstrating the causal relationship would be enhanced if the causal factor is subjected to *manipulation.* And fourth, *replication* would complete the study of causal relationships.

In general, the relative importance of these four approaches depends on the phenomenon under investigation. For example, many risk factors (e.g., a life-threatening disease) as the putative cause of emotional well-being cannot (easily) be changed or experimentally manipulated. In this case, the temporal sequence (i.e., the second approach) becomes the principal piece of evidence useful for making causal inferences about covariations between variables.

Summary

A resource is any characteristic available to a person that facilitates obtaining desirable outcomes. A risk factor is any characteristic of a person that makes undesirable states more probable. On a general level, resources and risk factors can be classified according to two characteristics: First, resources and risk factors may refer to external circumstances or to personal characteristics. Second, these factors can be specific or global. In the present study, criteria for defining characteristics as being either resources or risk factors refer to the two components of emotional well-being—positive and negative affect. Characteristics that lead to increases in positive affect, decreases in negative affect, or both are considered as resources. In contrast, risk factors are characteristics that lead to decreases in positive affect or to increases in negative affect or to both. Based on research on daily hassles and uplifts and on mood and emotion research, two hypotheses can be advanced: Risk factors and resources for positive affect most likely hinder or facilitate the interaction with the external world. In contrast, risk factors and resources for negative affect should refer to self-evaluation domains.

The nature of what is considered a resource and what a risk factor may be conditioned by contextual characteristics and may change with time. Consequently, when studying the effects of resources and risk factors on emotional well-being, the question arises: Resource or risk factor for whom, in which context, and over which time span? Seen from a longitudinal perspective, resources and risk factors might have immediate and long-term consequences that differ quantitatively (degree, and direction of effects) and qualitatively (outcome that is affected). Furthermore, many resources and risk factors are likely to change over time. This change process might be as influential for emotional well-being as the presence of these factors earlier.

In the following chapters, functional health constraints and three dimensions of generalized perceived control are introduced as resources and risk factors that may have concurrent and long-term effects on emotional well-being.

Poor Functional Health: A Risk Factor for Emotional Well-Being in Old Age?

Defining and Measuring Functional Health

Despite the fact that the concept of health has played a prominent role in gerontological research, no clear consensus exists on its conceptualization and measurement. Various health models have been proposed in the literature, and it has become clear that defining health requires one to consider a number of differing facets (e.g., George & Bearon, 1980; Lawton, 1984; Lawton & Lawrence, 1994; Liang, 1986; Maddox, 1987; Steinhagen-Thiessen & Borchelt, 1996). In terms of breadth, definitions range from the very broad World Health Organization (1958) definition—"a state of complete physical, mental, and social well-being"—to the very rudimentary definition—"the absence of diagnosable conditions" (for reviews, see Lawton & Lawrence, 1994; Maddox, 1987). Most researchers have chosen definitions of moderate breadth and have limited the conceptual range of health to *physical* dimensions only. Social and psychological conditions are generally viewed as antecedents or consequences of physical health.

The following four general facets of physical health have been most often distinguished: diagnosis of *life-threatening or chronic diseases* (e.g., cancer, coronary heart disease, osteoporosis, or arthritis) by a physician, *self-reported health* (e.g., satisfaction with health, to what extent health is a problem, or number of perceived symptoms), *health-related behaviors* (e.g., number of physician visits, number of days spent in bed, or use of medication), and *functional health* (e.g., number of daily activities a person is able to perform independently). These four health dimensions are often viewed as core aspects of physical health that are interrelated and interactive (e.g., Lawrence, 1995; Liang, 1986; Whitelaw & Liang, 1991).

This study focuses on only one of these four facets of physical health—on functional health. According to Verbrugge (1990), functional health refers to people's ability to act in typical and personally desired ways. In Lawton and Lawrence's terms (1994), functional health is "the competence with which the person is able to perform important roles in life" (p. 24). Although these two definitions imply that functional health may include a wide range of more or less complex abilities, definitions of functional health usually differentiate between competencies in only two activity domains: *basic activities* of daily living (i.e., activities concerning bodily maintenance) and *instrumental activities,* those that are important to independent life in a community (e.g., Kovar & Lawton, 1994; Lawton & Brody, 1969; Mahoney & Barthel, 1965; Steinhagen-Thiessen & Borchelt, 1996). Basic activities of daily living refer to eating, bathing, or dressing. Instrumental activities include shopping for personal items, doing light housework, preparing meals for oneself, managing one's money, and using a telephone.

Traditionally, functional health has been operationalized in terms of self or proxy reports. Participants are asked whether they receive help (alternatively whether they need help) in performing basic and more complex instrumental activities. More recently, measures have been developed that also ask about the degree of difficulty in performing these activities (Lawton & Lawrence, 1994; Verbrugge, 1990). Although self-report measures of functional health are very popular in gerontological research (e.g., Myers, Holliday, Harvey, & Hutchinson, 1993), these measures have also been criticized by several researchers (e.g., Kempen, Steverink, Ormel, & Deeg, 1996; Rubenstein, Schairer, Wieland, & Kane, 1984; Lawton & Lawrence, 1994; Verbrugge, 1990). One of the problems with self-report measures of functional health

is that they have been shown to be confounded with psychological variables such as perceived control, neuroticism, or depression. For example, individuals with a higher sense of personal control tend to report being in better functional health than do individuals with a low sense of personal control. This association between personal control and functional health remains significant, even when objective health status is statistically controlled (Kempen et al., 1996).

Moreover, as Kovar and Lawton (1994) pointed out, self-reported functional health is influenced by the specific activities included in a measure. For example, the chance of being diagnosed as functionally disabled rises as the number and difficulty of activities increases. Furthermore, the exact wording of the items seems to play a crucial role. For example, responses may depend on whether individuals are asked: "*Do* you prepare your meals yourself?" or "*Could* you prepare your meal yourself?" While the first item refers to functional performance, the latter is an attempt to assess functional capacity. Finally, contextual factors influence the answers to self-report measures of functional health. For example, perceived difficulty in preparing meals may not only depend on the ability of a person but also on the equipment in the kitchen and on the type of meal the person considers normal. Using think-aloud and cognitive probes, Keller, Kovar, Jobe, and Branch (1993) demonstrated that items assessing functional health were, in fact, not interpreted by the participants to have the same meaning as intended.

Given the many problems that are involved in self-reported functional health, more and more researchers suggest an alternative operationalization of this facet of physical health. That is, functional health has been operationalized using performance-based tests. In performance-based tests, a person is asked to actually perform a specific task and is evaluated in an objective, uniform manner using predetermined criteria, which may include counting of repetitions or timing of the activity. In these tests, participants are not asked whether they can touch their finger to the tip of their nose, they are asked to do it. Several types of performance-based tests can be distinguished. Some assess the range and limits of mobility (e.g., balance and gait by asking individuals to walk a certain distance or to put on and take off a jacket). Measures of sensory functioning (e.g., hearing and visual acuity) have also been employed as indicators of functional health (for reviews, see Guralnik, Branch, Cummings, & Curb, 1989; Marsiske et al., 1996; Myers et al., 1993; Steinhagen-Thiessen & Borchelt, 1996).

Both approaches to measuring functional health—employing self-report and performance-based measures—have their advantages and disadvantages. While self-report measures of functional health are easy to administer, performance-based tests are often time-consuming. In addition, they require trained interviewers, adequate space, and special equipment (e.g., reading tables or stopwatches); and also present a risk of injury. However, performance-based tests are less influenced by poor cognitive functioning, contextual factors, and personality dispositions. As will be reviewed below (see Section"Functional Health Constraints and Emotional Well-Being: Contributions from Two Lines of Research"), the question of whether self-reported health can be regarded as a valid reflection of actual health status is debated in research that is concerned with the effects of health on emotional well-being. Research on functional health may benefit from the use of objective performance measures to supplement the traditional self- and proxy-report measures (see, for example, Reuben, Siu, & Kimpau, 1992).

Why is it Important to Study the Emotional Consequences of Functional Health Constraints in Old Age?

The rise in functional health problems with advancing age is dramatic and well documented. Considerable negative age-related differences as well as decline over time have been shown for various indicators of functional health. The empirical evidence generally suggests that the majority of older individuals are confronted with functional health limitations (e.g., Avlund, Davidsen, & Schultz-Larsen, 1995; Branch, Horowitz, & Carr, 1989; Fozard, 1990; Liu, Liang, Muramatsu, & Sugisawa, 1995; Markides & Lee, 1990; Marsiske et al., 1996; Mayer & Baltes, 1996; Palmore, Nowlin, & Wang, 1985; Zarit, Johansson, & Malmberg, 1995). Moreover, because people accumulate disease over time, older individuals are likely to suffer from several coincident functional health constraints in the sense of multimorbidity (e.g., Rowe & Minaker, 1985; Steinhagen-Thiessen & Borchelt, 1996; World Health Organization, 1989).

What does decline in functional health mean emotionally for old and very old individuals? Are the multitude of functional health constraints reflected in diminished levels of emotional well-being? Are both components of emotional well-being—positive and negative affect—equally influenced by functional health constraints? Surprisingly, the pervasiveness of the problem has not generated systematic research on the emotional consequences of age-related functional health constraints. At first glance, being functionally impaired is a powerful negative life condition affecting the emotional life of older people. It is easily understandable why age-related constraints in functional health might diminish feelings of emotional well-being. Functional health—the ability to see, hear, and move—constitutes a necessary precondition for virtually all interactions between a person and his or her environment. Although it may be possible to compensate for some losses in functional health, or to function effectively following limited impairments (Whitbourne, 1985), age-associated losses in functional health must be thought of as a risk factor restricting effective participation in the everyday world. This assumption is consistent with the "cascade hypothesis" (Birren, 1964), in which the effects of aging losses in some systems seem to have "domino-like" effects for other systems. Losses in functional health might "drive" losses in other, more complex functional domains. If one cannot see, hear, or move, one cannot do things that require these capabilities, such as reading, writing, or interacting socially.

On a general level, it might be useful to distinguish between two kinds of consequences of functional health constraints. On the one hand, such constraints most likely lead to limitations in *performance domains* (i.e., where individuals actually engage in behaviors). For example, functional health constraints restrict an older person's capacity to perform desired activities, for example, they detract from interacting with friends and enjoying work and leisure activities (Marsiske et al., 1996; Tesch-Römer & Wahl, 1996). On the other hand, constraints in functional health might also affect *self-evaluation domains* (i.e., cognitive processes and bodily experiences). For example, functional health constraints are likely to be associated with unfavorable cognitive evaluations such as lowered self-esteem, worries, and feelings of uncertainty. Moreover, the experience of chronic pain and discomfort might also often be involved (Richtberg, 1990).

Regarding the question whether functional health constraints are differentially related to positive versus negative affect, a finding reported by Marsiske et al. (1996) appears to be important: Performance domains were more affected by functional health constraints than were

self-evaluation domains. In other words, the interaction with the external world may be more compromised by constraints in vision, hearing, and moving than interaction with the "internal" world. Given that the experience of positive affect has been demonstrated to be primarily dependent on positive experiences resulting from effectively interacting with the environment (e.g., Clark & Watson, 1988; Lawton, 1984; see Section "Implications of the Two-Component Model of Emotional Well-Being for Studying Resources and Risk Factors"), functional health constraints might be a particular risk factor for positive affect. Nonetheless, it is important to notice that functional health constraints, especially those due to pathological conditions, sometimes involve unfavorable effects on self-evaluation domains as well. For example, if rheumatoid arthritis is the cause of functional health constraints, severe pain, fatigue, and uncertainty because of the unpredictable nature of this disease are likely to occur. To the degree that functional health constraints also involve unfavorable self-evaluations and the experience of pain, negative affect might be affected too.

In sum, it appears important to study the emotional consequences of functional health constraints for two reasons: (a) Constraints in functional health are a very common problem in old age, and (b) these constraints potentially have widespread and aversive consequences for older people's lives. Two kinds of consequences of functional health constraints might be responsible for lowered emotional well-being: limitations in interacting with the external world and self-evaluation problems. While limitations on one's interactions most likely lead to lowered positive affect, self-evaluations are more likely to lead to heightened levels of negative affect. The following sections provide an overview of the empirical evidence of the relationship between health constraints and emotional well-being.

Functional Health Constraints and Emotional Well-Being: Contributions From Two Lines of Research

Two lines of research have addressed the question of how health is related to emotional well-being: research on mood and emotion and research on subjective well-being. These two research fields are rooted in different scientific traditions and focus on different parts of the lifespan. Moreover, between and even within each research field, tremendous differences exist regarding the operationalization of health.[4] Despite profound differences, each scientific field provides valuable contributions to questions about the association between functional health constraints and emotional well-being in old age.

Contributions From Research on Mood and Emotion

Research on mood and emotion primarily focuses on young individuals. The starting point of studying the association between health and emotional well-being was the finding that emotional well-being comprises two distinct dimensions, positive and negative affect (e.g., Watson & Tellegen, 1985; Zevon & Tellegen, 1982; see also Section "The Two-Component

[4] Given that the various dimensions of health (e.g., self-reported health, diagnosis of a disease) are interrelated elements of general physical health, they might have similar effects on emotional well-being. Consequently, hypotheses regarding the effects of functional health constraints can be at least partly derived from the emotional consequences of other facets of physical health. Important qualifications are detailed below.

Model of Emotional Well-Being"). Among a wide range of characteristics (e.g., leisure activities, exercise, stress, or quality of social relationships), health or its absence was considered as one of the potential differential predictors of these two components of emotional well-being. Specifically, it was hypothesized that physical symptoms (e.g., headaches, back pains, nausea, or colds) are associated with negative affect but should have little influence on positive affect (Watson & Pennebaker, 1989). The empirical evidence generally supports this hypothesis. The most robust finding derived from mood research is that individuals who report being in poor health are also likely to report high levels of negative affect (e.g., Clark & Watson, 1988; Watson 1988, Watson & Pennebaker, 1989). This association is modest in size, with correlations ranging from .10 to .35. Two findings of mood and emotion research deserve special mention. First—as was predicted—while measures of self-reported health were consistently related to negative affect, they almost never showed significant relationships with positive affect. Second—and unexpectedly—although the relationship between self-reported health and negative affect was sometimes of considerable magnitude, more objective indicators of physical health have been less highly, if at all, correlated with negative affect (e.g., Clark & Watson, 1988; Watson 1988; Watson & Pennebaker, 1989).

The Experience of Positive Affect: Insensitive to Health Problems?

How can the finding be explained that health constraints are significantly related to increased negative affect but show no association with positive affect? Two characteristics of the studies conducted by mood and emotion researchers might be responsible for this finding. On the one hand, all the studies are based on young and well-educated individuals (i.e., mostly psychology students). On the other hand, Watson and his colleagues do not concern themselves with major health constraints having multiple consequences for an individual's capacity to effectively interact with the environment. As Watson (1988) pointed out, "self-rated health complaints are significantly correlated with overall subjective distress but have no implications for one's capacity to live a full and exciting life" (p. 1025). The health complaint scales typically used by this research group include only minor and transient physical problems. These problems have been shown to have, in fact, no restricting impact either on work and leisure activities or on the social life of younger individuals (i.e., psychology undergraduate students; Clark & Watson, 1988). Thus, the reason behind the low association between physical symptoms and positive affect may be that the health problems investigated by Watson and his colleagues did not affect performance domains. Minor and transient health problems may result in primarily unfavorable internal self-evaluation processes (e.g., experience of discomfort and pain), which in turn might lead to enhanced negative affect but not to decreased positive affect. Given that the studies conducted by mood and emotion researchers have not examined the processes connecting health problems and emotional well-being, this hypothesis is in need of investigation.

Although minor health problems appear to have no long-term influence on younger individuals' positive affect, within-subject analyses (single individuals are assessed on multiple occasions) revealed that the problems did have short-term effects on positive affect. The within-subject correlations between physical symptoms and positive affect were typically as strong as those found for negative affect (Neale et al., 1987; Watson, 1988). Thus, on days when individuals actually experienced a physical problem, they typically reported feeling lowered positive affect *and* heightened negative affect. In contrast, seen over a longer time span, experiencing minor health problems did not necessarily preclude a person's also experi-

encing many situations eliciting positive affect. Acute health problems, however, appear to have implications for one's capacity to have exciting and positive experiences, and thus influence not only negative but also positive affect. Given the within-subjects finding, it seems plausible that *functional* health constraints in old age, which do affect an individual's capacity to live a full and exciting life, should not only be associated with increased negative affect but also with diminished levels of positive affect. In other words, to the degree that health problems involve consequences for self-evaluation *and* the capacity to interact with one's environment, both components of emotional well-being—positive and negative affect—might be compromised.

The Perception of Health is More Important Than Actual Health: Part I.

How can the finding be explained that self-reported health shows a much stronger relation to negative affect than do objective indices of health? Given that objective health measures sometimes have only little or even no impact on negative affect, Watson and Pennebaker (1989) concluded that the association between self-reported health and negative affect is likely to be spurious and due to other reasons than actual health. The authors have advanced a *symptom perception hypothesis* and argue that, in comparison to individuals low in negative affect, individuals high in negative affect may be more likely to notice and attend to normal body sensations and to interpret these symptoms as more painful and pathological. In other words, individuals who chronically experience high levels of negative affect are likely to *perceive* their health as poor, but they are not necessarily at greater risk of actually being in worse health than individuals low in negative affect. The symptom perception hypothesis implies that (a) negative affect is a precursor of self-reported health, and (b) the mechanism through which negative affect leads to self-reported health is largely unrelated to actual health. There are at least three reasons for caution in accepting the symptom perception hypothesis as an adequate account of the mechanism responsible for the association between self-reported symptoms and negative affect. First, most of the studies that report a positive association between symptom reports and negative affect are cross-sectional. Such data do not permit a clear causal interpretation (see Section "Resources and Risk Factors for Emotional Well-Being: Establishing a Causal Link").

Second, Watson and Pennebaker (1989) did not directly test the hypothesis that the effect of negative affect on self-reported health is mediated through selective attention processes. As was noted by Baron and Kenny (1986), establishing a mediational relationship in which Construct B (selective information processing) mediates the link between Construct A (negative affect) and Construct C (self-reported health) by definition contains three components. A (negative affect) is related to C (self-reported health), A (negative affect) is related to B (selective information processing), and B (selective information processing) is related to C (self-reported health). Watson and Pennebaker (1989) focused on only one component of a mediational relationship: They reviewed studies that demonstrated an association between negative affect and selective information processing.

Third, alternative explanations for the empirical associations exist and must be ruled out before accepting the symptom perception hypothesis. One such explanation, which has been mostly ignored in the literature, refers to the validity of objective health measures. According to the symptom perception hypothesis, self-report measures of health are not valid reflections of individuals' actual health status. An alternative hypothesis would be that the correlation between objective measures of health and emotional well-being might be smaller than that of

self-reported health, because objective (and not subjective) measures are invalid indicators of an individual's actual health status.

This hypothesis gains plausibility if one looks at the measures that were actually used in studies focusing on the relation between objective health and negative affect, for example, biological markers such as blood chemistry. From a psychological view, it is questionable why specific biological markers such as the composition of one's blood should be assumed to have an influence on one's emotional well-being. Given that these indices of health are often imperceptible, often have no implications for individuals' daily lives, and do not result in subjective discomfort and pain, it is not surprising that they sometimes showed only small correlations with emotional well-being (Watson & Pennebaker, 1989; Costa & McCrae, 1985b, 1987). Before rejecting the hypothesis that the actual health status of individuals has implications for emotional well-being, one should improve the measures of objective health and carefully consider whether they capture those aspects of health (or its absence) that might have consequences for a person's level of emotional well-being. Furthermore, perceived health, actual health problems, and other possible mediators of the relationship between health and emotional well-being should be simultaneously investigated using longitudinal designs.

Contributions From Research on Subjective Well-Being

In contrast to researchers on mood and emotion, subjective well-being researchers are traditionally involved in studying older individuals. In subjective well-being research, emotional well-being is typically subsumed under the broader and superordinate construct, subjective well-being, and is often not studied separately.[5] Subjective well-being is usually described as an indicator of successful adaptation to the specific challenges and restrictions typical of old age. Given that poor health is one of the most common problems associated with old age (see Section "Why is the Important to Study the Emotional Consequences of Functional Health Constraints in Old Age?"), it is understandable that health is one of the most often studied predictors of subjective well-being. In his review "Thirty years of research on the subjective well-being of older Americans," Larson (1978) pointed out: "Among all the elements of an older person's life situation, health is the most strongly related to subjective well-being. People who are sick or physically disabled are much less likely to express contentment about their lives." (p. 112) Larson's conclusion was based on a review of 14 cross-sectional studies that had been published at that time. All of these studies focused on the relationship between health and subjective well-being in participants 60 years of age and older. Correlations between good health and subjective well-being were generally above $r = .20$ and below $r = .40$.

The many studies conducted in the following years also suggested a moderate relation between health and subjective well-being. The findings were summarized in 1984 by a meta-analysis (Okun, Stock, Haring, & Witter, 1984), a replicated secondary data analysis (George & Landerman, 1984) and a narrative review (Zautra & Hempel, 1984). These three studies came to the same general conclusion: In old age, the correlation between health and subjective well-being is of moderate size. The meta-analysis, based on samples with a mean age of

[5] Given that the two components of emotional well-being (i.e., positive and negative affect) are interrelated to other dimensions of subjective well-being (see Section "Emotional Well-Being: A Central Facet of Subjective Well-Being"), the following sections also review studies that have not examined emotional well-being separately from other dimensions. Note, however, that subjective well-being is a broad construct that involves—besides *feeling* well—other components too.

65 years and over, revealed a median correlation of $r = .31$ between good health and subjective well-being. The 95 percent confidence interval estimates were .29 to .35 for the zero-order correlations. According to subjective well-being researchers, there is little doubt that health plays an important role in older people's subjective well-being. In spite of the cumulative evidence supporting the presence of a connection between health and subjective well-being in old age, the findings also suggest important qualifications. These are elaborated below.

The Effects of Health on Subjective Well-Being: A Function of the Specific Dimensions Considered?

An examination of the empirical studies that have investigated the association between health and the subjective well-being of older people reveals two aspects. First, most of the empirical studies examined general health assessed through self-report measures. Given that functional health is often considered as one of the most important facets of physical health in old age, it is surprising that only a small number of studies have focused on its relationship to subjective well-being. No single study reviewed by Larson (1978) utilized measures of functional health. This lack was also revealed by the meta-analysis of Okun and his colleagues (1984): Of a total of 229 correlations between health and subjective well-being, only 13 were based on a measure of functional health. The mean correlation between functional health and subjective well-being was of moderate size ($r = .35$), indicating that functional health is equally important to subjective well-being as are other health facets (e.g., the mean correlation between self-reported general health and subjective well-being was also $r = .35$).

Second, many studies that have investigated the effects of health do not focus on specific dimensions of subjective well-being but on *general* subjective well-being. This lack of focus appears unfortunate, given the clear evidence that subjective well-being comprises several dimensions (e.g., George, 1981; Liang & Bollen, 1983; McCulloch, 1991; see also Section "Emotional Well-Being: A Central Facet of Subjective Well-Being"). Are all the dimensions of subjective well-being equally compromised by poor health? More to the point, does poor health affect older people's emotional well-being only through one dimension or are both negative affect and positive affect influenced?

Table 3 provides an overview of the studies that examined the effects of health on subjective well-being and focused on either functional health or one of the two components of emotional well-being (i.e., positive and negative affect).[6] As seen in Table 3, three studies examined the effects of *physical symptoms* on the two components of emotional well-being and five studies focused on the emotional consequences of *general health.* Only two studies that investigated the effects of *functional health* on positive and negative affect were identified.

The effects of physical symptoms. Turning first to the emotional implications of physical symptoms, the study reported by Bradburn (1969) revealed that this facet of physical health was associated with increased negative affect but not with (decreased) positive affect. For two reasons this finding might be consistent with the findings derived from mood and emotion research (see Section "Contributions From Research on Mood and Emotion"): First, similar to mood and emotion research, health was operationalized as *minor* and *transient* physical symptoms (e.g., presence of cold or flu, hands sweating, headaches, rapid heart beat during the last few weeks). Second, a relatively young sample of individuals was investigated covering young

[6] Studies that investigated the relation between other facets of health (e.g., diagnosis of life-threatening diseases by a physician) and other dimensions of subjective well-being (e.g., life satisfaction) were excluded.

to late middle adulthood (21–59 years; see Table 3). Assuming that positive affect results from interacting with the external world (e.g., Clark & Watson, 1988; Lawton, 1983; see also Section "Implications of the Two-Component Model of Emotional Well-Being for Studying Resources and Risk Faktors"), it is not surprising that young individuals' minor and transient physical symptoms, which most likely do not restrict those interactions, had no influence on positive affect. A study conducted by Spiro, Aldwin, Levenson, and Bosse (1990) was also based on younger individuals and utilized a measure of physical symptoms. As expected, the authors found that physical symptoms showed a smaller cross-sectional association to extraversion than to neuroticism.[7]

Thus, consistent with the studies reported in mood and emotion research, minor and transient physical symptoms appear to be a risk factor particularly for (younger) individuals' negative affect (see also Diefenbach, Leventhal, Leventhal, & Patrick-Miller, 1996). Does this finding generalize to other facets of health and to samples that are comprised of old and very old individuals? The answer to this question is probably "no."

The effects of general physical health. Table 3 reveals that in all of the cross-sectional studies that were based on older people, self-reported *general health* was associated with both decreased positive affect *and* increased negative affect (Bild & Havighurst, 1976; Brief et al., 1993; Okun et al., 1984).

Three longitudinal studies on the relationship between self-reported general health and the two components of emotional well-being were identified. Brief et al. (1993) found that the cross-sectional inverse relationship between self-reported good health and negative affect remained significant when negative affect was assessed two and four years later. The cross-sectional positive association between self-reported good health and positive affect, however, became weaker after two years and was nonsignificant after four years. This finding can be interpreted as indicating that self-reported health problems have short-term rather than long-term influences on positive affect. Individuals might be able to adapt to the consequences of health that are responsible for lowered positive affect. Another way of explaining this finding is that those aspects of self-reported general health that are responsible for diminished levels of positive affect might have changed over time. If these changes were differential, the predictive power of initial levels of health may become weaker over time. Brief et al. (1993) did not analyze whether change in health status was associated with later positive affect.

The findings reported by Markides and Lee(1990) are consistent with the results of Brief et al. (1993). They found that self-reported good health was inversely related to negative affect. In an eight-year follow-up study, the authors showed that poor general health at baseline was associated with increases in psychological distress over the time interval of eight years. However, the reverse was not true; psychological distress did not predict changes in health status.

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[7] Given that the core aspect of neuroticism is the tendency to experience negative affect, whereas the tendency to experience positive emotions is a central facet of extraversion, these two personality factors can be considered as indicators of the two components of emotional well-being (e.g., Lawton, 1983). Consistent with this notion, an explorative factor analysis based on data of the present study (i.e., data from the first wave, $N = 516$) revealed that items measuring neuroticism (6), extraversion (6), negative affect (10), and positive affect (10) produced two largely uncorrelated factors ($r = -.10$), explaining 55.4 percent of the total variance. As was expected, items assessing neuroticism and negative affect loaded on the first factor, whereas items measuring extraversion and positive affect loaded on the second factor. More information about the results of this analysis can be obtained from the author upon request.

Table 3
Studies Measuring Facets of Health and Subjective Well-Being

Source[1]	*Sample*	*Facet of Health*	*Facet of subjective well-being*	*Finding*
Bradburn (1969)	*N* = 2,788 (age: 21–29, 24%; 30–39, 30%; 40–49, 26%; 50–59, 27%; males: 53%)	Self-reported physical symptoms	Positive affect Negative affect	*Cross-sectional:* Physical symptoms were associated with high negative affect but not with (low) positive affect.
Spiro et al. (1990)	*N* = 1,111 (mean age at entry 43.1 years, 100% male)	Self-reported physical symptoms	Extraversion Neuroticism	*Cross-sectional:* Physical symptoms were associated with low extraversion and high neuroticism. *Longitudinal: Retest interval: 17 years* Neither extraversion nor neuroticism predicted change in physical symptoms; the reverse causal chain was not tested.
Diefenbach et al. (1996)	*N* = 76 (mean age 73.5 years, 50% males)	Self-reported physical symptoms	Negative affect (depression/ anxiety)	*Cross-sectional:* Physical symptoms were associated with high depression but not with (high) anxiety.
Markides & Lee (1990)	*N* = 254 (mean age at entry 67.4 years, 64% female)	Self-reported general health: sum score of 4 items on limitations due to poor health, bed disability days, and hospitalizations	Psychological distress	*Longitudinal: Retest interval: 8 years* Poor general health at baseline was associated with increased distress over time; the reverse was not true.
Brief et al. (1993)	*N* = 443 (mean age at entry 60.5 years, 48.8% female)	Self-reported general health: sum score of 2 items on general health, and 2 items on the extent of physical discomfort and limitation related to cardiovascular & musculoskeletal symptoms	Positive affect Negative affect	*Cross-sectional:* Poor general health was associated with low positive affect and high negative affect. *Longitudinal: Retest intervals: 2 and 4 years* The effect of general health on negative affect remained significant 2 and 4 years later. The effect of general health on positive affect vanished over time and was nonsignificant after 4 years.
Bild & Havighurst (1976)	*N* = 474 (age 60 and older)	Self-reported general health	Positive affect Negative affect	*Cross-sectional:* Poor health was associated with low positive affect and high negative affect.
George et al. (1984) Secondary data analysis: Myth and Reality of Aging Study	*N* = 4,254 (age 18 and older)	Self-reported general health	Positive affect Negative affect	Cross-sectional: Poor health was associated with low positive affect and high negative affect.

Table 3 (continued)

Source[1]	*Sample*	*Facet of Health*	*Facet of subjective well-being*	*Finding*
George et al. (1984) Secondary data analysis: Second Duke Longitudinal Study	*N* = 502 (age 45 and older)	Self-reported general health Physician-rated health (based on physical examination, medical history, and routine lab tests)	Positive affect Negative affect	*Cross-sectional:* Poor health (self- and physician-rated) was associated with high negative affect but not with (low) positive affect. *Longitudinal: Retest interval: 6 years:* The unfavorable effects of poor health on negative affect, assessed 6 years later, remained significant.
Okun et al. (1984)	104 samples (mean age 65 and over)	Self-reported general health	Positive affect Negative affect	*Meta-analysis:* Poor general health was associated with low positive affect and high negative affect (result was based on 4 correlations).
		Self-reported functional health	General subjective well-being	Poor functional health was associated with low general subjective well-being (result was based on 13 correlations).
Lawton (1983)	258 older individuals[2]	Self-reported functional health	Positive affect Negative affect	*Cross-sectional:* Poor functional health was associated with high negative affect and indirectly with low positive affect.
Marsiske et al. (1996) Data from the Berlin Aging Study	516 individuals (mean age 85 years, 50% male)	Performance-based functional health (constraints in vision, hearing, and mobility)	Positive affective states Negative affective states	*Cross-sectional:* Poor functional health was associated with low positive and high negative affective states.

[1] The studies were selected according to whether they examined either functional health or one of the two components of emotional well-being (i.e., positive or negative affect).

[2] The author did not provide sample characteristics.

The authors did not utilize a measure of positive affect; whether the findings can be generalized to positive affect is, therefore, an open question.

Using data from the Normative Aging Study, Spiro et al. (1990) found that neither neuroticism nor extraversion predicted *changes* in symptom reporting over the retest interval of 18 years. Investigating the relationship between health and subjective well-being from the perspective of personality psychology, the authors concluded that assigning causal priority to either personality or health makes little sense. This conclusion might be premature, because the reverse causal path—health may predict change in affective traits—which is prominent in subjective well-being research, was not analyzed.

Taken together, general poor health can be considered a risk factor for older individuals' concurrent levels of positive affect and negative affect. The longitudinal findings suggest that general health is also associated with (a) individual differences in negative affect assessed several years later and with (b) individual differences in *intra*individual changes of negative affect. The findings are consistent with the notion that general health causes negative affect. The reverse causal chain—negative affect causes health—found less support (see Markides &

Lee, 1990; Spiro et al., 1990). Whether initial levels of health predict *intra*individual changes in positive affect has not yet been investigated. Moreover, no empirical study has investigated whether individual differences in *intra*individual changes of health predict differential *intra*individual changes in positive and negative affect. Given the sparse empirical evidence, more longitudinal studies are needed to understand the effects of health on the two components of emotional well-being over time.

The effects of functional health. As seen in Table 3, two cross-sectional studies were identified that have investigated the consequences of functional health separately for positive versus negative affect. A study conducted by Marsiske et al. (1996), which was based on the sample of the Berlin Aging Study, suggests that older individuals with poor functional health experience higher negative affect *and* lower positive affect. This study is unique in that functional constraints were assessed with objective performance-based tests. However, positive and negative emotional well-being have not been assessed with pure measures of affective states (i.e., positive emotional well-being was derived by computing a sum score of positive affect, extraversion, and openness to experience; negative emotional well-being was measured by negative affect, neuroticism, and emotional loneliness). Despite these qualifications, it is interesting to note that functional constraints in hearing, vision, and mobility were associated with increased negative (personality and) affective traits and decreased positive (personality and) affective traits.

A study based on 258 older individuals, conducted by Lawton (1983), shed further light on the relations between functional health and the two components of emotional well-being. Functional health, as measured by an activities-of-daily-living questionnaire, had a direct effect on negative affect ($r = .28$), and was indirectly related to positive affect, mediated by social competence and perceived quality of time use. This finding is consistent with the assumption that the effects of functional health constraints on positive affect are mediated through limitations in performance domains. In other words, the effect of functional health constraints on positive affect are likely to be dependent on whether functional constraints are chronic and serious enough to have consequences for individuals' performance in daily lives. Unfortunately, the path model tested by Lawton (1983) did not include consequences of functional health constraints that potentially mediate the effects on negative affect. Lowered self-esteem, chronic pain, or feelings of uncertainty might have explained the path from functional health to negative affect.

Thus, contrary to the evidence based on young adults (derived in mood and emotion research), gerontological studies suggest that in old age poor health, including functional health constraints, is associated with increased negative affect *and* with decreased positive affect. However, very little longitudinal evidence on the relationships between health and emotional well-being exists. Specifically, no longitudinal study was identified that has investigated the effects of *functional* health on the two components of emotional well-being over time. To date, it is largely an open question whether initial levels or *intra*individual changes in functional health constraints predict differential *intra*individual changes in positive and negative affect.

The Perception of Health is More Important Than Actual Health: Part II

Like researchers in mood and emotion, subjective well-being researchers have found objective measures of health to be poorer predictors of subjective well-being than self-reported health (e.g., Brief et al., 1993; Okun et al., 1984; Zautra & Hempel, 1984). How do subjec-

tive well-being researchers approach this finding? Given that self-reported and objective health are typically moderately interrelated, Smith, Fleeson, Geiselmann, Settersten, Nitschke, and Kunzmann (1996) argue, for example, that the pattern of results would be consistent with the hypothesis that perceived health mediates the influence of actual physical health on subjective well-being (see also Brief et al., 1993; Campbell et al., 1976; Lawton, 1983). That is, objective health problems are believed to result in subjective perceptions of these problems, which in turn might reduce subjective well-being. Using data from the Virginia State-wide Survey of Older People (2,146 participants aged 60 or older), George and Landerman (1984) provided some empirical support for this hypothesis. The authors have shown that nearly half of the total effect of objective physical impairment on life satisfaction was indirect, mediated through self-reported health.[8] On the basis of data from the Berlin Aging Study (the sample covers adults aged 70–103 years), Smith, Fleeson, Geiselmann, Settersten, Nitschke, and Kunzmann (1996) were also able to show that the effects of specific objective life conditions on subjective well-being were filtered through subjective evaluations of these conditions. Objective life conditions as such had only a minimal direct effect on reports of general subjective well-being. However, objective conditions exerted substantial indirect effects because they influenced the way individuals evaluated these conditions.

Seen in a broader theoretical context, the hypothesis that self-reported health functions as a mediator of the relationship between actual health and subjective well-being appears particularly fruitful, because it combines two general theories of subjective well-being: bottom-up and top-down theories. Bottom-up theories of subjective well-being, as described by Diener (1984), focus on objective life conditions as determinants of emotional well-being. According to bottom-up theories, emotional well-being changes with changing life conditions such as objective changes in health status (Andrews & Withey, 1976; Bradburn, 1969; Veenhoven, 1991).

Top-down theories of emotional well-being, on the other hand, bring into focus personality and self-related processes as determinants of emotional well-being. In this context it has been argued that subjective perceptions and evaluations of objective life conditions are more important for emotional well-being than objective life conditions per se (e.g. Campbell et al., 1976; Costa & McCrae, 1980, 1984; McNeil, Stones, & Kozma, 1986). Top-down theories of subjective well-being dictate that emotional well-being changes with changing perceptions of health status and not necessarily with objective changes.

Given that the empirical evidence generally supports top-down *and* bottom-up effects, more and more researchers argue that the controversy between bottom-up and top-down theories of subjective well-being should be overcome by integrating these two broad approaches (e.g., Brief et al., 1993; Feist, Bodner, Jacobs, Miles, & Tan, 1995; Headey & Wearing, 1991; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996). The proposition that both objective and perceived health are contributors to subjective well-being can be regarded as one such integrating attempt, specifically, the hypothesis that perceived health mediates the effect of objective health on subjective well-being.

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[8] The authors based their measure of objective physical impairment on a sum score of participants' reports of chronic illnesses, use of medication and supportive devices, and the degree to which health problems interfere with functioning. Although these domain-specific self-report measures might be based on *more* objective grounds than a general rating of health status, it is not known to what degree they tap objective health status.

Summary

Two lines of research have addressed the question of how health is related to emotional well-being: research on mood and emotion and research on subjective well-being. Research on mood and emotion, which is primarily based on young individuals, suggests that minor and transient health problems are associated with high levels of negative affect but not with (low levels of) positive affect. An explanation for this differential effect is that minor and transient physical symptoms of younger individuals do not imply limitations in interacting with the external world. Studies based on old and very old individuals have found poor health (including functional health constraints) to be associated with high levels of negative affect *and* low levels of positive affect. In old age, health problems are likely to be more serious and long-lasting than in previous life periods. As a consequence, both components of emotional well-being may be affected.

Surprisingly, in both mood and emotion research and subjective well-being research, there is almost a complete lack of longitudinal studies that cover longer time periods of several years. To date, it is largely an open question whether initial levels or individual differences in *intra*individual changes of functional health predict differential *intra*individual changes in positive and negative affect. Do the emotional consequences of poor health persist over time? Are changes in health status more important for feelings of well-being than absolute levels? Does health cause emotional well-being or does emotional well-being cause health? Investigating people over time is crucial in providing answers to these questions.

Although the two lines of research reviewed take quite different perspectives on the study of the relation between health and emotional well-being, researchers from both groups have found objective measures of health to be poorer predictors of subjective well-being than self-reported health. Several explanations of this pattern have been advanced. Given the small correlations between objective health and emotional well-being, a number of researchers (e.g., Watson & Pennebaker, 1989; see also Costa & McCrae, 1985b, 1987) concluded that the relation between self-reported health problems and emotional well-being might be completely spurious (i.e., unrelated to actual health problems). In contrast, subjective well-being researchers typically focus on the moderate correlation between objective and self-reported health and posit that the effects of objective health problems on emotional well-being might be mediated by self-reported health. Clearly, studying objective and subjective facets of health simultaneously is a necessary precondition to gain an insight into their dynamic interplay and their joint effects on emotional well-being.

Perceived Control: A Resource for Emotional Well-Being in Old Age?

While the previous section discussed the emotional consequences of constraints in functional health, the present section focuses on feelings of control and their influence on emotional well-being.[9] In other words, *beliefs* about control rather than the *objective* potential to exert

[9] In this study, the terms feeling in control, perceived control, subjective control, and control beliefs are used interchangeably. These four terms describe perceived control at the most abstract level, and can be broken down into several more specific types or dimensions (e.g., self-related control vs. perceived others' control; for detailed definitions, see Section "Defining Perceived Control").

control will now be discussed as potentially contributing to emotional well-being in old age. A large number of studies support the assumption that beliefs about personal control are pivotal contributors to emotional well-being and successful aging in general (e.g., Abeles, 1991; Baltes & Baltes, 1986; Lachman, Ziff, & Spiro, 1994; Rodin, 1986). What is often ignored in the literature is that perceived control may also comprise facets that are less desirable and may even be dysfunctional. The present study addresses the question whether all facets of perceived control are resources with beneficial effects. As elaborated below, some facets of perceived control are better viewed as risk factors for emotional well-being rather than as resources. Before considering the role of three generalized beliefs about control in maintaining emotional well-being, issues about defining and measuring perceived control are discussed first.

Defining Perceived Control

Several approaches have been utilized in describing the types and dimensions of perceived control (for reviews, see Baltes & Baltes, 1986; Bandura, 1996; Flammer, 1990; Haidt & Rodin, 1995; Lefcourt, 1981; Little, in press; Rodin, 1990; Skinner, 1995, 1996). At least five major theories can be identified and organized around the constructs: locus of control (Rotter, 1966, 1975, 1990), causal attributions (Graham & Weiner, 1991; Weiner, 1986), perceived non-contingency (Abramson, Seligman, & Teasdale, 1978; Seligman, 1975), self-efficacy (Bandura, 1977, 1996), and agency (Little, in press; Skinner, 1995, 1996). All these constructs focus on how individuals regard their personal experiences and whether they perceive themselves to be capable of dealing with their circumstances.

Perceived control is considered to be a multidimensional construct with several differing dimensions, but a clear consensus is lacking on the number of perceived control facets and their precise definition. Perceived control constructs (i.e., locus of control, causal attributions, perceived non-contingency, agency, and self-efficacy) differ regarding their proposed (a) *source of control* (e.g., self-oriented vs. other-oriented), (b) *valence of the control domain* (e.g., desirable vs. undesirable), (c) *time specificity of the control domain* (e.g., future-oriented vs. past-oriented), (d) *domain specificity of the control domain* (e.g., control at work vs. in general), and (e) *function* (e.g., action regulative vs. emotion regulative; see Abeles, 1991; Averill, 1973; Bandura, 1996; Little, 1995; Rodin, 1990; Schwarzer, 1993; Skinner, 1995). These five characteristics of control beliefs are elaborated below.

The Source of Control and the Valence of the Control Domain

The present study focuses on control beliefs, which have two distinct characteristics. First, control beliefs can be differentiated according to the *source of control* (i.e., whether they are self- or other-oriented). A person may believe that he or she has control over outcomes and events (perceived personal control). On the other hand, a person may believe that other people typically influence the things in his or her life (perceived others' control). This distinction between perceived personal control and perceived others' control is related to the "internal" versus "external" loci of control constructs (Rotter, 1966). While Rotter (1966) originally conceptualized internal and external locus of control as two poles of one dimension, several factor-analytic studies have shown that perceived personal control and perceived others' control indicate two control dimensions that are mostly independent of each other (e.g., Levenson, 1981; Presson, Clark, & Benassi, 1997; Shewchuk, Foelker, Camp, & Blanchard-

Fields, 1992). The perception that one needs assistance from others to achieve certain goals, then, is not necessarily in conflict with feelings of high personal control. This implication is often ignored, given that high perceived others' control is typically (more or less implicitly) considered as indicating low personal control (e.g., Affleck, Tennen, Pfeiffer, & Fifield, 1987; Colvin & Block, 1994).

Second, control beliefs can be classified by the valence of control domains (i.e., the outcomes or events a person believes to be controllable). On a general level, control beliefs can refer to desirable or undesirable outcomes. A person might, for example, believe that he or she can approach and influence positive events (e.g., "If I want them to, people like me."). Control beliefs can also relate to negative and undesirable outcomes. A person might, for example, believe that he or she can avoid or at least influence negative events (e.g., "If I do not want to, I won't get sick."). Several factor-analytic studies have supported the notion that perceived personal control over desirable outcomes versus undesirable outcomes constitutes two separate dimensions of personal control (Brewin & Shapiro, 1984; Kunzmann & Smith, 1996; Reich & Zautra, 1991; Smith & Baltes, 1996). Given that there may always be undesirable *and* desirable events in people's lives, to distinguish between control over the one kind versus the other kind of experiences might be important for psychological adaptation. Particularly in old age, a life period full of undesirable outcomes that are potentially beyond personal control, a successful strategy for maintaining emotional well-being might be to focus instead on desirable outcomes that are still controllable. To date, little attention has been allocated to the emotional benefits that may result from the differentiation between perceived control over desirable and over undesirable outcomes.

While *personal* control over desirable versus undesirable outcomes indicates two control dimensions, factor-analytic studies based on data of the Berlin Aging Study (Kunzmann & Smith, 1996; Smith, Marsiske, & Maier, 1996) found that perceived *others'* control over desirable versus undesirable outcomes constitutes only one dimension. In other words, if older individuals believe that other people have control over desirable outcomes in their lives, they also tend to believe that other people have control over undesirable outcomes and vice versa.

Table 4
Three Dimensions of Generalized Perceived Control

Dimensions	*Examples of indicators*
Perceived personal control over desirable outcomes	• I can make sure that good things come my way. • When I get what I want, it's usually because I have worked hard for it.
Perceived personal responsibility for undesirable outcomes	• It's my fault if something goes wrong in my life. • If something goes wrong in my life, it's usually because I didn't take enough care.
Perceived others' control over desirable and undesirable outcomes	• The good things in my life are determined by other people. • I depend on others to ensure that there are no problems in my life.

Note. As seen, the dimensions of perceived control are differentiated regarding the source of control (i.e., personal control vs. others' control) and the valence of control (i.e., the two beliefs of personal control are further differentiated according to whether they refer to desirable or undesirable outcomes).

Combining the two characteristics of beliefs about control—the source of control, and the valence of control domain—results in three dimensions of perceived control. These three dimensions are detailed in Table 4.

The Domain and Time Specificity of Perceived Control

A number of studies have demonstrated that control beliefs vary by domain (e.g. Bandura, 1977, 1996; Lachman, 1986; Skinner, 1995). For example, a person might believe that he or she has the capabilities to be successful at work. At the same time, this person might be uncertain about whether he or she is able to stick to plans and goals in other life domains (e.g., being socially active, making friends, or doing well in sports). Domain-specific control beliefs might even exist on the most concrete behavior level. For example, a claustrophobic person might feel that he or she can spend a couple of hours in a spacious museum hall but not in a small theater.

Despite this domain specificity, some people are more likely than others to make external attributions or to perceive personal control across multiple domains (Lefcourt, 1981; Peterson, Maier, & Seligman, 1993; Rotter, 1966, 1990). Generalized control beliefs can best be thought of as a broad, cognitive personality trait, or as a generalized and stable "attributional style" (e.g., Mischel, 1990; Peterson et al., 1988). Research on learned helplessness (Seligman, 1975) has examined the ways in which generalized control beliefs are built up over time. For example, people who are frequently exposed to non-contingency and uncontrollability learn to expect non-contingency and uncontrollability, and these expectations generalize beyond the domains in which they were formed. As seen in Table 4, the dimensions of perceived control that are central to the present study are generalized regarding the domains of control.

Control beliefs vary not only by domain but also by the time perspective involved (i.e., past, present, or future). For example, perceived control over undesirable outcomes can refer to avoiding negative events in future (e.g., "If I want to, I can avoid getting sick.") or to the responsibility for past undesirable events (e.g., "It's not my fault that I got sick."). Time constitutes a continuous dimension. Consequently, control beliefs might relate to the near future or to the recent past. Alternatively, control beliefs can refer to a longer time span covering, for example, the whole life of an individual. These long-term beliefs about control are often operationalized by items that do not refer to any particular time frame (e.g., "I can control the desirable events in my life."). As can be seen in Table 4, the dimensions of perceived control of this study are generalized regarding the time perspective.

When investigating the role of perceived control in maintaining older people's emotional well-being, it is important to take the domain and time specificity or generality of perceived control into account. Two things need to be considered. First, control beliefs may be the best predictors for those outcomes that are equivalent regarding the generality dimension (i.e., predictor-outcome symmetry; Haidt & Rodin, 1995; Rotter, 1975; Schwarzer, 1994; Skinner, 1995). Consequently, specific control beliefs should be more useful than general control beliefs for predicting specific behaviors (e.g., who will quit smoking). In contrast, generalized control beliefs are probably more important when predicting successful adaptation in broad domains of activity (e.g., who will be satisfied with his or her life). Consistent with this notion, for example, Lachman (1986) found that domain-specific control beliefs about intellectual performance were more highly correlated with actual performance than were generalized beliefs about control.

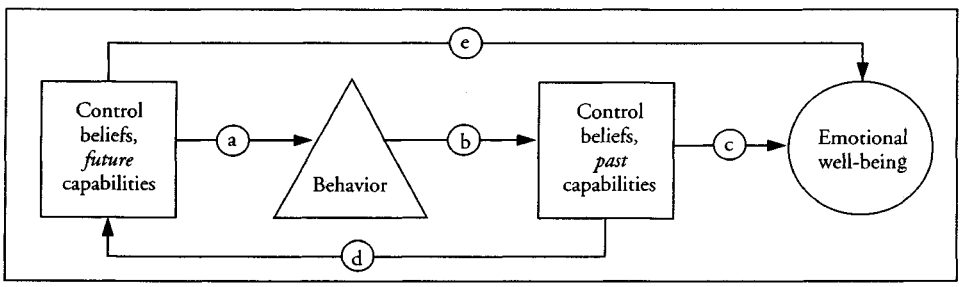
Second, the influence of generalized control beliefs is likely to be strongest in situations where a person has the least prior experience, that is, where domain-specific beliefs have not yet been formed. In *new* and *ambiguous* contexts, generalized beliefs of control might have the most pronounced effects on psychological adaptation (Haidt & Rodin, 1995). Many perceived-control experts would add that when individuals encounter *obstacles, failure,* and *stress,* generalized perceived control becomes a particularly salient and important contributor to subjective well-being (Skinner, 1995; Taylor & Brown, 1988; Thompson & Spacapan, 1991).

The Function of Perceived Control

The time perspective of control beliefs is especially involved in a further characteristic of control beliefs—their proposed function. Following Skinner (1995), control beliefs have two functions: (a) They regulate behavior before and during engagement, and (b) they interpret the behavioral outcomes after engagement. Control beliefs that refer to the future are assumed to primarily regulate behavior (e.g., investment or persistence). In contrast, the major purpose of control beliefs that refer to the past might be the interpretation of behavioral outcomes (e.g., the search for causes of performance).[10] Consequently, past-oriented control beliefs might have their most proximal effect on emotional states following the interpretation of an outcome. (For a discussion of how specific past-oriented control beliefs differentially predict specific affective states, see Graham & Weiner, 1991; Weiner, 1986, 1990; Weiner & Litman-Adizes, 1980.) Figure 3 summarizes the proposed direct and indirect influences of control beliefs referring to the future and to the past on behavior and emotional well-being.

To exemplify Figure 3, imagine an obese woman who wants to lose weight. The woman's future-oriented control belief, "if I want to, I can lose weight," fosters the engagement in goal-relevant behaviors (e.g., dieting, exercising; path a). If this woman were successful, a past-oriented control belief such as "I was successful because I did a lot to lose weight" is believed to be associated with enhanced emotional well-being (e.g., high self-esteem, feelings of happiness, and satisfaction; path c). In addition, this past-oriented control belief may be involved in

Figure 3
Hypothesized Functions of Future- and Past-Oriented Control Beliefs



[10] Past-oriented control beliefs are also known in the literature as attributions (e.g., Seligman, 1975; Weiner 1986). Following Skinner (1995), in the present study, the terms past-oriented control and attribution are used interchangeably.

shaping and strengthening future-oriented beliefs (path d). For example, the successful woman may come to the conclusion "if I want to, I can withstand any temptation."

Following the model illustrated in Figure 3, future-oriented control beliefs may be the most proximal predictors of goal-directed behaviors, while past-oriented control beliefs most likely are proximal predictors of emotional well-being. However, as shown, future-oriented control beliefs are likely to influence emotional well-being not only in an indirect way (through their effects on behavior and performance) but also directly (path e). That is, the belief that one is able to control desirable things in the future is certainly pleasant in itself.

As seen in Table 4, the present study's dimensions of perceived control do not have a specific time orientation. These generalized beliefs about control most likely influence a broad range of outcomes—behavior, performance, and emotional well-being. However, the influences of generalized control beliefs are likely to be less strong than those of more specific control beliefs (i.e., compared with generalized perceived control, future-oriented control beliefs may explain more variance in goal-relevant behaviors, while past-oriented control beliefs may explain more variance in emotional well-being).

Summary

Perceived control is a multidimensional construct. Its dimensions vary regarding several characteristics—the source of control, the valence of the control domain, and the specificity regarding domain, time, and function. All these characteristics are important when investigating the relationship of older people's perceived control and emotional well-being. Two implications seem most salient. First, generalized beliefs of control might be most useful when predicting general and long-term emotional well-being as opposed to current emotional well-being in specific life domains. Second, because in old age, challenges and threats to a wide range of competencies exist (see Section "Poor Functional Health: A Risk Factor for Emotional Well-Being in Old Age?"), the availability of *generalized* control beliefs might be particularly important for older people's emotional well-being. Based on these considerations, the present study focuses on control beliefs that are generalized regarding the domain and time perspective (see Table 4). These beliefs appear well-suited for investigating their role as predictors of older people's positive and negative affect—indicators of emotional well-being that are equally generalized across domains and time. As will be elaborated in the remainder of this chapter, whether generalized beliefs of control are resources or risk factors for emotional well-being may depend on two characteristics: (a) the source of perceived control (self vs. other) and (b) the valence of the control domain (desirable vs. undesirable).

Not all Facets of Perceived Control may be Beneficial for Emotional Well-Being

A sense of *personal* control has often been described as one characteristic of the aging self that functions as a resource in struggling with the challenges and risks of late life (e.g., Abeles, 1991; Baltes & Baltes, 1986; Haidt & Rodin, 1995; Lachman et al., 1994; Rodin, 1986). Despite the fact that the concept of perceived control plays a prominent role in gerontological research, the multidimensionality of this construct has often been overlooked (for a critique, see Haidt & Rodin, 1995; Krause, 1986; Reich & Zautra, 1991). Different perceived control dimensions may have different emotional consequences. In the present study, three dimensions of perceived control (see Table 4) are expected to relate to emotional well-being in a

complex fashion, sometimes increasing it and sometimes reducing it. The question of the consequences of perceived control becomes even more complex if the multidimensionality of emotional well-being is also taken into account. The relationship of perceived control to emotional well-being appears to be a function of the specific dimensions of perceived control and emotional well-being that are considered.

Perceived Personal Control Over Desirable Outcomes and Emotional Well-Being

Perceived personal control over desirable outcomes is often viewed as a prototype of an adaptive, functional, and desirable personality trait. In our individualistic "do-it-yourself" society, the belief that one is capable of achieving desired outcomes is highly valued, and this high value is reflected in prominent psychological theories of perceived control (e.g., Abeles, 1991; Baltes & Baltes, 1986; Bandura, 1996; Deci & Ryan, 1985, 1991; Heckhausen & Schulz, 1995; Skinner, 1995; Taylor & Brown, 1988). Following these theories, a feeling of personal control is a major contributor to a wide range of indicators of psychological adjustment. The mechanisms underlying the effects of this facet of perceived control are manifold. Perceived personal control has been shown to operate through motivational, cognitive, and behavioral pathways to influence psychological adjustment (e.g., Bandura, 1989; Haidt & Rodin, 1995; Lazarus & Folkman, 1987; Lopez & Little, 1996; Parkes, 1984, 1986; Shaw, 1992). For example, people with a higher sense of personal control are likely to set themselves higher standards and to be more persistent in achieving their goals (e.g., Bandura & Wood, 1989; Flammer, 1990; Locke & Latham, 1990; Skinner, 1995). Thus, perceiving personal control over desirable outcomes should be a resource that helps older individuals to maintain or even enhance their emotional well-being.

What is the empirical evidence? Recent empirical studies on the relationship between perceived control and emotional well-being primarily focus on personal control over *undesirable* outcomes. The adaptivity of personal control over desirable outcomes is far less often investigated. Given that theories of perceived control usually predict high adaptivity of personal control over desirable outcomes, this lack of focus on control over desirable outcomes in current empirical research is surprising. A meta-analysis by Sweeney et al. (1986) summarized earlier studies conducted in the 1970s and 1980s. Based on 54 studies (N = 4,857 mostly middle-aged participants), the authors found an average correlation of $r = -.19$ between depression and personal responsibility for desirable outcomes. This finding indicates that individuals who perceive themselves as responsible for successful outcomes are generally less depressed than people who do not feel responsible for their achievements. One might conclude from these earlier studies that personal control over desirable outcomes is a resource that is involved in minimizing negative affect (i.e., depression).

The question arises whether this facet of perceived control might also be involved in regulating positive affect. To the best of my knowledge, no study on perceived control has ever empirically investigated this question. However, the research on daily hassles and uplifts suggests some tentative answers. As reviewed above (see Section "Implications of the Two-Component Model of Emotional Well-Being for Studying Resources and Risk Factor"), this research demonstrated that desirable life events primarily influence one's level of positive affect, whereas undesirable events primarily influence one's level of negative affect (e.g., Reich & Zautra, 1983; Weiner, 1986; Zautra & Reich, 1983; Zautra et al., 1994). Applying these observations to the area of perceived control suggests that beliefs about personal control over desirable outcomes should not only be associated with negative affect but also with positive affect. The

association with positive affect might even be stronger than the association with negative affect.

Two factors may explain the imbalance between studies investigating personal control over undesirable outcomes and those investigating personal control over desirable outcomes. On the one hand, many studies simply ignore the multidimensional structure of perceived control. On the other hand, in recent studies, personal control is typically investigated in individuals facing major stressful life events (e.g., chronic, progressive, or life-threatening diseases; see Table 5). At first glance, it appears that a sense of subjective well-being and adaptation is primarily derived from believing that one can control or even terminate undesirable outcomes associated with the stressors. This assumption, however, might be misleading. Personal control over many threatening events may not be feasible, either because the event *cannot* be controlled (e.g., death of a loved one) or because influence over it may be difficult to achieve for many people (e.g., remission of cancer). In those adverse situations, one possibility for maintaining emotional well-being might be to focus on desirable outcomes that are still under one's personal control. At the same time, accepting a lack of personal control over undesirable things but perceiving that some desirable outcomes remain under one's control might be an important path to successful adaptation to stressful contexts. Given that virtually no study has simultaneously focused on perceived personal control over desirable *and* undesirable outcomes, this assumption is in need of investigation.

In sum, there are theoretical and empirical grounds for the hypothesis that the perception of personal control over desirable outcomes is a resource for older people's emotional well-being. Specifically, this type of perceived control has been shown to be inversely associated with negative affect (i.e., depression). Moreover, based on research that has shown that desirable outcomes are primarily associated with positive affect, perceiving personal control over those outcomes is most likely also associated with this component of emotional well-being.

Perceived Personal Responsibility for Undesirable Outcomes and Emotional Well-Being

While there is little doubt about the beneficial effects of personal control over desirable outcomes, predicting the effects of personal responsibility for undesirable outcomes appears to be somewhat more difficult. The learned helplessness model and its attributional reformulation is probably the most influential theoretical model that focuses on the emotional consequences of this type of control belief (Abramson et al., 1978; Seligman, 1975). This model states that when people experience an aversive, uncontrollable event, they ask themselves why it occurred. Answers to this question can be mapped onto three dimensions: internality, stability, and globality. The first dimension is the *internality* of the perceived cause: Does a person attribute a negative outcome to something about the person's self (internal attribution) or to something about other people or circumstances (external attribution)? The helplessness model predicts that by attributing past, undesirable outcomes to internal causes (i.e., perceiving personal responsibility for undesirable outcomes), people are at risk for lowered self-esteem and enhanced depression. The second and third dimensions are the *stability* and *globality* of the causal explanation: Does a person attribute an outcome to something that will persist and influence many aspects of the person's life or to something transient and specific? The helplessness model predicts that a person who makes stable and global attributions for undesirable outcomes will be distressed for a longer time and will show disturbances in more areas of life. Overall, a poorly adjusted person is assumed to attribute undesirable outcomes to internal, stable, and global causes.

A great number of studies that were conducted in the 1970s and 1980s support this hypothesis. The meta-analysis by Sweeney et al. (1986) summarized studies on 90 samples (N = 9,207 mostly middle-aged participants) and revealed an average correlation of r = .20 between personal responsibility for undesirable outcomes (internality) and depression. In addition, Peterson et al. (1988) provided longitudinal evidence that is consistent with the hypothesis that personal responsibility for undesirable outcomes is associated with poor adjustment. The major finding of their study was that students who attributed undesirable events to internal, stable, and global causes were more likely to experience a decline in physical health later than were students who explained past events with external, unstable, and specific causes. Table 5 provides an overview of this study, as well as of studies conducted by other researchers.

Although the results reported by Peterson et al. (1988) are intriguing, inspection of Table 5 shows that the link between personal responsibility for undesirable outcomes and psychological adjustment is not consistent across studies. For example, Bulman and Wortman (1977) published a pivotal investigation of people's attributions of blame and their adaptation to serious accidents. The most frequently cited finding of their study is that paralyzed accident victims who believed that they acted in some way to cause their misfortune (i.e., personal responsibility for an undesired outcome) appeared to adapt more successfully to their paralysis. Several recent studies have replicated the finding that personal responsibility for undesirable outcomes can be associated with better psychological adjustment (e.g., Taylor, Helgeson, Reed, & Skokan, 1991). Other studies have found no association of this type of control belief and adaptation (e.g., Firth & Brewin, 1982; Newsom, Knapp, & Schulz, 1996).

Do these studies disconfirm the prediction derived from the learned helplessness model? How can the inconsistencies across studies be reconciled? A closer look at the measures used to assess personal responsibility for undesirable outcomes suggests that part of the inconsistency is due to differences in the exact definition of this type of perceived control.

It appears that personal responsibility for undesirable outcomes is likely to have positive effects on indicators of psychological adjustment when assessed using items that explicitly refer to the ability to avoid or influence undesirable outcomes (e.g., "If I want to, I can avoid a negative outcome."). In contrast, items that reflect the perception of low capability to influence or prevent undesirable outcomes (e.g., "It's my fault that I have become sick.") are likely to be associated with poor psychological adjustment.

Thus, a note on terminology is required. It might be an advantage to label as personal *control* over undesirable outcomes the facet of personal responsibility for undesirable outcomes that reflects perceptions of high capacity or agency to influence those outcomes.

A direct test of the difference between personal responsibility for and personal control over undesirable outcomes can be found in a study contrasting perceptions of responsibility for the *cause* of cancer versus control over its *course* (Watson, Greer, Pruyn, & van den Borne, 1990; see Table 5). The "responsibility for the cause" items seem to directly tap the inability to prevent the undesirable disease (e.g., "My becoming ill was especially due to something about me."). Correspondingly, this type of perceived control was associated with "anxious preoccupation." In contrast, the "control over the course of the disease" items seem to reflect effectiveness (e.g., "I can definitely influence the course of my illness."), and were positively related to indices of "fighting spirit." Consistent with this finding, two other studies also provide evidence that the perception of control over undesirable outcomes (as reflecting capacity) may help adjusting to challenging or threatening life situations (e.g., Affleck et al., 1987; Taylor et al., 1991; Thompson, Nanni, & Levine, 1994; Thompson et al., 1993; see Table 5).

Table 5
Studies Measuring Personal Responsibility for Undesirable Outcomes and Psychological Adjustment

Source	*Sample*	*Predictor*	*Outcome*	*Finding*
Sweeney et al. (1986)	90 samples including students, patient samples diagnosed with depression, and "normal" adults	Responsibility for causes of undesirable outcomes were rated along three dimensions: internality, stability, and globality.	Depression	Meta-analysis based on 90 samples revealed that all of the three attributional dimensions were associated with increased depression (the more internal, stable, and global the attribution, the more depressed).
Peterson et al. (1988)	90 former students screened on the basis of high academic success and good health (100% male)	Responsibility for causes of difficult wartime experiences were rated along three dimensions: internality, stability, globality. A composite score was used.	Physical health (rated by a physician)	*Longitudinal:* Attributional style at age 25 predicted decline in physical health assessed 15 years and 20 years later (the more internal, stable, and global the attribution, the less healthy).
Firth & Brewin (1982)	8 female patients with a diagnosis of depression	Responsibility for causes of symptoms and three upsetting life events were rated along four dimensions: internality, stability, globality, and controllability.	Depression	*Longitudinal:* Initial attributions of *internality* were *not* associated with depression assessed 6 weeks later. However, attributions of *uncontrollability* and *stability* predicted increased depression.
Newsom, Knapp, & Schulz (1996)	120 individuals with recurrent cancer (mean age 62.4 years, 51% female)	Five dimensions: • responsibility for cancer • perceived avoidability of cancer in general • control over symptoms • control over course of cancer • control over undesirable outcomes in general	Depression	*Cross-sectional:* Control over course, over symptoms, and over undesirable outcomes in general were associated with decreased depression. *Longitudinal:* Avoidability of cancer in general was the only dimension that predicted increased depression assessed 8 months later.
Bulman & Wortman (1977)	29 victims of spinal cord injuries (mean age 27 years, 79% male)	Responsibility for the accident perceived avoidability.	Coping efficacy rated by social workers and nurses	*Cross-sectional:* Responsibility was positively associated with coping efficacy. Perceived avoidability was negatively associated with coping efficacy.
Watson et al. (1990)	68 cancer patients (mean age 57 years, 75% female)	Personal responsibility for the cause of cancer Personal control over course of cancer	Four coping styles: • fighting spirit • helplessness • anxious preoccupation • fatalism	*Cross-sectional:* Control over the course was associated with increased fighting spirit. Responsibility for the cause of cancer was associated with increased anxious preoccupation.
Taylor et al. (1991)	47 patients with severe coronary heart disease (mean age 64 years, 83% male)	Personal control over heart problem	Depression Anxiety	*Longitudinal:* Initial levels of personal control over heart problem predicted decreased depression and anxiety assessed 3 and 6 months later.

Table 5 (continued)

Source	*Sample*	*Predictor*	*Outcome*	*Finding*
Affleck et al. (1987)	92 patients with rheumatoid arthritis (mean age 50.4 years, 34% female)	Personal control over • day-to-day symptoms • long-term course of the disease • medical care and treatment	Negative affect, physician-rated global psychological adjustment	*Cross-sectional:* Personal control over treatment was associated with decreased negative affect and increased psychological adjustment.
Thompson et al. (1993)	71 patients with cancer (mean age 54.6 years, 63% female)	Personal control over • emotions/symptoms • social relationships • medical care • course of the disease • overall	Composite score of depression and anxiety	*Cross-sectional:* All five control measures were associated with decreased depression/anxiety. However, only personal control over emotions/symptoms was an independent predictor of adjustment.
Thompson et al. (1994)	104 men with a diagnosis of HIV (mean age 32.5 years)	Personal control over • course of the infection • consequences of the infection	Depression	*Cross-sectional:* Personal control over the course of the infection and the consequences were associated with decreased depression. However, only personal control over consequences was an independent predictor of decreased depression.

What is the answer, then, to the question: Is perceived personal responsibility for undesirable outcomes a resource that helps older people maintain emotional well-being? If personal responsibility for undesirable outcomes implies personal failure, it should be considered as a risk factor for emotional well-being rather than as a resource. In this case, perceiving that one is generally responsible for undesirable outcomes most likely undermines the motivation to engage in behaviors aimed at avoiding failures in the future. Moreover, perceiving personal responsibility for not being able to prevent undesirable outcomes is most likely unpleasant in itself. In contrast, if personal responsibility for undesirable outcomes implies control and the capacity to prevent undesirable outcomes, it should be considered as a resource for emotional well-being. In this case, perceiving personal responsibility for undesirable outcomes most likely fosters the engagement in avoidance-oriented behaviors that make future undesirable outcomes less likely (e.g., Hobfoll, 1989).

No empirical evidence has been found on whether personal control over undesirable outcomes is differentially related to negative versus positive affect. Based on the research on daily hassles and uplifts, that has shown that undesirable outcomes primarily influence one's level of negative affect, personal control over undesirable outcomes should also be primarily associated with the experience of negative affect, but it is unknown whether this type of perceived control is also involved in the regulation of positive affect.

Perceived Others' Control and Emotional Well-Being

How is perceived control by others associated with older adults' emotional well-being? Is perceiving that one is in need of other people's help to produce or avoid certain outcomes a

resource or a risk factor for emotional well-being? Perceived others' control is usually considered as the dysfunctional counterpart of personal control over desirable outcomes (e.g., Rotter, 1966; Smith & Baltes, 1996). However, although it has been argued that perceived others' control may have unfavorable effects on psychological adjustment, few researchers have put this hypothesis to an empirical test. Moreover, the sparse empirical evidence is inconsistent across studies.

Taylor, Lichtman, and Wood (1984) found that perceived others' control was positively associated with adjustment to cancer. In contrast to this finding, Taylor et al. (1991) reported that perceived others' control was negatively associated with psychological adjustment in a sample of 24 gay men diagnosed with AIDS. Consistent with this latter finding, Affleck et al. (1987) found that perceived others' control over symptoms was associated with negative mood in patients with rheumatoid arthritis. The authors explained this finding by suggesting that seeing others as responsible for something that the patients themselves were not able to control might represent maladjustment. However, Helgeson (1992) reported that in a sample of 97 patients with coronary heart disease, perceived others' control was neither associated with general distress nor with psychological adaptation to the disease.

Given the inconsistent findings, it appears difficult to ascertain whether perceived others' control is a risk factor or a resource for older individuals' emotional well-being. However, part of the inconsistency might be due to the exact definition of perceived others' control. One differentiation seems to be particularly critical to the adaptive value of perceived others' control: Does it reflect *confidence* in or *dependency* on other people? (cf., Baltes, 1996) In research on perceived control, two models have been proposed that define perceived others' control as trusting other people to act on one's own behalf. In terms of Skinner, Chapman, and Baltes (1988), other-oriented control beliefs are beliefs about the amount of access to the mean "powerful others," who help a person to produce or avoid certain outcomes. A typical indicator for this type of perceived control might read, "when you want them to, will other people help to see that you get what you want?" Defined in this manner, perceived others' control reflects the belief that one can profit from the control potential of other people (e.g., from their intelligence, power, or knowledge; see also Bandura's notion of "proxy control," Bandura, 1996). The belief that other people take care of one's own interests, needs, and desires can be assumed to be positively associated with psychological adjustment (e.g., Skinner, 1995).

Rothbaum, Weisz, and Snyder (1982) define other-oriented control beliefs (in terms of the authors' "vicarious control") in a similar way. The authors differentiate between primary vicarious control and secondary vicarious control. Similarly to the model of perceived control proposed by Skinner et al. (1988), primary vicarious control is defined as the perceived ability to use powerful others for one's own ends. Secondary vicarious control also refers to beliefs about the control of others, but the association with others is simply made for the sake of sharing psychologically in the others' control. This kind of vicarious control is, for example, evidenced in the proud assertion of a grandmother, "my grandson is the best tennis player in town." Rothbaum et al. (1982) posit that both kinds of other-oriented control—primary and secondary vicarious control—are associated with better psychological adjustment.

Perceived others' control, however, is not always conceptualized as reflecting confidence in other people. For example, Rotter (1966) and Levenson (1981) conceptualized perceived others' control as the perceived power of others to influence oneself. Typical indicators for this type of perceived others' control might read, "getting what I want requires pleasing those peo-

ple above me" or "in order to have my plans work, I make sure that they fit in with the desires of people who have power over me." Seen in this light, strong beliefs in the control of other people result from the absence of perceived personal control and do not reflect confidence that other people respect one's own feelings, needs, and desires. To the contrary, perceived others' control, defined in this manner, reflects the perception that one is dependent on powerful other people who act primarily to fulfill their own needs and do not care about one's needs. This feeling of dependency is assumed to be negatively associated with psychological adjustment (Levenson, 1981; Rotter, 1966).

Taken together, given the small number of empirical studies on the adaptivity of perceived others' control, more empirical evidence is necessary to give sound answers to questions about its relationship to emotional well-being. Theoretical considerations imply that the adaptive value of other-oriented control beliefs might depend on whether they reflect dependency on or confidence in other people (Baltes, 1996). Other-oriented control beliefs that emphasize dependency on others are likely to reduce emotional well-being. In contrast, other-oriented control beliefs that reflect the perceived ability to make use of other people's control potential might lead to enhanced emotional well-being. Based on the research on daily hassles and uplifts, because perceived others' control refers to desirable and undesirable outcomes, it is highly likely that perceived others' control influences negative *and* positive affect.

Summary

Research on perceived control suggests that three dimensions of perceived control—personal control over desirable outcomes, personal responsibility for undesirable outcomes, and perceived others' control—are related to emotional well-being in a complex fashion, sometimes increasing it and sometimes reducing it. While personal control over desirable outcomes appears to be a resource for older individuals' emotional well-being, personal responsibility for undesirable outcomes and perceived others' control are most likely risk factors that lower emotional well-being in old age.

Several limitations in previous research are noticeable. First, research on the adaptivity of perceived control typically examines global indicators of psychological adaptation or negative emotional states. As a consequence, it is largely an open question whether positive affect is equally affected by perceived control. Following research on daily hassles and uplifts, which has shown that desirable daily events primarily influence positive affect while undesirable daily events primarily influence negative affect, the following hypotheses can be advanced: Perceiving personal control over desirable outcomes should primarily result in feelings of positive affect. In contrast, perceived personal responsibility for undesirable outcomes should primarily be associated with negative affect. Given that perceived others' control typically refers to desirable and undesirable outcomes, it may be involved in regulating positive *and* negative affect.

Second, while the effects of personal responsibility for undesirable outcomes are relatively well established, empirical studies addressing the adaptive value of the other two dimensions of perceived control (i.e., personal control over desirable outcomes and perceived others' control) are relatively rare.

Third, much of the research on the adaptivity of perceived control focuses on selected samples of individuals who were confronted with major stressful life events. There are virtually no studies that investigated the adaptivity of perceived control in samples of "normal" individ-

uals. It is open to question whether the empirical results that were reviewed above generalize to a sample of old and very old people.

Finally, much of the previous research has been cross-sectional. The few longitudinal studies typically cover only a short time interval of several months (an exception is the study conducted by Peterson et al., 1988; see Table 5). Consequently, several questions remain open. Do the three dimensions of perceived control predict long-term changes in the two components of emotional well-being? Are *intra*individual changes in the three dimensions of perceived control associated with *intra*individual changes in positive and negative affect? Does perceived control cause emotional well-being? Or does emotional well-being cause perceived control? Longitudinal data is necessary to answer these questions.

The Interactive Effects of Functional Health Constraints and Perceived Control: Does the Adaptiveness of Perceived Control Depend on Functional Health Status?

So far, two important contributors to emotional well-being in late life—constraints in functional health and perceived control—have been considered separately. This section focuses on the combined effects of these two sources of emotional well-being. Specifically, the discussion centers on the question of whether the functional health status of older individuals may have an influence on the adaptiveness of perceived control. Are the effects of the three dimensions of perceived control on positive and negative affect moderated by functional health constraints? In this section, two models of perceived control—the positive illusion model and the reality-fit model—will be introduced, both answering the question posed above with "yes." As detailed below, the specific predictions derived from these models, however, are opposed to each other.

Functional Health: A Proxy Variable for an Older Person's Actual Control Competence

In understanding the role that functional health status might play for the adaptivity of perceived control, it is important to consider what functional health (or its absence) means for older individuals. Functional health—the ability to see, hear, and move—has been described as a necessary precondition for virtually all interactions between a person and his or her environment (see Section "Why is it Important to Study the Emotional Consequences of Functional Health Constraints in Old Age?"). As a consequence, constraints in functional health involve a threat to an older person's ability to control the large and small events of life. In other words, functional health status constitutes a proxy variable for the control potential that older individuals objectively possess. If one links functional health status (i.e., the ability to objectively control the things in one's live) and beliefs about control, two possibilities arise: Control beliefs can be *congruent* with objective control competencies or they can be *illusory* (i.e., they underestimate or overestimate one's objective control competencies). Table 6 presents a classification of control beliefs as being more or less realistic, depending on the status of functional health.

It should be noted that the proposed classification serves heuristic purposes. This classification is not strictly categorical but denotes a "more or less" quality. As seen in Table 6, perceiving personal control over desirable outcomes is assumed to be more realistic for older individ-

Table 6
Three Dimensions of Perceived Control:
Their Realistic Nature Depending on Functional Health Status

Type of control	*Functional health status*	
	Favorable	*Unfavorable*
High perceived personal control over desirable outcomes	More realistic	Less realistic (overestimation)[1]
High perceived personal responsibility for undesirable outcomes	Less realistic (underestimation)	More realistic
High perceived others' control	Less realistic (underestimation)	More realistic

[1] Over- and underestimation refers to an individual's objective control competence. Given a particular functional health status (i.e., favorable or unfavorable), the three control beliefs indicate whether those competencies are over- or underestimated.

uals with good functional health status than for those in poor functional health. Assuming good functional health reflects high competence to control the things in one's life, perceiving personal control over desirable outcomes may be a valid representation of reality in high-functioning old people. In contrast, when older people succumb to major functional health constraints, their actual control competence is likely to be limited. For them to perceive personal control over desirable outcomes may be optimistic and even illusory: Strong beliefs about personal control would, therefore, generally overestimate objective control competencies of functionally impaired individuals. Thus, perceived personal control over desirable outcomes may become *less* realistic when older people face major functional health constraints.

In contrast, the two other beliefs about control—personal responsibility for undesirable outcomes and perceived others' control—may become *more* realistic when older individuals possess low control competencies. An old person with major functional health constraints might be often unable to avoid undesirable outcomes such as falls or other accidents. Moreover, functionally impaired people often need social support to get along with the activities of daily life; for these individuals with low control potential, perceiving personal responsibility for undesirable outcomes and others' control might be an accurate representation of reality. In contrast, it is likely to be less realistic for older people with high control competencies to believe that undesirable outcomes are their own doing and that they need the help of powerful others. Those beliefs can be considered as reflecting underestimations of their actual competencies.

In the following, two models of subjective well-being are described; both models propose that the degree to which control beliefs are realistic—as opposed to illusory—is of central importance to the adaptiveness of these beliefs.

The Reality-Fit Model of Subjective Well-Being

The reality-fit model of subjective well-being assumes that beliefs about the self and the world, including beliefs about control, are most adaptive when they are in accordance with

reality (e.g., Abeles, 1991; Bandura, 1989; Baumeister, Heatherton, & Tice, 1993; Colvin & Block, 1994; Folkman, 1984; Heckhausen & Schulz, 1995; Krause, 1986; Skinner, 1995). This model can be traced back to humanistic psychology, which established that contact with reality is a hallmark of mental health (Allport, 1943; Jahoda, 1958; Maslow, 1950; Rogers, 1961). For example, Rogers (1983) described a person who is well adjusted as being able to consciously perceive all his or her experiences, no matter what they are:

> He is able to experience all of his feelings, and is afraid of none of his feelings; he is his own sifter of evidence, but is open to evidence from all sources; (...) and because of the awareness of himself which flows freely in and through his experiences, he is a fully functioning person. (p. 290)

From the viewpoint of humanistic psychology, poorly adjusted individuals are forced to ignore a great number of experiences that remain unconscious and cannot be integrated into conscious self structure. Accordingly, beliefs of control are considered dysfunctional when they are based on only small facets of one's experiences—beliefs that either overestimate or underestimate one's objective control competencies. Consistent with this perspective, cognitive theorists of depression (e.g., Beck, 1967, 1976; Ellis, 1962, 1987) have emphasized that depressed individuals have unrealistically negative perceptions of themselves, the world, and the future. The other extreme—succumbing to positive illusion—produces a different sort of problem. As Baumeister (1989) argued, positive illusions about the self may help people to feel better about themselves and maintain positive affect in the short run, but they increase the risk of making overly ambitious decisions that lead into situations where a person is likely to fail.

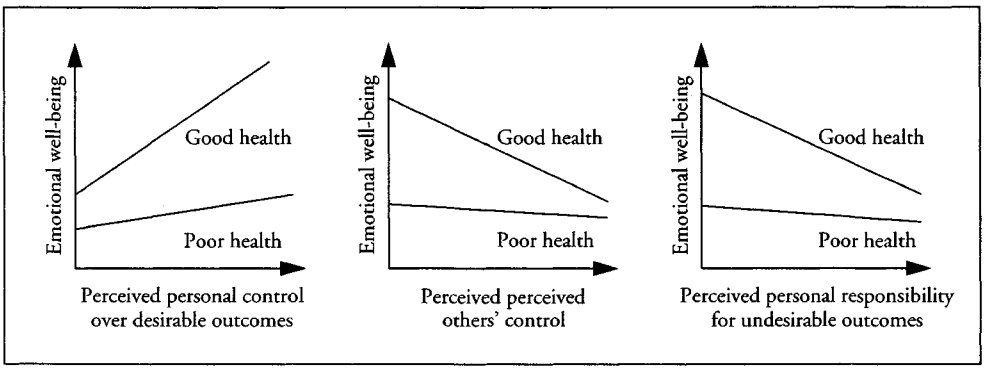
Seen from an action theoretical point of view, the veridicality of control beliefs is of central importance because control beliefs are assumed to influence psychological adaptation mainly through their effects on behavior and performance (e.g., Bandura, 1977, 1996; Heckhausen & Schulz, 1995; Lopez & Little, 1996; Skinner et al., 1988). As Skinner (1995) points out:

> the primary psychological mechanism by which perceived control influences outcomes is through its effects on action and action regulation. I am willing to argue that all of the psychological effects of perceived control can be traced back to these sources. (pp. 69–70)

In action-theoretical frameworks, the effects of perceived control are believed to be constrained by existing competencies of the individual (see also Wortman & Brehm, 1975). The proponents of action-theoretical models argue that a falsely positive sense of one's personal control might lead people to pursue plans and interests for which they are ill-suited. Faith in one's capacity to master situations might lead people to persevere at tasks that are actually uncontrollable. Moreover, positive illusions of control might lead people to ignore legitimate risks (e.g., diseases) and fail to take measures to offset those risks (e.g., Bandura, 1989; Baumeister, 1989; Heckhausen & Schulz, 1995; Skinner, 1995). To put it in more general terms, because individuals need to learn from their experiences, especially from their failures, the reality-fit model of subjective well-being assumes that being able to perceive the whole universe of experiences—positive and negative ones—with as little bias as possible is inherent to psychological adjustment.

The predictions that can be derived from the reality-fit model of subjective well-being regarding the question whether the adaptivity of perceived control changes in the context of age-related functional health constraints, are illustrated in Figure 4. Assuming that perceived control over desirable outcomes is *less* realistic for older people with poor functional health than for those in good functional health, this facet of perceived control (in general a resource for emotional well-being) should be *less* beneficial for the emotional well-being of functionally impaired older people than for those with high objective control competence.

Figure 4
The Adaptivity of Perceived Control Depending on Functional Health Status: Predictions Derived From the Reality-Fit Model of Subjective Well-Being



Note. Assuming that personal control over desirable outcomes is more realistic for healthy, older people than for those in poor health, following the reality-fit model, this facet of perceived control is also more adaptive for healthy people than for impaired people. Assuming that perceived others' control and personal responsibility for undesirable outcomes are more realistic in older individuals with poor health, these two facets of perceived control should be less dysfunctional in those individuals. Note that in this research context, no hypothesis has been advanced whether the fit between objective and perceived control is more important for specific dimensions of subjective well-being than for others. Consequently, the general term emotional well-being is used as the dependent variable rather than its specific dimensions (i.e., positive and negative affect).

As mentioned, the reality-fit model of subjective well-being assumes that it is adaptive to perceive all of one's experiences—even negative or undesirable ones—with as little bias as possible. Thus, perceiving personal responsibility for undesirable outcomes and perceiving that one is dependent on other people (in general risk factors for emotional well-being) should be *less* unfavorable for older individuals with poor functional health status than for those in good functional health.

The Positive Illusion Model of Subjective Well-Being

The proposition that "the more congruence between perceived and actual control the better" has been called into question by researchers proposing a positive illusion model of subjective well-being (e.g., Alloy & Abramson, 1988; Alloy & Clements, 1992; Taylor, 1983, 1989; Taylor & Brown, 1988, 1994). While the reality-fit model equates psychological adjustment with good reality testing and maladjustment with irrationality and distortion, the positive illusion model of subjective well-being challenges this view. Its proponents argue that depressives' perceptions and judgments are often quite accurate and realistic. In contrast, well-adjusted and healthy people generally hold overly positive views of themselves and the world. These overly positive views or positive illusions are defined as a positive, "false mental image or conception which may be a misinterpretation of a real appearance or may be something imagined" (Stein, 1982, p. 662).

Based on their interpretation of the empirical evidence mainly provided by experimental studies, Taylor and Brown (1988), for example, came to the following conclusions: Positive illusions generally characterize normal populations. In contrast, depressive individuals have a more balanced and realistic view of themselves and the world. As a consequence, positive illusions most likely promote well-being and mental health. Specifically, the authors assume that most people exhibit positive illusions in three ways: (a) They view themselves in unrealistically positive terms, (b) they hold views of the future that are more rosy than can be justified, and (c) they believe they have greater control over environmental events than is actually the case. The third illusion—the illusion about personal control—is the most relevant to the present study.

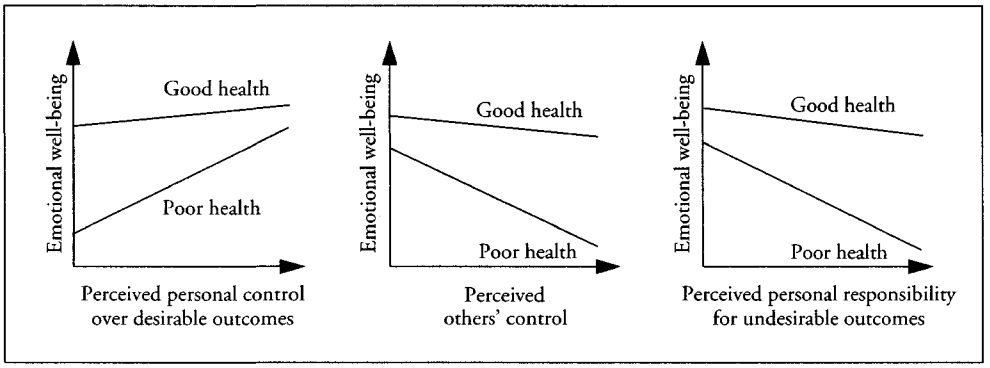
The positive illusion model of subjective well-being views the overestimation of one's actual control competencies as contributing to psychological adjustment. Moreover, this model proposes that positive control illusions are especially important to well-being in situations that pose a threat to the self. Following Taylor (1983), to believe that one has more personal control than is justified by one's objective control possibilities should be particularly adaptive when one's objective control competencies are limited. "The effective individual in the face of threat seems to be one who permits the development of illusions, nurtures those illusions, and is ultimately restored by those illusions." (Taylor, 1983, p. 1168)

While the reality-fit model of subjective well-being emphasizes the benefits of perceiving one's control competence accurately, the positive illusion model is concerned with the benefits of seeing one's control competencies as greater than they actually are. Positive control illusions are believed to cause positive mood, intellectual creativity, self-regard, hope, and persistence in achieving one's goals and desires. In the face of threat, positive control illusions are believed to protect one's subjective well-being by reducing the likelihood of one's being discouraged (Alloy & Clements, 1992; Taylor & Brown, 1988).

Moreover, the disconfirmation of positive control illusions through negative feedback from the environment is assumed to lead to only temporary frustrations. Taylor and Brown (1988, 1994) argue that these disconfirmations can be compensated for by building up new control illusions for alternative control domains, illusions that have not yet been contradicted (see also Taylor, Collins, Skorkan, & Aspinwall, 1992). Taylor (1983) illustrated this shift with the example of a woman who experienced a recurrence of breast cancer, which she had strongly believed she could prevent. This woman maintained her sense of well-being by finding control in another area of life, she "decided to quit her dull job and use her remaining time to write short stories—something that she had always wanted to do. Having lost control in one area of life, she turned to another area, her work life, that was controllable." (p. 1170) Although this observation is intriguing, one needs to add that the sparse empirical evidence is mixed on the relation of perceived control and adjustment when control efforts fail. Helgeson (1992) provided some support for the assumptions advanced by the positive illusion model. In contrast, Christensen et al. (1991) showed that in patients with end-stage renal disease who experienced a failed kidney transplant (i.e., a salient demonstration of their own and their caregivers' inability to control treatment outcomes), strong beliefs in either personal or powerful others' control were associated with *increased* depression. For severely ill renal patients who had not previously experienced an unsuccessful transplant, both beliefs of control were associated with *lower* levels of depression (for a critique of the positive illusion model and a review of mixed empirical results, see also Colvin & Block, 1994).

In sum, the positive illusion model of subjective well-being assumes that overly positive views about the self and the world—including the overestimation of one's actual control com-

Figure 5
The Adaptivity of Perceived Control Depending on Functional Health Status: Predictions Derived From the Positive Illusion Model of Subjective Well-Being



Note. Assuming that the overestimation of one's objective control competence is adaptive, following the positive illusion model, personal control over desirable outcomes is more favorable in individuals with poor health. In contrast, perceived others' control and personal responsibility for undesirable outcomes should be more dysfunctional in individuals with poor health than for healthy people. Note that in this research context, no hypothesis has been advanced whether the fit between objective and perceived control is more important for specific dimensions of subjective well-being than for others. Consequently, the general term emotional well-being is used as the dependent variable rather than its specific dimensions (i.e., positive and negative affect).

petencies—are associated with better psychological adjustment, especially when individuals possess low control competencies. What predictions can be derived from research on positive illusions regarding the adaptivity of perceived control in the context of age-related increases in functional health constraints? The predictions are illustrated in Figure 5.

According to the positive illusion model, people who are well-adjusted hold the following beliefs about control: They overestimate their personal control over desirable outcomes and underestimate their personal responsibility for undesirable outcomes and their dependency on powerful others. Especially when individuals possess low control competencies (e.g., when their functional health status is unfavorable), this profile of perceived control is assumed to be adaptive. Consequently, high perceived personal control over desirable outcomes (in general a resource for emotional well-being) should be *more* beneficial for the emotional well-being of older individuals with poor functional health than for healthy older people. In contrast, perceiving personal responsibility for undesirable outcomes and perceiving that one is dependent on other people (in general risk factors for emotional well-being) should be even *more* dysfunctional for the emotional well-being of functionally impaired older individuals than for those with good health.

Empirical Evidence

This section provides an overview of empirical studies that have investigated the adaptivity of perceived control in various circumstances that differ regarding the objective control possibil-

ities individuals possess. As described in research on perceived control, two models of subjective well-being were proposed that imply opposing predictions. The reality-fit model predicts that, to be adaptive, perceived control should be congruent with the objective control possibilities. The positive illusion model predicts that perceived control should overestimate objective control competencies. What is the empirical evidence? Do the findings support the positive illusion model or the reality-fit model of subjective well-being?

Experimental Studies

The experimental evidence about the link between perceived control and adaptation when faced with uncontrollable situations primarily comes from studies conducted in the 1970s and 1980s by Abramson and Alloy (Abramson & Alloy, 1981; Alloy, Abramson, & Viscusi, 1981; Greenberg, Vazquez, & Alloy, 1988) and by Golin and Terrell (Golin, Terrell, & Johnson, 1977; Golin, Terrell, Weitz, & Dorst, 1979). Abramson, Alloy and colleagues used a partial reinforcement task wherein participants pushed or did not push a button after which, on a random basis, a light either turned on or did not turn on. After many trials, participants were asked to estimate the degree of control their responses had over the light. Golin, Terrell and colleagues used a dice-playing procedure and assigned participants to either a player-throw or a croupier-throw condition. Before the game began and several times during it, participants were asked to rate their expectancy of success or luck in winning the dice game.

Consistent with the positive illusion model of subjective well-being, these studies showed that depressed individuals generally held accurate beliefs about personal control, whereas those who were not depressed generally overestimated their control competencies. When confronted with a problem that was objectively *uncontrollable,*[11] depressed individuals (or those in whom a depressed mood had been induced) accurately perceived that they possessed no personal control either over desirable or over undesirable outcomes. In contrast, nondepressed individuals (or individuals in whom an elated mood had been induced), overestimated their personal control over desirable outcomes, although they accurately judged their degree of personal responsibility for undesirable outcomes as being low.

The participants were also subjected to an experimental task that was *partially* controllable; here, the only difference regarding control judgments was that nondepressed individuals underestimated their responsibility for undesirable outcomes. As was the case in the complete uncontrollability condition, nondepressed individuals overestimated personal control over desirable outcomes, and depressed participants accurately judged personal control over desirable as well as over undesirable outcomes.

In sum, susceptibility to the illusion of personal control appears to be influenced by individuals' long-term and current mood states. The question arises whether the reverse causal chain—positive illusions of control lessen negative affective states and foster well-being—is also true. As Colvin and Block (1994) argued, the interpretation of the experimental evidence as supporting the positive illusion model of subjective well-being is difficult, because illusions were treated as the dependent variable, while emotional states were viewed as the independent factors. However, a more recent study conducted by Alloy and Clements (1992) suggests that

[11] In the experiments conducted by Abramson, Alloy and their colleagues, uncontrollability was realized in that the probability of the outcome "green light" was the same whether or not a given response, "push a button," occurred (e.g., Abramson & Alloy, 1981).

the relation between illusions of control and adjustment may be reciprocal. Consistent with the positive illusion model of subjective well-being, the authors showed that people who exhibit a positive illusion of personal control were less vulnerable to depressive states than those who held realistic perceptions of control.

Although perceptions of other people's control over one's uncontrollable problems have generally been ignored by experimental studies, two notable exceptions exist. An experiment conducted by Martin, Abramson, and Alloy (1984) showed that nondepressives, when subjected to a problem that was objectively uncontrollable, succumbed, as expected, to a positive illusion of control when judging their own control over desirable outcomes; they estimated other people's control, however, relatively accurately. In contrast, depressive individuals accurately estimated their own personal control over desirable outcomes but held positive illusions about other people's control.

Consistent with these findings are those reported by Golin et al. (1977). When assigned to a player-throw condition (i.e., a simulation of a skill task, because the participants were asked to personally throw a dice), nondepressed individuals overestimated their personal control, while depressed individuals accurately perceived low personal control. In contrast, when subjected to a croupier-throw condition (i.e., a task obviously beyond personal control, because the experimenter threw the dice) the pattern was reversed: Depressed individuals overestimated the control of the croupier, while the nondepressed individuals accurately perceived the croupier's low control. Thus, to believe that other people have control over desirable outcomes when these outcomes are actually uncontrollable might be associated with depression and low well-being. Again, it is open to question whether this is a valid interpretation of the findings, given that these experiments did not test whether judgments of control actually led to depression.

With the reservation that assigning causal priority to perceptions of control may be difficult, all findings considered, three conclusions can be drawn from the experimental evidence. First, beliefs of personal control over desirable outcomes can be adaptive, even when they are incongruent with one's actual control competencies (i.e., when they overestimate one's actual control over desirable outcomes). Second, beliefs of personal responsibility for undesirable outcomes can be dysfunctional, even when outcomes are partly due to one's own doing (i.e., when they are realistic). Third, to believe that other people have control over desirable outcomes when they actually do not (i.e., to overestimate others' control) can also be dysfunctional. The next section reviews field studies that are concerned with understanding the adaptivity of perceptions of control in "naturally occurring" low-control circumstances.

Field Studies

In field research, the question of whether perceived personal control is adaptive in low-control circumstances has primarily emerged in the context of chronic, progressive, or terminal disease such as cancer (e.g., Taylor et al., 1991), rheumatoid arthritis (e.g., Affleck et al., 1987), HIV infection (e.g., Thompson et al., 1993), coronary heart disease (e.g., Helgeson, 1992), or end-stage renal disease (Christensen et al., 1991). Objective control conditions were "manipulated" by *stage of the disease* (e.g., in the case of cancer), *rehospitalization* (e.g., in the case of coronary heart disease), *transplant failure* (e.g., in the case of end-stage renal disease), or *symptom activity* (e.g., in the case of AIDS or rheumatoid arthritis). All these characteristics are assumed to be indicators of disease severity, which in turn is considered as proxy variable for individuals' objective control competencies.

Table 7
Studies on the Adaptivity of Perceived Control in Low-Control Circumstances

Source	*Sample*	*Predictor*	*Outcome*	*Finding*
Thompson et al. (1993)	71 patients with cancer (mean age 54.6 years, 63% female)	Personal control over • emotions/symptoms • social relationships • medical care • course of the disease • overall	Composite score of depression and anxiety	• Personal control over emotions/symptoms was more adaptive in low-functioning patients.
Affleck et al. (1987)	92 patients with rheumatoid arthritis (mean age 50.4 years, 34% female)	Personal control over • day-to-day symptoms • long-term course • medical care and treatment	Negative affect, physician-rated global psychological adjustment	• Personal control over symptoms was adaptive for patients with relatively active symptoms but was not adaptive for those without symptoms. • Personal control over course was adaptive for patients with a mild disease but was dysfunctional for those with a severe disease.
Watson et al. (1990)	68 cancer patients (mean age 57 years, 75% female)	Personal responsibility for the cause of cancer Personal control over course of cancer	Four coping styles: • fighting spirit • helplessness • anxious preoccupation • fatalism	• Personal control over the course of the disease was adaptive only for those patients whose disease was at an early stage.
Taylor et al. (1991)	24 men with a diagnosis of HIV (mean age 37.9 years)	Personal control over • day-to-day symptoms • maintaining health • medical care and treatment Vicarious control over • day-to-day symptoms • maintaining health • medical care and treatment	Global adjustment	• All dimensions of personal control were related to better adjustment in men with poor health but not in men with favorable health status. • All dimensions of vicarious control were related to low adjustment in men with poor health but not in men with favorable health status.
Helgeson (1992)	96 patients with coronary heart disease (mean age 57 years, 80% male)	Personal control over the heart problem Internal health locus of control Vicarious control over the heart problem	Distress Adjustment to illness	• Personal control was adaptive for rehospitalized patients but unrelated to distress in non-rehospitalized patients. • Internal health locus of control was adaptive for patients with poor prognosis but unrelated to distress in patients with good prognosis. • Vicarious control was adaptive for intervention patients but dysfunctional for patients without intervention.

The findings provided by field studies generally suggest that perceived control has more implications for individuals' psychological adjustment when objective control competencies are limited (i.e., when diseases become more severe). Does perceived control become more

adaptive in the face of threat or could it be that perceived control becomes dysfunctional? Examination of the empirical findings (see Table 7) reveals that some dimensions of perceived personal control are *more* adaptive in low-control circumstances while others become *less* adaptive. At first glance, some findings support the positive illusion model (i.e., perceived control is more adaptive in low-control circumstances), while others support the reality-fit model of subjective well-being (i.e., perceived control is less adaptive in low-control circumstances). The seemingly inconsistent findings can be reconciled by taking a closer look at the specific dimensions of perceived control.

As seen in Table 7, the dimensions of perceived personal control that refer to outcomes that are actually controllable—personal control over *symptoms*—were shown to be more beneficial in low-control circumstances. In contrast, dimensions of perceived control that are actually beyond people's personal control—personal control over the *course* of the disease—were less adaptive in low-control circumstances (i.e., in the face of setbacks). Seen in that light, the findings provided by field studies clearly support the reality-fit model of subjective well-being.

The reality-fit model is also supported by the findings that refer to another type of perceived control—perceived others' control or vicarious control. As seen in Table 7, to perceive that other people have control over one's disease is not adaptive if other people in fact have little control, as in the case of HIV infection (Taylor et al., 1991). In contrast, Helgeson (1992) has shown that perceived others' control can be adaptive in the context of diseases in which intervention strategies play a critical role (i.e., in coronary heart disease).

All findings considered, field research suggests that perceived personal control and perceived others' control have greater implications for more severe threat than for less severe threat. The direction of the relation between the two types of perceived control and adjustment appears to be dependent on whether the threat is controllable or uncontrollable: The beneficial effects of perceived control increase with threat severity when the threat is controllable, but decrease with threat severity when the threat is uncontrollable. This interpretation of the empirical evidence is consistent with the reality-fit model of subjective well-being. Perceptions of control must be based in reality (threat-controllable) for beneficial effects to occur.

Summary and Implications

In research on perceived control, two models have been advanced that address whether the fit between subjective and objective control may be important for psychological adjustment. These two models imply opposing predictions. The reality-fit model assumes that the more congruence between perceived control and actual control the better. The positive illusion model challenges this view and proposes that the overestimation of one's objective control possibilities is most adaptive.

The empirical evidence provided by experimental research generally supports the positive illusion model of subjective well-being. In contrast, the evidence provided by field studies generally supports the reality-fit model of subjective well-being. One difference between experimental and field studies may be particularly responsible for this inconsistency: Uncontrollable problems encountered in the lab and uncontrollable aversive events studied in field research differ in the breadth of their implications, as well as in the length of time that a person is confronted with the consequences. As noted by Thompson et al. (1993), the uncontrollable situations to which participants were subjected in experimental research pale in compar-

ison with the intensity and potential impact of real-world stressors (e.g., being diagnosed with a serious illness, being a crime victim, or having lost a loved one; see also Colvin & Block, 1994; Silver & Wortman, 1980; Thompson et al., 1993).

Control perceptions that are effective when confronted with minor and transitory stressors may have little impact or might even be maladaptive when individuals are subjected to prolonged or severe distress. For example, it might be adaptive to hold strong beliefs in one's personal control over desirable outcomes that are actually uncontrollable, when these desirable outcomes refer to experimentally manufactured outcomes such as winning or losing money. However, it is highly unlikely that it is adaptive to falsely overestimate one's personal control over desirable outcomes, when failing to achieve these outcomes (e.g., marriage or parenthood) is followed by more serious and long-lasting implications.

Given the evidence of field studies, misinterpretations of one's own and other peoples' control are dysfunctional in situations with psychological significance and long-lasting implications for people's lives. Thus, although there is no doubt that positive illusions can be advantageous, the adaptivity of those illusions might be restricted to a few situations that are more or less irrelevant in terms of the psychological consequences. In general, it appears to be most adaptive to accurately judge one's control competencies.

General Summary and Conclusions for the Present Study

The present study investigates two potential sources of both stability and change in older people's emotional well-being: functional health constraints and perceived control. Following Watson and Tellegen (1985), emotional well-being is defined in terms of two distinct dimensions—positive affect and negative affect. Positive and negative affect are relatively broad dimensions. Positive affect includes a wide range of specific positive emotions such as interest, enthusiasm, and alertness. Negative affect comprises specific negative emotions such as depression, anger, hostility, and anxiety. As reviewed, empirical evidence and theoretical considerations suggest that positive and negative affect constitute two orthogonal dimensions of emotional well-being (see Section "The Two-Component Model of Emotional Well-Being").

Under the two-component model of emotional well-being, personal or environmental characteristics that lead to increases in positive affect, decreases in negative affect, or both are resources. In contrast, characteristics that lead to decreases in positive affect, increases in negative affect, or both constitute risk factors (see Section "Defining Resources and Risk Factors"). The question of whether functional health constraints and perceived control influence positive affect and negative affect to the same degree is one of the foci of the present study.

Poor Functional Health: A Risk Factor for Emotional Well-Being in Old Age?

The decision to investigate the influences of functional health constraints on older people's emotional well-being was driven by the empirical evidence that they are very common in old age and potentially have widespread and adverse consequences for older people's lives (see Section "Why is Important to Study Emotional Consequences of Functional Health Constraints in Old Age?"). Functional health constraints restrict older people's range of activities, they detract from interacting with friends, enjoying friendships, work, and leisure activities. Poor

functional health might also be associated with a number of other adverse consequences, including lowered self-esteem, worries, and uncertainty (i.e., cognitive self-evaluation problems). These concomitants of functional health constraints are likely to lower both components of emotional well-being. Consistent with this hypothesis, a review of empirical studies based on old and very old people (see Section "Functional Health Constraints and Emotional Well-Being: Constributions From Two Lines of Research") showed that poor health, including poor functional health, is associated with high negative affect and low positive affect.

Research on the emotional consequences of poor health have found objective measures of health to be worse predictors of emotional well-being than self-reported health. Given this finding, several researchers concluded that health or its absence may only play a minor role in people's emotional well-being. The relationship between self-reported health and emotional well-being has even been considered as spurious and due to factors other than objective health (Costa & McCrae, 1985b, 1987; Watson & Pennebaker, 1989). In contrast, this study assumes that the often-found low association between objective health and emotional well-being points to the invalidity of objective health measures. That is, objective health measures of previous studies may not be a valid reflection of the facets of health that are objectively important to people's emotional well-being (see Section "Functional Health Constraints and Emotional Well-Being: Constributions From Two Lines of Research"). Using performance-based tests, this study investigates three facets of functional health (i.e., the ability to see, hear, and move) as predictors of positive and negative affect. It is assumed that these tests capture those aspects of poor health that are relevant for the daily lives of older people and, thus, for their feelings of well-being. Poor functional health should be associated with low positive affect and high negative affect.

Following bottom-up theories of subjective well-being (see Section "Functional Health Constraints and Emotional Well-Being: Constributions From Two Lines of Research"), other facets of functional health (i.e., self-reported and other-reported functional health) are investigated as mediators of the effects of objective functional health constraints on positive and negative affect. In addition, the following alternative predictors of emotional well-being are investigated and controlled for: (a) socio-demographic variables (i.e., age, gender, years of education, and living alone), (b) self- and other-reported health (i.e., self-reported subjective competence, self-reported general health, self-rated number of functional constraints, and other-rated number of functional constraints), (c) self-evaluation (i.e., worries and feelings of worthlessness), (d) activities (i.e., general investment level and investment level in health issues), (e) coping styles (i.e., assimilative and accommodative styles), and (f) satisfaction with social relationships.

Perceived Control: Resource and Risk Factor for Emotional Well-Being?

A large number of studies support the assumption that beliefs about personal control are pivotal contributors to emotional well-being and successful aging in general (e.g., Abeles, 1991; Baltes & Baltes, 1986; Lachman et al., 1994; Rodin, 1986). However, the multidimensionality of this concept has often been overlooked. The present study addresses the question whether all facets of perceived control are resources with beneficial effects. Three dimensions of generalized perceived control are investigated: perceived personal control over desirable outcomes, perceived personal responsibility for undesirable outcomes, and perceived

others' control over desirable and undesirable outcomes. Based on the empirical evidence and theoretical considerations (see Section "Perceived Control: Not all Facets may be Beneficial for Emotional Well-Being"), perceived control over desirable outcomes is assumed to be the only dimension with beneficial effects. In contrast, personal responsibility for undesirable outcomes and perceived others' control should be risk factors for older people's emotional well-being.

Under the two-component model of emotional well-being, the question arises whether both components are equally affected by the three dimensions of perceived control investigated in this study. Earlier studies have not addressed this question. However, hypotheses can be derived by incorporating the findings reported in research on daily hassles and uplifts into the area of perceived control. This research has shown that desirable daily events primarily influence positive affect, while undesirable events primarily lead to negative affect. Analogously, perceived control over *desirable* outcomes should primarily be a resource for positive affect, while perceiving responsibility for *undesirable* outcomes should primarily be a risk factor for negative affect. Thus, personal control appears to be a mixed blessing—personal control over desirable outcomes is a resource for positive affect, while personal responsibility for undesirable outcomes is a risk factor for negative affect. In contrast, perceived others' control over desirable *and* undesirable outcomes is considered as a risk factor for both positive affect *and* negative affect.

The same alternative predictors of the two components of emotional well-being were investigated as control variables, as examined when controlling the effects of functional health constraints (i.e., sociodemographic variables, self- and other-reported health, self-evaluations, activities, coping styles, and satisfaction with social relationships).

The Lack of Longitudinal Studies in Research on Risk Factors and Resources

The review of empirical studies on the emotional consequences of poor functional health and perceived control pointed to a lack of longitudinal studies (see Section "Functional Health Constraints and Emotional Well-Being: Contributions From Two Lines of Research," Table 5, and Section "Perceived Control: Not all Facets may be Beneficial for Emotional Well-Being," Table 6). As discussed, in cross-sectional studies one cannot distinguish empirically cause from effect. Given the sparse longitudinal evidence, it is largely an open question whether functional health and perceived control cause emotional well-being or whether emotional well-being causes functional health and perceived control. Using longitudinal data, the present study addresses these questions. Specifically, this study focuses on the question whether individual differences in functional health constraints and perceived control are associated with differential *intra*individual changes in positive and negative affect.

Moreover, another question is addressed that also awaits empirical investigation: Are individual differences in *intra*individual changes of functional health and perceived control associated with individual differences in *intra*individual changes of positive and negative affect? Given the lack of earlier empirical evidence and of specific theoretical considerations addressing the potential differences between cross-sectional and longitudinal effects of poor functional health and perceived control, the present study hypothesizes that the longitudinal effects mirror the proposed cross-sectional effects. This explorative approach can be viewed as a first step in a process that may end with more specific hypotheses.

The effects of resources and risk factors are rarely fixed; they can be intensified or lessened by contextual factors. Applying this general proposition to questions about the adaptivity of perceived control, this study defines context as older people's functional health status. Thus, the present study not only investigates the separate effects of functional health constraints and perceived control but also the interactive effects of these two sources of emotional well-being. Specifically, the question centers on whether functional health influences emotional well-being through its effects on the functioning of perceived control. In other words, we examine whether the effectiveness of perceived control in regulating older people's emotional well-being is dependent on the status of functional health.

In research on perceived control, two models have been advanced (i.e., the positive illusion model and the reality-fit model), which are relevant for the present study's focus. Both models propose that the degree to which control beliefs fit objective control competencies is of central importance to their adaptivity. The reality-fit model posits that beliefs about control are most adaptive when they are in accordance with objective control competencies (see Section "The Reality-Fit Model of Subjective Well-Being"). In contrast, the positive illusion model assumes that overestimating one's control competence is adaptive (see Section "The Positive Illusion Model of Subjective Well-Being").

A review of the empirical evidence revealed that the beneficial effects of positive control illusions may be restricted to those situations that are relatively harmless in terms of potential outcomes. Experimental research has shown that illusions of control over transitory and minor stressors were associated with good mood. In contrast, field research provided evidence in favor of the reality-fit model. Given the evidence of field studies, misinterpretations of one's own and other peoples' control are dysfunctional in situations with psychological significance and long-lasting implications for people's lives. Thus, in general, it appears to be most adaptive to accurately judge one's control competencies.

Assuming that functional health is a reasonable indicator of older people's objective control competence, the present study advances three interactive hypotheses: Given that personal control over desirable outcomes is *less* realistic for older people with poor functional health than for those in good functional health, this facet of perceived control (in general a resource for emotional well-being) should also be *less* beneficial for older people with poor functional health than for those with good functional health.

In contrast, given that perceived personal responsibility for undesirable outcomes and perceived others' control are *more* realistic for older people with poor functional health than for those in good functional health, these facets of perceived control (in general risk factors for emotional well-being) should be *less* unfavorable for older individuals with poor functional health than for those with good functional health. The specific hypotheses of the present study are summarized in the following section.

Hypotheses

In this section, the hypotheses of the present study are presented in three main parts. The first set of hypotheses focuses on the effects of functional health constraints on emotional well-being. The second set of hypotheses details the effects of three perceived control dimensions

on emotional well-being. The third set of hypotheses is concerned with the combined effects of functional health and perceived control on emotional well-being. Here, functional health is considered as a factor influencing the relations between specific dimensions of perceived control and emotional well-being.

The hypotheses were tested employing structural equation modeling (SEM) techniques (Jöreskog & Sörbom, 1993; see Method Chapter). In order to test the first two sets of hypotheses, models were based on the sample as a whole. In addition, a two-group model was specified, to test the third set of hypotheses. The two groups of participants were derived by using a median split of the scores on functional health (see Method Chapter). Thus, in the first set of hypotheses, the direct effects of functional health on the two components of emotional well-being are addressed (i.e., functional health is treated as a continuous variable). The third set of hypotheses refers to the moderating effects of functional health on emotional well-being through its influences on the adaptive value of perceived control (i.e., functional health is treated as a group variable). Each of the three sets of hypotheses comprises cross-sectional and longitudinal models.

First Set of Hypotheses: Poor Functional Health is a Risk Factor for Emotional Well-Being in Old Age

Cross-Sectional Prediction

Prediction 1a: Individual differences in functional health should be associated with individual differences in positive and negative affect. The more participants are confronted with constraints in functional health, the more likely they should experience low positive affect and high negative affect.

Longitudinal Predictions

Prediction 1b: Individual differences in functional health at the first wave should be associated with individual differences in *intra*individual changes of positive and negative affect over time. Those who have more constraints in functional health at the first wave should be more likely to experience a decline in positive affect and an increase in negative affect over time.

Prediction 1c: Individual differences in *intra*individual changes of functional health constraints over time should be associated with individual differences in *intra*individual changes of positive and negative affect. Those who experience more increases in functional health constraints over time should be more likely to experience a decline in positive affect and an increase in negative affect over time.

Second Set of Hypotheses: Three Dimensions of Perceived Control: Resources and Risk Factors for Emotional Well-Being in Old Age

Cross-Sectional Predictions

Prediction 2a: Two out of three perceived control dimensions (i.e., personal responsibility for undesirable outcomes and perceived others' control) should have unfavorable effects on emotional well-being. In contrast, personal control over desirable outcomes should be a resource for emotional well-being.

Prediction 2b: Depending on the valence of the control domain, the three dimensions of perceived control should relate differentially to positive and negative affect.

Individual differences in *personal control over desirable outcomes* should primarily be associated with individual differences in positive affect. The more participants believe in personal control over desirable outcomes, the more likely they should experience high positive affect. Individual differences in *personal responsibility for undesirable outcomes* should primarily be associated with individual differences in negative affect. The more participants believe in personal responsibility for undesirable outcomes, the more likely they should experience high negative affect. Because *perceived others' control* relates to desirable and undesirable outcomes, individual differences in this facet of perceived control should be associated with individual differences in positive and negative affect. The more participants believe in others' control, the more likely they should experience high negative affect and low positive affect.

Longitudinal Predictions

Prediction 2c: Individual differences in the three dimensions of perceived control at the first wave should be associated with individual differences in *intra*individual changes of positive and negative affect.

The longitudinal effects should mirror the predicted cross-sectional effects (see prediction 2b): The more individuals perceive desirable outcomes to be under personal control at the first wave, the more likely they should experience an increase in positive affect over time. The more individuals perceive themselves to be responsible for undesirable outcomes at the first wave, the more likely they should experience an increase in negative affect over time. The more individuals perceive others to be in control over desirable and undesirable outcomes at the first wave, the more likely they should experience a decline in positive affect and an increase in negative affect over time.

Prediction 2d: Individual differences in *intra*individual changes of the three dimensions of perceived control over time should be associated with individual differences in *intra*individual changes of positive and negative affect.

The longitudinal effects should, again, mirror the predicted cross-sectional effects (see prediction 2b): The more individuals experience an increase in perceived personal control over desirable outcomes over time, the more likely they should experience an increase in positive affect. The more individuals experience an increase in perceived responsibility for undesirable outcomes over time, the more likely they should experience an increase in negative affect. The more individuals exhibit an increase in perceived others' control over desirable and undesirable outcomes over time, the more likely they should experience a decrease in positive affect and an increase in negative affect.

Third Set of Hypotheses: Three Dimensions of Perceived Control: Their Influences on Emotional Well-Being are Conditioned by Functional Health Constraints

Cross-Sectional Predictions

Prediction 3a: The beneficial effect of perceived personal control over desirable outcomes on positive affect should be stronger in older individuals with good functional health status than in those with poor functional health status. That is, the positive association between per-

ceived personal control over desirable outcomes and positive affect should be higher in individuals with good functional health than in individuals with poor functional health.

Prediction 3b: The unfavorable effect of perceived personal responsibility for undesirable outcomes on negative affect should be weaker in older individuals with poor functional health status than in those with good functional health status. That is, the positive association between perceived personal responsibility for undesirable outcomes and negative affect should be higher in individuals with good functional health than in individuals with poor health.

Prediction 3c: The unfavorable effect of perceived others' control over desirable and undesirable outcomes on positive and negative affect should be weaker in older individuals with poor functional health status than in those with good functional health status. That is, the positive association between perceived others' control and negative affect should be higher in individuals with good functional health than in individuals with poor health. Analogously, the negative association between perceived others' control and positive affect should be higher in individuals with good functional health than in individuals with poor health.

Longitudinal Predictions

Prediction 3d: The beneficial effects of initial levels and *intra*individual changes in perceived personal control over desirable outcomes on *intra*individual changes in positive affect should be stronger in older individuals with good functional health status than in those with poor functional health status. That is, the positive association between perceived personal control over desirable outcomes (initial levels and changes) and changes in positive affect should be higher in individuals with good functional health than in individuals with poor health.

Prediction 3e: The unfavorable effects of initial levels and *intra*individual changes in perceived personal responsibility for undesirable outcomes on *intra*individual changes in negative affect should be weaker in older individuals with poor functional health status than in those with good functional health status. That is, the positive association between perceived personal responsibility for undesirable outcomes (initial levels and changes) and changes in negative affect should be higher in individuals with good functional health than in individuals with poor health.

Prediction 3f: The unfavorable effects of initial levels and *intra*individual changes in perceived others' control over desirable and undesirable outcomes on *intra*individual changes in positive and negative affect should be weaker in older individuals with poor functional health status than in those with good functional health status. That is, the positive association between perceived others' control (initial levels and changes) and changes in negative affect should be higher in individuals with good functional health than in individuals with poor health. Analogously, the negative association between perceived others' control (initial levels and changes) and changes in positive affect should be higher in individuals with good functional health than in individuals with poor health.

Method

The present study employs data of the Berlin Aging Study (BASE), an ongoing interdisciplinary, longitudinal project on old age and aging (Mayer & Baltes, 1996). The following sections provide a brief description of the general assessment procedure of BASE, the participants, and the measures that were used in the present study. Subsequently, the preparation of raw data for the analyses and the general statistical procedures of this study are described.

General Assessment Procedure

The empirical part of the present study belongs to the first and second wave of BASE. The first wave of data collection took place between May 1990 and June 1993 and was comprised of two parts: a multidisciplinary intake assessment and an intensive protocol (for details, see Baltes et al., 1996). The intake assessment included measures from four different disciplines, namely, internal medicine and geriatrics, psychiatry, psychology, and sociology. The primary goal in designing the intake assessment was to get a comprehensive first picture of the participants regarding psychological, sociological, and medical characteristics. The variables that were collected during the intake assessment constitute a broad spectrum ranging from sociodemographic characteristics to subjective well-being, life satisfaction, overall indicators of physical health, and tests of cognitive functioning.

The intensive protocol was designed to provide an in-depth profile of the sample. It comprised a total of 13 sessions. Each of the four different disciplines of BASE was primarily responsible for three to four sessions of the entire 13 assessments. The four disciplines are further divided into several subdisciplines. The psychology unit, for example, includes the subdisciplines *Intelligence and Cognition, Social Relationships,* and *Self and Personality* (see Baltes & Smith, 1997; Smith & Baltes, 1996). Each of these three subdisciplines arranged one of the three sessions of the psychology unit. The present study focuses on measures that were included in the Self and Personality battery as well as on measures employed by the internal medicine unit.

All sessions, including the multidisciplinary intake assessment, were organized as face-to-face interviews and lasted about one and a half hours. Most of the interviews took place in the participant's residence, that is, in his/her home or in an institution such as a nursing home, or wherever the participant resided. The major exceptions were four sessions involving internal medicine, dentistry, and geriatrics, for which the participants came or were taken to various medical units of the Free University Berlin. The data collection staff were highly trained, full-time research assistants and medical personnel including internists and psychiatrists. Notably, throughout the study each participant was assigned to one of the research assistants who served as a continuing liaison agent.

The second wave of data collection began in March 1995 and was completed in May 1996. On average, a time interval of 3.77 years (*SD* = .68; *range* = 2.37–5.18 years) lies between the first and second wave of BASE. The second wave also included two parts: a follow-up of the multidisciplinary intake assessment, and a reduced follow-up of the intensive protocol, which now comprised a total of five sessions covering the four disciplines of BASE. Although the intensive protocol of the second wave was somewhat reduced in scope (e.g., the psychology unit arranged only one session instead of three), the second wave of data collection sessions was designed to be as similar as possible to the first data collection procedure. In exactly the same way as in the first wave of data collection, all sessions were conducted by highly trained research assistants as face-to-face interviews. All of the interviews again took place in the participant's residence with the exception of one session involving internal medicine and geriatrics, for which the participants came or were taken to the medical units of the Free University Berlin.

Participants

The first part of this section provides a description of the sample size and rate of participation in the second wave of data collection. Subsequently, the participants are described on three sets of variables: *sociodemographic variables* (i.e., age, gender, marital status, residence, and educational status), *physical health* (i.e., self-reported general health, and number of diagnoses by a physician), and *personality traits* (i.e., neuroticism, extraversion, and openness to experience). In order to test some of the predictions that were formulated in the hypotheses section, the sample was divided into subgroups differing in functional health status. These subgroups are described in the last part of this section.

Sample Size and Rate of Participation in the Longitudinal Study

The first-wave sample of BASE was designed to be representative of the western part of the city of Berlin, and to oversample the very old and male population. Specifically, the sample represents a stratified probability sample of community-dwelling and institutionalized individuals aged 70 to 103 years randomly drawn from the city registration office. Stratification variables were age (i.e., 70–74, 75–80, 80–85, 85–90, 90–95, and 95+ years) and gender. The first wave of BASE comprised 516 participants who participated in all of the 13 sessions covering the first data collection (Baltes et al., 1996; Baltes & Smith, 1997). As seen in Table 8, each of the six age groups of the first wave of BASE consisted of 43 men and 43 women.

Table 8
Age and Gender Distribution of the Parent Sample

	Age group					
Gender	*70–75*	*75–80*	*80–85*	*85–90*	*90–95*	*95+*
Male	43	43	43	43	43	43
Female	43	43	43	43	43	43

Table 9
Sample Sizes and Reasons for Drop-Out

Sample	*Size* *N*	*%*
Parent	516	100.0
Continuer	206[a]	39.9
Noncontinuer	310	60.1
died	203	39.3
incomplete	50	9.7
refused	48	9.3
moved	8	1.6
unreachable	1	0.2

[a] Two out of 206 participants of the longitudinal intensive protocol were not able to answer the questions of the Self and Personality battery in the required five-point response format. In addition, the data of one participant were not available when performing the analyses for this study. Thus, the present study's longitudinal analyses are based on 203 participants.

One of the major threats to the internal validity of a longitudinal study is the occurrence of participant attrition (experimental mortality) such that not all participants tested at the first occasion of data collection are available for retest at the following occasions of data collection (e.g., Baltes et al., 1978; Schaie, 1996). The issue of experimental mortality is particularly important in a study focusing on the life period of very old age (Baltes et al., 1996; Lindenberger, Gilberg, Pötter, Little, & Baltes, 1996). In BASE, a longitudinal study that investigated individuals aged between 70 and 103, a high percentage of participant attrition is to be expected because of factors such as disease and disability in the time interval between the two waves of data collections.

Inspection of Table 9 indicates that, in fact, only 206 participants (i.e., 39.9% of the parent sample) were able and willing to participate in the longitudinal intensive protocol.

Thus, 310 individuals (i.e., 60.1% of the parent sample) did not participate in the second occasion of data collection. The highest percentage of individuals who did not continue their participation in the longitudinal study died between the two occasions of data collection (39.3% of the parent sample). Attrition was also due to reasons other than mortality. A relatively low percentage of the parent sample refused to take part in the longitudinal study (N = 48, 9.3%) and a small number of individuals moved out of the area (N = 8, 1.6%). In addition, 50 individuals who initially took part in at least one of the sessions of the second wave

Table 10
Age and Gender Distribution of the Continuer Sample

Gender	*Age group* *70–75*	*75–80*	*80–85*	*85–90*	*90–95*	*95+*
Male	29	30	21	11	5	3
Female	31	29	20	14	7	3

were treated as drop-outs because they were not able to complete all of the interviews (Berlin-Brandenburgische Akademie der Wissenschaften, 1996).

Table 10 shows the age and gender distribution of the continuer sample. A comparison with Table 8 reveals that very old participants were less likely to participate in the longitudinal study.

Sample Characteristics

The following sections provide a description of the sample in terms of sociodemographic characteristics, physical health, and personality traits. In view of the substantial sample attrition (see Table 9), the question of sample selectivity arises. Typically drop-outs score lower on objective performance tests (e.g., Baltes, Schaie, & Nardi, 1971; Schaie, 1996) and describe themselves as possessing less favorable traits than do those who return (e.g., Cooney, Schaie, & Willis, 1988). In order to gain insight into potential effects of attrition, selected sample characteristics are separately presented for the parent sample (N = 516), for individuals who continued (N = 203), and for those who were treated as noncontinuers (N = 313).

Chronological Age and Gender

The parent sample comprised individuals aged between 70 and 103 years (M = 84.91; SD = 18.66). As seen in Table 11, the continuer sample was younger (M = 79.67) than the parent sample, while the noncontinuer sample was older (M = 88.31).

Continuers were on average significantly younger than noncontinuers ($F_{(1)} = 160.34$; $p < .01$). In addition, the age range of the continuer group (SD = 6.81) was more restricted than the age ranges of the parent sample (SD = 18.66) and the noncontinuer sample (SD = 18.02).

Regarding gender, continuers and noncontinuers did not significantly differ ($\chi^2_{(1)} = .20$; $p = .65$). As in the parent sample, in the continuer (51%) and noncontinuer (49%) samples about half of the participants were female.

Table 11
Age and Gender of the Parent, Continuer, and Noncontinuer Samples

Characteristic	*Parent sample (N = 516)*	*Continuers (N = 203)*	*Noncontinuers (N = 313)*
Age			
Mean	84.91	79.67	88.31
SD	18.66	6.81	18.02
Females			
N	258	99	159
%	50	49	51
Males			
N	258	104	154
%	50	51	49

Marital Status, Residence, and Years of Education

In the parent sample, more than 50% of the participants were widowed (55%, $N = 283$) and about one third of the sample (30%, $N = 154$) was married. Notably, relatively few participants of the parent sample were divorced (7%, $N = 38$) or had never lived in a marital relationship (8%, $N = 41$).

Continuers and noncontinuers differed in marital status ($\chi^2_{(3)} = 7.98$; $p = .05$). Continuers were more likely to be married and less likely to be widowed than individuals who dropped out from the study.

Contrary to a common stereotype of old age that most of the very old people live in institutions, the overwhelming majority of participants in the parent sample lived in private households (80%, $N = 410$). Relatively few individuals were institutionalized (20%, $N = 106$). A similar pattern was found in the continuer and noncontinuer samples. However, a comparison of continuers and noncontinuers ($\chi^2_{(1)} = 22.92$; $p < .01$) indicated that among noncontinuers more individuals had been institutionalized (27%, $N = 86$) than among continuing participants (10%, $N = 20$).

Participants of the parent sample on average had 10.75 years of education. As seen in Table 12, continuers spent more years in education ($M = 11.24$) than the parent sample, while non-

Table 12
Marital Status, Residence, and Years of Education of the Parent, Continuer, and Noncontinuer Samples

Characteristic	*Parent sample (N = 516)*	*Continuers (N = 203)*	*Noncontinuers (N = 313)*
Marital status			
Married			
N	154	73	81
%	30	36	26
Widowed			
N	283	101	182
%	55	50	58
Divorced	38	17	21
N	7	8	7
%			
Single	41	12	29
N	8	6	9
%			
Residence			
Private			
N	410	183	227
%	80	90	73
Institutionalized			
N	106	20	86
%	20	10	27
Years of education[1]			
Mean	10.75	11.24	10.43
SD	2.34	2.46	2.20

[1] Years of education was defined as including any kind of education, ranging from elementary school to professional training.

continuers were biased toward fewer years of education ($M = 10.43$). Continuers and noncontinuers significantly differed in years of education ($F_{(1)} = 15.15$; $p < .01$).

Physical Health

Two indicators of general physical health were selected to describe the health status of the participants. The first indicator was self-reported general health, measured by a single item asking: "How would you rate your physical health at present?" Responses were given on a five-point scale ([1] *very good;* [2] *good;* [3] *moderate;* [4] *poor;* [5] *very poor*). The second indicator of physical health was the number of medical diagnoses. Medical diagnoses were determined by a physician according to the International Classification of Diseases (ICD-9, 1988) and weighted by severity (see Steinhagen-Thiessen & Borchelt, 1996).

As seen in Table 13, participants of the parent sample evaluated their health as moderately good ($M = 2.91$). As was expected, continuers and noncontinuers significantly differed in their reports on subjective health ($F_{(1)} = 8.37$; $p < .01$). On average, continuers evaluated their health as being better ($M = 3.08$) than noncontinuers ($M = 2.80$).

In terms of medical diagnoses, continuers were also healthier than noncontinuers ($F_{(1)} = 21.98$; $p < .01$). The number of diagnoses in the parent sample was between that of the continuer and noncontinuer samples. Noncontinuers had more medical diagnoses ($M = 3.98$) than individuals of the parent sample ($M = 3.61$), while continuers had fewer diagnoses ($M = 3.05$).

Thus, consistent with the results of other studies (e.g., McArdle, Hamagami, Elias, & Robbins, 1991; Norris, 1985), continuers of the present study can be described as feeling subjectively healthier and also as being objectively healthier than the noncontinuer sample. Compared to the parent sample, continuers were in better health, while noncontinuers were in worse health.

Personality Traits

In BASE, three personality traits (i.e., neuroticism, extraversion, and openness to new experiences) were measured using items selected from the NEO Personality Inventory (Costa & McCrae, 1985a). Relatively little is known about personality factors involved in drop-out among older participants. However, the results of two studies (Cooney et al., 1988; Rusin & Siegler, 1985) suggest that continuers score somewhat higher on favorable personality traits

Table 13
Physical Health of the Parent, Continuer, and Noncontinuer Samples

Characteristic	*Parent sample (N = 516)*	*Continuers (N = 203)*	*Noncontinuers (N = 313)*
Self-reported general health			
Mean	2.91	3.08	2.80
SD	1.09	1.05	1.11
Number of medical diagnoses			
Mean	3.61	3.05	3.98
SD	2.23	2.16	2.20

Table 14
Personality Traits of the Parent, Continuer, and Noncontinuer Samples

Traits[1]	*Parent sample (N = 516)*	*Continuers (N = 203)*	*Noncontinuers (N = 313)*
Neuroticism			
Mean	2.37	2.26	2.44
SD	.77	.71	.79
Extraversion			
Mean	3.33	3.42	3.27
SD	.58	.54	.60
Openness			
Mean	3.11	3.01	3.26
SD	.61	.69	.74

[1] Personality traits were measured with a German version of the NEO-Personality Inventory (Costa & McCrae, 1985a). Each dimension comprised a subsample of six items. Selection criterion was age appropriateness of the respective items.

(e.g., extraversion or openness to new experiences) and somewhat lower on less favorable traits (e.g., neuroticism) than do noncontinuers.

As seen in Table 14, individuals of the parent sample scored quite low on neuroticism (M = 2.37),[12] indicating that BASE participants can be described as emotionally stable and nonneurotic individuals. However, as was expected, continuers and noncontinuers differed in their neuroticism scores ($F_{(1)} = 7.14$; $p < .01$). Continuers scored lower ($M = 2.26$) than noncontinuers ($M = 2.45$). Continuers and noncontinuers also differed in extraversion ($F_{(1)} = 8.42$; $p < .01$) and openness to new experiences ($F_{(1)} = 21.25$; $p < .01$). Continuers were more extraverted ($M = 3.42$) and more open to new experiences ($M = 3.92$) than were noncontinuers ($M = 3.27$ and $M = 3.60$, respectively).

In sum, continuers and noncontinuers differed on most of the sample characteristics investigated. As was expected, in comparison with the parent sample, the continuers were consistently better off, while the noncontinuers showed consistently more unfavorable traits. Although statistically significant, however, the differences between continuers and noncontinuers were relatively small (i.e., considerably smaller than half of the respective variables' standard deviations). This observation indicates that the samples are more or less comparable with each other.

Subgroups of Participants Differing in Functional Health Status

In the present study, some of the statistical analyses were separately performed for participants with relatively minor functional health constraints and those with major functional impairments. This study investigates three facets of functional health constraints—constraints in vision, hearing, and mobility (for details, see Section "Measures"). Using a median split of first

[12] Responses were given on a five-point scale (1 *statement applies very much* to 5 *statement does not apply at all).*

wave scores on overall functional health constraints (i.e., the mean score of the three functional health indicators), the parent sample (N = 516) and the continuer sample (N = 203) were divided into two groups.

Functional Health Subgroups in the Parent Sample

Table 15 contains information about the differences between participants with relatively poor functional health (N = 258) and those with only minor functional health constraints (N = 258).

With one exception (i.e., gender), the two functional health subsamples differed on all the variables that were analyzed. In comparison with participants in good functional health, participants in poor functional health were older and had lower education; they scored higher on neuroticism, and lower on extraversion and openness to new experiences. In addition, a higher percentage of participants in poor functional health were institutionalized.

Table 15
The Parent Sample: Differences Between Participants With Good and Poor Functional Health

Characteristic	*Good functional health (N = 258)*	*Poor functional health (N = 258)*	*Significance*
Age			$F_{(1)} = 364.22$; $p < .01$
Mean	79.33	90.47	
SD	6.59	6.67	
Gender			$\chi^2_{(1)} = 1.12$; $p < .29$
Females			
N	123	135	
%	48	52	
Males			
N	135	123	
%	52	48	
Residence			$\chi^2_{(1)} = 36.46$; $p < .01$
Institutionalized			
N	25	177	
%	10	69	
Private			
N	233	80	
%	90	31	
Years of education			$F_{(1)} = 22.76$; $p < .01$
Mean	11.24	10.27	
SD	2.36	2.21	
Neuroticism			$F_{(1)} = 9.35$; $p < .01$
Mean	2.27	2.47	
SD	.70	.84	
Extraversion			$F_{(1)} = 19.30$; $p < .01$
Mean	3.44	3.22	
SD	.54	.60	
Openness			$F_{(1)} = 34.60$; $p < .01$
Mean	3.26	2.96	
SD	.57	.62	

Functional Health Subgroups in the Continuer Sample

Participants of the parent sample with poor functional health were less likely to participate in the longitudinal study than participants with good functional health. As shown in Table 16 (see continuer sample divided using criterion 1), of 258 participants with good functional health, 161 participants continued the study. In contrast, of the 258 participants with poor functional health, only 42 returned.

Using criterion 1, the poor functional health group was too small for the statistical analysis employed in the present study (i.e., longitudinal multiple-group mean and covariance structure analysis). Specifically, 42 observations are inadequate for a longitudinal two-group structural model with 14 measured variables and five latent constructs (see Result Chapter). Clearly, no well-established guidelines on how to evaluate sample-size adequacy exist; however, when testing a relatively large model on the basis of 42 observations a number of problems may emerge. For example, sampling variability, instable or inflated parameter estimates, and large standard errors. Moreover, the statistical power to reject the hypotheses is too low and Type II decision errors are highly likely.

Given that confident conclusions cannot be drawn, when analyzing too small samples, it was decided to classify the functional health groups of the continuer sample according to another criterion than was applied in the parent sample. That is, the sample split was based on the median of the first-wave *continuer* sample's scores on functional health. This split resulted in two functional health groups that were sufficiently large for the statistical analyses (see Table 16; continuer sample divided by criterion 2). Note, however, the poor functional health group of the continuer sample was less impaired (M = 4.05) than that of the parent sample (M = 4.83). However, because the good functional health group of the continuer sample was healthier (M = 2.74) than that of the parent sample (M = 3.17), the differences in functional health between the groups in the parent and continuer samples were of similar magnitude (i.e., ΔM = 1.66 in the parent sample and ΔM = 1.31 in the continuer sample; see Table 16). Table 17 shows that the two functional health groups of the continuer sample differed regarding sociodemographic and personality variables in a similar way as the functional health groups of the parent sample.

In comparison to participants with good functional health, participants with poor functional health were older, had lower education, scored higher on neuroticism, and lower on extraversion and openness to new experiences. The two functional health subsamples were not

Table 16
The Definition of Functional Health Groups in the Continuer Sample

	Parent Sample		*Continuer Sample*			
			Criterion 1[a]		*Criterion 2*[b]	
Functional health	*Good (N = 258)*	*Poor (N = 258)*	*Good (N = 161)*	*Poor (N = 42)*	*Good (N = 102)*	*Poor (N = 101)*
M	3.17	4.83	3.08	4.60	2.74	4.05
SD	.56	.56	.57	.50	.41	.59
Δ M		1.66		1.52		1.31

[a] The sample split was based on the median of the *parent* sample's scores on functional health.
[b] The sample split was based on the median of the *continuer* sample's scores on functional health.

Table 17
The Continuer Sample: Differences Between Participants With Good and Poor Functional Health

Characteristic	*Good functional health (N = 102)*	*Poor functional health (N = 101)*	*Significance*
Age			$F_{(1)} = 50.72$; $p < .01$
Mean	76.64	82.74	
SD	4.70	7.25	
Gender			$\chi^2_{(1)} = .04$; $p < .83$
Females			
N	53	50	
%	52	49	
Males			
N	49	51	
%	48	51	
Residence			$\chi^2_{(1)} = .00$; $p < .98$
Institutionalized			
N	10	10	
%	10	10	
Private			
N	92	91	
%	90	90	
Years of education			$F_{(1)} = 17.51$; $p < .01$
Mean	11.93	10.54	
SD	2.44	2.27	
Neuroticism			$F_{(1)} = 10.53$; $p < .01$
Mean	2.10	2.42	
SD	.57	.81	
Extraversion			$F_{(1)} = 10.10$; $p < .01$
Mean	3.54	3.30	
SD	.50	.56	
Openness			$F_{(1)} = 9.91$; $p < .01$
Mean	3.39	3.14	
SD	.48	.65	

different regarding gender and place of residence. With the exception of a difference in the place of residence that was found in the two subsamples of the parent sample, the two functional health groups of the continuer sample differed on the same variables and in the same direction as those of the parent sample.

Measures

All measures that were used in the present study were administered in the first and second wave of BASE. The dependent variable (i.e., emotional well-being), and one of the predictor variables (i.e., perceived control) were measured by the psychology research unit (i.e., the Self and Personality group; Smith & Baltes, 1996). Functional health was measured in the multi-

Table 18
The PANAS: Two Scales Measuring Positive and Negative Affect

Positive affect		*Negative affect*	
enthusiastic	(begeistert)	distressed	(bedrückt)
excited	(erwartungsvoll)	upset	(verärgert)
strong	(stark)	guilty	(schuldig)
interested	(interessiert)	scared	(verängstigt)
proud	(stolz)	hostile	(feindselig)
alert	(hellwach)	irritated	(reizbar)
inspired	(angeregt)	ashamed	(beschämt)
determined	(entschlossen)	nervous	(nervös)
attentive	(aufmerksam)	jittery	(unruhig)
active	(aktiv)	afraid	(ängstlich)

Note. The participants were asked to indicate on a five-point scale ranging from "very often" to "not at all" how frequently they had experienced each emotion during the last year.

disciplinary intake assessment and by the internal medicine research unit of BASE (Steinhagen-Thiessen & Borchelt, 1996).

Emotional Well-Being

Positive and negative affect were operationalized by a self-report measure: the Positive Affect Negative Affect Schedules (PANAS; Watson et al., 1988).

The PANAS consist of two adjective scales; each scale comprises ten adjectives, referring either to positive or to negative emotions. Original and translated adjectives are presented in Table 18.

Functional Health

In order to assess functional health, three performance-based measures were chosen (Steinhagen-Thiessen & Borchelt, 1996). Specifically, functional health was operationalized by measures of mobility, visual acuity, and auditory acuity. *Mobility* was assessed by following the recommendations of Tinetti (1986) for the clinical evaluation of balance and gait in older people. In the balance test (i.e., Romberg's trial), participants stand upright with legs as close together as possible, arms extended in front of the body with palms turned up and eyes closed for about one minute. Performance during this test was evaluated by the examining physician on a six-point scale (no swaying, slight swaying, heavy swaying but keeps position, not able to keep position but able to correct, not able to correct [needs support], and not able to stand

Table 19
Three Performance-Based Measures of Functional Health

Construct		*Instrument*	*Indicators*
Mobility	Balance	Romberg's Trial	Amount of swaying
	Gait	360° turn	Number of steps
Vision	Distance	Standard reading tables	Best distance vision
	Close		Best close vision
Hearing	Speech frequencies	Audiometer (Bosch	Hearing thresholds at 1 and 2 kHz
	High frequencies	ST-20-1 pure-tone)	Hearing thresholds at 4 and 6 kHz

upright at all). For the assessment of gait, participants were asked to perform a 360 degree turn as fast as they could without risking a fall. The number of steps needed to complete the circle were counted.

Visual acuity was measured in Snellen decimal units at two different distances using two different standard reading tables. Distance visual acuity was assessed binocularly using a reading table presented at a minimum distance of 2.5 m from the participant. Close visual acuity was assessed separately for the left and the right eye using a reading table presented at reading distance. All three measurements were taken with and without the best optimal correction available to the participant (Borchelt & Steinhagen-Thiessen, 1992; Marsiske et al., 1996). In the present study, indicators of visual acuity are based on the better values, which in most cases referred to corrected vision. This decision was driven by the assumption that corrected vision (i.e., the better values) rather than uncorrected vision would reflect the control potential that individuals "objectively" possess in their daily lives.

Auditory acuity was assessed with a Bosch ST-20-1 pure-tone audiometer using headphones. Thresholds were measured separately for the right and left ear at eight different frequencies. For technical reasons, thresholds were assessed without hearing aids only. For participants who did not know which ear was the better one, it started with the right ear, otherwise testing started with the better ear. Within ears, frequencies were tested in the following order[13]: 1.00, 2.00, 3.00, 4.00, 6.00, 8.00, 0.50, and 0.25 kHz (Borchelt & Steinhagen-Thiessen, 1992; Marsiske et al., 1996). The three measures of functional health are summarized in Table 19.

Perceived Control

Perceived control was operationalized by a self-report measure that has been developed after Levenson (1981) to measure three generalized dimensions of perceived control: perceived personal control (6 items), perceived others' control (4 items), and chance-oriented perceived control (4 items; Smith & Baltes, 1996). Based on the work of Skinner et al. (1988), each of

[13] In the second wave of data collection only four frequencies were measured: 1.00, 2.00, 4.00, 6.00 kHz. Because the present study is designed to be primarily longitudinal, first wave indicators of hearing acuity were created using only the frequencies that were also available at the second wave of data collection.

Table 20
A Self-Report Measure of Three Dimensions of Perceived Control

Dimension	*Items*	
	English	*German*
Perceived personal control over desirable outcomes.	I can make sure that good things come my way. It's up to me to arrange for all the good things in life. When I get what I want, it is usually because I have worked hard for it.	Das, was an Gutem in meinem Leben passiert, kann ich selbst bestimmen. Das Gute und Schöne im Leben kann ich selbst beeinflussen. Wenn ich bekomme, was ich will, so ist das meistens, weil ich selbst viel dafür getan habe.
Perceived personal responsibility for undesirable outcomes.	It's my fault if something goes wrong in my life. If something goes wrong in my life, it's usually because I did not take enough care. If there are problems in my life, then they are my own doing.	Wenn etwas bei mir nicht klappt, liegt es an mir selbst. Wenn in meinem Leben etwas schiefgeht, dann habe ich einfach nicht genügend aufgepaßt. Wenn ich Probleme im Leben habe, sind sie meistens auf mein eigenes Verhalten zurückzuführen.
Perceived others' control.	The good things in my life are determined by other people. Other people generally arrange for good things to happen in my life. Other people generally make sure that nothing goes wrong in my life. I depend on others to ensure that there are no problems in my life.	Die angenehmen Dinge in meinem Leben hängen von anderen Leuten ab. Zum größten Teil sorgen andere Leute dafür, daß in meinem Leben alles gut geht. Im allgemeinen sorgen andere Leute dafür, daß in meinem Leben nichts schief geht. Ich bin auf Andere angewiesen, um Unannehmlichkeiten zu vermeiden.

these perceived control dimensions was further divided into two dimensions, according to the valence of control domain (i.e., whether they refer to perceived control over desirable outcomes versus undesirable outcomes). In the present study, three of these dimensions of perceived control were analyzed—perceived personal control over desirable outcomes, perceived personal responsibility for undesirable outcomes, and perceived others' control over desirable and undesirable outcomes.[14] Table 20 presents the items measuring the three dimensions of perceived control. The participants were asked to indicate on a five-point scale ranging from "very much" to "not at all" the extent to which each perceived control item applies to them.

[14] Factor analytic analyses (see Kunzmann & Smith, 1996; Smith, Marsiske, & Maier, 1996) revealed that perceived others' control over desirable outcomes versus undesirable outcomes indicated only one dimension rather than two. Thus, if older individuals believe other people have control over desirable outcomes in their lives they also tend to believe that other people have control over undesirable outcomes and vice versa. Consequently, perceived others' control over desirable and undesirable outcomes were conceived as belonging to only one dimension of perceived control.

Preparation of Raw Data for Analyses

Treatment of Missing Values and Outliers

Following the procedures that were applied in the research group of BASE, the estimation of missing values and the treatment of outliers were done separately for the two waves of BASE (i.e., for the parent sample of BASE [N = 516] and the longitudinal continuer sample [N = 203]).[15]

The treatment of missing values and outliers differed somewhat depending upon whether single items (i.e., univariate level) or groups of multiple items indicating the same underlying construct (i.e., multivariate level) were considered. On the *univariate* level, missing values were estimated by regressing age and gender. No particular attention was given to outliers.

On the *multivariate* level, missing values were also estimated by a regression approach. In addition to age and gender, predictor variables included all the other items indicating the respective construct. For example, the procedure for estimating missing values for one indicator of functional health—visual acuity—was not only based on the age and gender regression weights but also on the regression weights of the other two indicators of functional health, that is, hearing acuity and mobility.

For data on the multivariate level, particular attention was devoted to outliers. Scores were defined as an outlier if they were beyond the extreme 1% isodensity contour of the regression distribution. Those cases identified as an outlier were pulled back toward the mean (i.e., reweighted) and were assigned a score that reflected the 5th percentile of the isodensity contour of the regression distribution. Descriptive statistics (i.e., means, standard deviations, maximum, minimum, skewness, and kurtosis) for the indicators of the present study's constructs, including information about number of missing values and outliers, are presented in Appendix A.

Aggregating Items Into Subscales

For purposes of factor analysis, wherever possible items indicating the same underlying construct were collapsed into subscales (in subsequent discussion these are called parcels). In factor analysis, analyzing responses to item parcel scores instead of items is advantageous in several respects: (a) Parcel scores typically have greater reliability and generality, (b) response biases and other characteristics that are idiosyncratic to individual items are likely to have less influence, (c) the ratios of measured variables to inferred factors and to estimated parameters are increased, and (d) distributions of the measured variables are less likely to cause problems (e.g., Kishton & Widaman, 1994; Marsh, Antill, & Cunningham, 1989). Various procedures of collapsing items into subscales have been suggested in the literature (e.g., Kishton & Widaman, 1994). The procedure employed for the indicators of emotional well-being and

[15] While the estimation of missing values and the treatment of outliers were occasion specific, the standardization of second wave items was dependent on the first wave standardization procedure. If items had been standardized at the first occasion of measurement (e.g., items measuring functional health, because they were based on different metrics), the respective second wave items were standardized to the respective means and standard deviations of the items measured at the first wave.

perceived control was a random assignment of items to parcels. The indicators of functional health constraints were built according to theoretical criteria.

Indicators of emotional well-being. The ten items from each of the two emotional well-being scales were randomly divided into thirds. This procedure resulted in three parcels defining the positive affect scale and three parcels defining the negative affect scale. Descriptive statistics of the emotional well-being parcels and their intercorrelations are presented in Appendix A.

Indicators of perceived control. Two of the three dimensions of perceived control (i.e., personal control over desirable outcomes and perceived personal responsibility for undesirable outcomes) were assessed by three items each. Because the optimal situation in confirmatory factor analyses is using three indicators for each latent factor, it was not possible to build parcels defining these two dimensions. Accordingly, personal control over desirable outcomes and personal responsibility for undesirable outcomes were defined by three single items each. In contrast, the scale measuring perceived others' control consisted of four items. They were randomly divided into two parcels, each including two items. Descriptive statistics of the perceived control parcels and their intercorrelations are presented in Appendix A.

Indicators of functional health constraints. The three indicators of functional health were measured with two performance-based scores each. The two measures assessing visual acuity were collapsed into one parcel and served as the first indicator of functional health. The two measures assessing hearing acuity were collapsed into one parcel and served as the second indicator of functional health. Finally, the two mobility measures were combined to reflect the third functional health indicator. Descriptive statistics of the perceived control parcels and their intercorrelations are presented in Appendix A. While Appendix A contains information about the *indicators* of the present study's constructs, Appendix B presents descriptive statistics, intercorrelations, and age trajectories of the constructs themselves.

General Statistical Procedures

The hypotheses of this dissertation were tested employing multiple-group mean and covariance structure (MACS) analysis. MACS models can be conceived as an extension of standard structural equation modeling (SEM) techniques whereby mean-level information is analyzed in addition to variance-covariance information (Cole, Maxwell, Arvey, & Salas, 1993; Horn & McArdle, 1992; Little, 1997; McArdle, 1996; McArdle & McDonald, 1984). MACS models provide numerous research advantages such as (a) correction for measurement error whereby estimates of the latent constructs' means and covariances are disattenuated, (b) tests of measurement equivalence across groups, and (c) inclusion of covariates. In addition, MACS models are well-suited for examining longitudinal changes in terms of both individual differences in covariation patterns and group-related mean-level changes. The statistical program chosen for analysis was LISREL 8 (Jöreskog & Sörbom, 1993). Before presenting the results from the analyses, the statistical evaluation of model fit and the procedure for testing invariance across groups and over time are described.

Evaluation of the Overall Model Fit

Model evaluation is not necessarily a simple procedure because no well-established guidelines for testing goodness-of-fit exist. The approach that is often recommended is to examine multiple goodness-of-fit indices rather than to rely on a single piece of information (e.g., Bollen, 1990; Marsh, Balla, & McDonald, 1988; Mulaik et al., 1989; Raykov, Tomer, & Nesselroade, 1991). LISREL provides several fit indices for the model as a whole (for a review and assessment of these indices, see Marsh et al., 1988). In the present study, the following overall goodness-of-fit measures were used to assess the fit between the hypothesized models and the sample data.

χ^2 value with its associated degrees of freedom and probability level. When the sample size is sufficiently large, χ^2 is a likelihood ratio test statistic that can be used to test the fit between a restricted hypothesized model and the unrestricted sample data. A nonsignificant χ^2 value indicates that a certain model is tenable (i.e., it possesses an acceptable fit). The sensitivity of the χ^2 likelihood ratio test to sample size, as well as to the violation of various model assumptions (linearity, multinormality, additivity) is widely known. For example, with the enormous statistical power that comes when investigating large samples, almost every reasonable model will be rejected if only the χ^2 value and the associated probability are considered. Given the difficulties that are involved when interpreting the significance of the χ^2 value as a goodness-of-fit index, the following goodness-of-fit indices were evaluated as well.

χ^2: df ratio. A variety of acceptable values for the χ^2: *df* ratio have been proposed, ranging from a low value of χ^2: *df* < 1.50 through values of χ^2: *df* < 3.0 to χ^2: *df* < 5.0. Following the recommendation of Byrne (1989), in the present study a χ^2: *df* ratio < 2.0 is conceived to represent an adequate model fit.

Root-Mean-Square-Error-of-Approximation (RMSEA). The RMSEA indicates the average discrepancy between the elements in the sample and hypothesized covariance matrices. RMSEA values range from zero to one, whereas small values indicate a good model fit. In the present study a value of RMSEA < .05 is used as indicating acceptable model fit.

Relative goodness-of-fit indices. Relative goodness-of-fit indices are especially important in cases of large samples when the power of the statistical test underlying the structural equation modeling approach is very high. Relative goodness-of-fit indices are derived from the comparison of a specified (i.e., restricted) model with a null model (i.e., one that posits complete independence of all measured variables). Thus, relative fit indices provide measures of complete covariation in the data. These indices range from zero to one. A value of > .90 is usually conceived as indicating an acceptable fit to the observed data. The following three relative goodness-of-fit indices were used to assess overall model fit: the non-normed fit index (NNFI),[16] the incremental fit index (IFI), and the comparative fit index (CFI).

Testing for Factorial Invariance in Longitudinal Multi-Sample Analyses

LISREL methodology can be used to analyze data from a single sample at a certain time point. LISREL can also be used to analyze data from several samples at several time points simulta-

[16] The non-normed fit index is also known as the Tucker-Lewis Index (RHO or TLI).

neously, with some or all parameters constrained to be equal across groups or time. In general, any degree of invariance can be tested, from the one extreme where all parameters are assumed to be invariant across groups, over time, or both to the other extreme when no constraints exist.

The Invariance of Six Parameters Can be Tested

When employing MACS models, six types of parameter estimate can be evaluated: (a) the unstandardized regressions of the indicators on the latent constructs (the loadings of the indicators), (b) the intercepts or means of the indicators, (c) the residual variances of the indicators (the unique factors and unreliability of the indicators), as well as (d) the latent construct means, (e) variances, and (f) covariances. The first three components refer to the measurement model and the latter three refer to the latent structural level (Little, 1997).

Testing Invariance Follows a Certain Sequence

Testing factorial invariance follows a two-step process. First, the invariance of the measurement model is tested. Measurement invariance addresses whether a construct is measured in the same way when comparing two groups of individuals or one group of individuals at different times. Consequently, measurement invariance is a precondition for testing the invariance of the structural model (e.g., Baltes et al., 1978; Horn & McArdle, 1992; Little, 1997). If one does not know that measurement invariance obtains, any differences of the structural components (e.g., differences in factor means and covariances) could be interpreted as indicating qualitatively different constructs, or quantitative differences between constructs, or some combination of both. To ensure that the constructs of the present study do possess the same meaning across groups, over time, or both, two components of the measurement model were subsequently constrained to be invariant—the factor loadings and intercepts of the indicator[17]. Assuming these two components are invariant, the invariance of three structural model components—factor variances, factor covariances, and factor means—can be evaluated.

As described above, it is important to follow the rule of first testing invariance of the measurement components before assessing invariance of the structural components. However, even the invariance of the structural components needs to be tested in a certain sequence. While the interpretation of group differences in factor means would not confuse the interpretation of differences in the other two structural components (i.e., factor variances and covariances), the interpretation of factor covariances is, at least partly, dependent on invariance of the factor variances. Suppose the factor variances of perceived others' control and positive affect differ across two groups. Differences in the covariation between perceived others' control and positive affect could indicate that perceived others' control is less important for positive affect in one group, or that less variability in one group is responsible for attenuating the covariation in that group, or both. Thus, if factor variances were demonstrated to vary across groups or over time, at first sight, it is difficult to interpret the invariance of factor covariances.

Following Little (1997), this difficulty can be overcome, when decomposing the factor variance-covariance matrix, by specifying phantom factors. That is, each latent factor is speci-

[17] The invariance of the residual variances of the indicators was not tested, because residual variances represent both errors and unique factors. If one assumes errors to be random, it makes little sense to expect the residuals to be invariant over time or across samples.

fied as two-yoked, first- and second-order latent factors (e.g., age is represented twice, once at the first-order level and again at the second-order level). Consequently, a given mirrored (phantom) construct predicts all the variance of its associated first-order representation. As a result, the parameters (β paths) that yoke the two mirrored constructs together contain estimates of the representative latent constructs standard deviations. These estimates must be fixed to a nonzero value (e.g., 1.0) in the first group or at the first wave in a longitudinal study, as part of identifying the model. In the second group or at the second wave these estimates are freed, thereby allowing the necessary proportional rescaling for the constraints on the measurement parameters. Finally, the variances of the second-order factors are fixed at 1.0 to complete model identification and to establish the scale of measurement. With the scaling set at unit variance, the relations among the mirrored, second-order constructs are estimated as correlations in each group (i.e., on a standardized and comparable metric).

Two Rationales for Testing Factorial Invariance

The invariance of the factor structure across groups of participants and the factorial stability over time were analyzed using hierarchical model testing. Two rationales can be used for testing factorial invariance: a statistical rationale and a modeling rationale (see Little, 1997). Adopting a *statistical* rationale, the decision to reject or not to reject the hypothesis that certain parameters are invariant across two groups or over time is based on the $\Delta \chi^2$ test. This test involves a comparison of χ^2 values referring to a restricted and a less restricted model. The χ^2 value of a model in which certain parameters are constrained to be equal across groups or over time (i.e., the restricted model) is compared with the χ^2 value of a model in which these same parameters are free to take on any value (i.e., the less restricted model). If the difference in χ^2 ($\Delta \chi^2$) is not significant, the hypothesis of an invariant pattern of parameters is considered tenable. According to a *modeling* rationale, the decision to reject or not to reject a hypothesis is based on the overall goodness-of-fit indices of the restricted and the less restricted models. A satisfactory fit in the restricted model argues for invariance of the respective tested parameters.

Following Little (1997), a modeling rationale was used for the measurement parameters and a statistical rationale for the latent construct parameters. Employing a modeling rationale for testing invariance on the measurement level is appropriate for two reasons: (a) Testing measurement invariance involves many parameters, and (b) sampling errors might affect the testing procedure. In contrast, the structural model reflects error-free effects among constructs. Here, invariance testing should be based on a more precise criterion, that is, a statistical rationale.

In multisample longitudinal analysis with constraints across groups and over time, neither the observed nor the latent variables should be standardized within the groups or within waves. Such standardization procedures make it impossible for means and variances to vary from one group or one wave to another and distorts the covariances as a consequence. To compare parameters across groups and over time, the variables must be measured in a common metric. The reference points for standardizing variables (in the present study only the indicators of functional health were standardized) were the means and variances of the BASE parent sample (N = 516). The maximum likelihood procedure was applied as a method of parameter estimation.

Results

The results are presented in the same sequence as the hypotheses were posed. Accordingly, this chapter is divided into three main sections. Results addressing the effects of functional health constraints on positive and negative affect are described first. Results about the effects of the three dimensions of perceived control on emotional well-being follow. Finally, results concerning the interactive effects of perceived control and functional health constraints on emotional well-being are presented. Each of these three main sections is further divided into two parts. The first part addresses the cross-sectional results. In the second part, the longitudinal results are presented. Preceding each subsection, a description of the respective statistical model is given.

Poor Functional Health: A Risk Factor for Emotional Well-Being in Old Age?

Cross-Sectional Results

This section deals with the analyses that address the cross-sectional relations between functional health constraints and the two components of emotional well-being, positive and negative affect. It was predicted that the more participants are confronted with constraints in functional health, the more likely they should experience low positive affect and high negative affect (see Section "Hypotheses," Prediction 1a).

The model to be tested in Prediction 1a postulates a priori that emotional well-being is a two-factor structure consisting of positive affect and negative affect, with each factor being defined by three measured variables. Functional health constraints were defined as a single construct represented by three measured indicators, namely, constraints in vision, hearing, and mobility (see Method Chapter). The random errors of measurement and uniqueness of the indicators (i.e., specific variance not common to the other measured variables defining the same latent factor) were specified to be uncorrelated. For purposes of identification all the latent factor variances were fixed to 1.0. The relationships between functional health constraints and the two components of emotional well-being were specified as causal effects (i.e., in LISREL connotation as β paths). In contrast, the relation between positive and negative affect was specified as a bivariate correlation (i.e., in LISREL connotation ψ paths).

Assessing Model Fit

Table 21 reveals that this model is tenable. All fit indices uniformly indicated an acceptable fit for the proposed model, when tested in the parent sample ($N = 516$).

Examination of Table 22 shows that all estimates of factor loadings are reasonable, a further indication of an acceptable fit between the hypothesized model and the sample data. The t-values associated with the estimated factor loadings ranged from 12.89 to 19.14, indicating

Table 21
Global Fit Indices of the Proposed Cross-Sectional Model: Functional Health Constraints and Emotional Well-Being

	χ^2	*df*	*p*	χ^2:*df*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Model	37.71	24	.04	1.5	.03	.99	.98	.99	.97

that all estimated parameters were significantly different from zero and thus important contributors to the overall model. Furthermore, the standard errors associated with the factor loadings were uniformly small, ranging from .03 to .05, which is highly acceptable.

As shown in Table 22, the communalities (h^2 = 1 – standardized residual variance) were all acceptable. For the positive affect indicators, the average communality was .54, ranging from .46 to .64, for the negative affect indicators, the average communality was .61, ranging from .60 to .62. For the functional health constraints indicators, the average communality was somewhat lower at .49, ranging from .36 to .59.

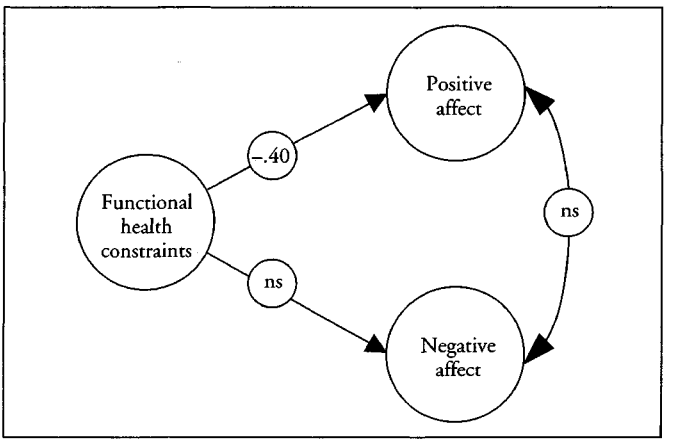
Taken together, the global fit indices (see Table 21) and the specific goodness-of-fit indices of the individual measurement model parameters (see Table 22) attested to an acceptable fit between the hypothesized model and the sample data. The precondition for testing the hypotheses that individual differences in functional health are associated with individual differences in positive and negative affect was met.

Table 22
Unstandardized Factor Loadings and Communalities of the Cross-Sectional Model: Functional Health Constraints and Emotional Well-Being

	Unstandardized factor loadings (t, se)		
Functional constraints	*Positive affect*	*Negative affect*	h^2
$.73_{(t = 15.72;\ se = .05)}$			.53
$.60_{(t = 12.89;\ se = .05)}$			.36
$.77_{(t = 16.44;\ se = .05)}$			.59
	$.48_{(t = 16.02;\ se = .03)}$		.53
	$.44_{(t = 14.94;\ se = .03)}$		.46
	$.55_{(t = 17.33;\ se = .03)}$		.64
		$.54_{(t = 18.85;\ se = .03)}$	.61
		$.58_{(t = 18.75;\ se = .03)}$	.60
		$.62_{(t = 19.14;\ se = .03)}$	.62

Note. Communality (h^2) = 1 – standardized residual variance. The communality reflects the amount of explained variance in the manifest indicators by its respective construct.

Figure 6
Cross-Sectional Effects of Functional Health Constraints on Positive and Negative Affect



Functional Health Constraints: Do They Predict Emotional Well-Being?

As seen in Figure 6, functional health constraints were negatively associated with positive affect ($\beta_{(t = -6.61;\ se = .07)} = -.40$). The more individuals were confronted with functional health constraints, the less likely they reported experiencing high positive affect.

Functional health constraints explained 16 percent of the variance in positive affect. Contrary to the first prediction, however, functional health constraints did not predict negative affect ($\beta_{(t = .66;\ se = .06)} = -.04$).

A further aspect of Figure 6 deserves mention. The two dimensions of emotional well-being were mostly orthogonal. The residual correlation between positive and negative affect was not significant ($r_{(se = .06;\ t = 1.05)} = .04$) and the respective zero-order correlation was also essentially zero ($r_{(se = .05;\ t = .72)} = .04$; see Appendix C).

Based on the cross-sectional relations, one might conclude that functional health constraints may only be a risk factor for one of the two components of emotional well-being, namely, for positive affect.

The Analysis of Chronological Age as a Control Variable

In order to test whether chronological age had a significant influence on the effects of functional health constraints on positive and negative affect, the model described above, was re-specified. The re-specified model comprised, in addition to the effects of functional health constraints, the effects of chronological age on the two components of emotional well-being.[18] Except for the relationship between positive and negative affect, the relations between all the latent factors were specified as causal effects. Figure 7 shows a graphical presentation of this model, including the independent effects of chronological age and functional health con-

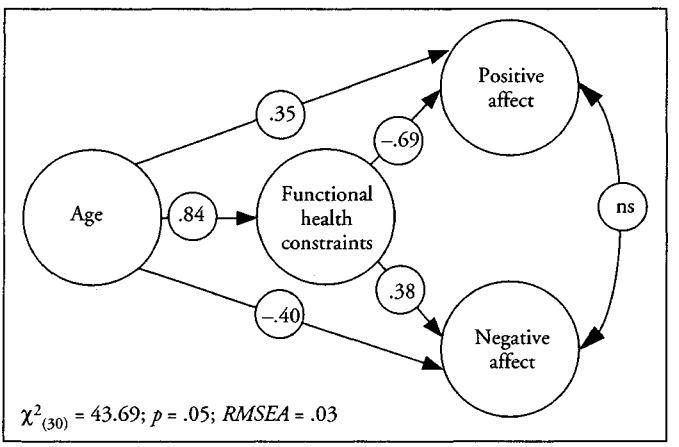
[18] Chronological age was specified as a single indicator construct. Because age was expected to have been measured without error, residual variances were fixed to zero. In addition, for scaling purposes the factor variance was fixed to 1.0.

straints on positive and negative affect (the bivariate correlations between the four constructs are tabled in Appendix C).

Three aspects of Figure 7 deserve special note. First, the regression between age and functional health constraints was impressively high (i.e., on the latent level $r = .84$). Although old age cannot be equated with poor functional health (the correlation between age and functional health constraints was well below a perfect correlation), a relation of this size indicates that, for most individuals, the last period of life is accompanied by becoming more and more functionally impaired.

Second, chronological age, when controlled for functional health constraints, was equally *beneficial* for both components of emotional well-being—positive and negative affect. A comparison of the net age effect on positive affect and the net age effect on negative affect (i.e., irrespective of the directions of the effects) yielded a nonsignificant Δz value ($\beta_{(1)} = .35$; $\beta_{(2)} = -.40$; $\Delta z = .36$),[19] indicating that the net age effects were of equal size. Given that the causal effect of chronological age on positive affect without controlling for functional health constraints was significantly negative ($\beta_{(t = -4.57;\ se = .05)} = -.23$), the age-controlled effect ($\beta_{(t = 2.61;\ se = .15)} = .35$) implies that functional health constraints suppressed the beneficial effect of age on positive affect. Functional health constraints also suppressed the effects of chronological age on negative affect. When controlled for functional health constraints, chronological age was associated with low negative affect ($\beta_{(t = -3.14;\ se = .13)} = -.40$). In contrast, the causal effect of chronological age on negative affect, without controlling for functional health constraints, was only marginally significant ($\beta_{(t = -1.71;\ se = .05)} = -.08$).

Figure 7
Cross-Sectional Effects of Age and Functional Health Constraints on Positive and Negative Affect



[19] For testing whether two causal or correlational paths were significantly different, the following formula was used:

$$\Delta z = \frac{\beta_{(1)} - \beta_{(2)}}{\sqrt{\frac{se^2_{(1)} + se^2_{(2)}}{2}}}$$

$\beta_{(1)}$ and $\beta_{(2)}$ are the two estimated paths to be compared. $se_{(1)}$ and $se_{(2)}$ are their respective standard errors. Δz is the resulting test-statistic; a value > +/−1.96 indicates that the two paths to be compared differ at a $p = .05$ level.

The third aspect that deserves mention is most important to the first prediction of the present study (i.e., poor functional health is a risk factor for both components of emotional well-being, positive and negative affect). When statistically controlling for chronological age, functional health constraints were *unfavorable* for both, positive *and* negative affect. As seen in Figure 7, the age-controlled effect of functional health constraints on negative affect was significantly positive ($\beta_{(t = 2.81;\ se = .07)} = .38$). Given that the causal effect of functional health constraints on negative affect, without controlling for chronological age, was nonsignificant ($\beta_{(t = 1.05;\ se = .06)} = -.04$), the age-controlled functional health effect suggests that chronological age suppressed the unfavorable effect of functional health constraints on negative affect.

Functional health constraints were associated with low positive affect, regardless of whether the effect was controlled for chronological age ($\beta_{(t = -4.79;\ se = .09)} = -.69$) or not controlled ($\beta_{(t = -6.61;\ se = .07)} = -.40$). However, the unfavorable effect of functional health on positive affect was significantly stronger after controlling for chronological age ($\beta_{(1)} = -.40$; $\beta_{(2)} = -.69$; $\Delta\ z = -3.60$), indicating that age not only suppressed the unfavorable effects of functional health constraints on negative affect but also on positive affect.

In sum, the analysis of age as a control variable suggests that the age-independent aspects of functional health constraints might be more unfavorable for older people's emotional well-being than those aspects that are associated with chronological age. Moreover, the finding that functional health constraints suppressed the beneficial effects of age on emotional well-being suggests that age per se is not a risk factor for older people's emotional well-being.

The Analyses of Further Control Variables

All of the variables that were tested as covariates have been demonstrated to be predictors of emotional well-being in old age. Some of these variables can be considered as mediating the effects of functional health constraints on emotional well-being (e.g., self-reported health). Other variables can be thought as third variables influencing both functional health and emotional well-being (e.g., gender). In particular, six sets of variables were investigated and controlled for: *sociodemographic variables* (i.e., gender, years of education, and living alone), *self- and other-reported health* (i.e., subjective competence, self-reported general health, self-rated number of functional constraints, and other-rated number of functional constraints), *self-evaluation* (i.e., worries and feelings of worthlessness), *activities* (i.e., general investment level and investment level in health issues), *coping styles* (i.e., assimilative and accommodative style), and *satisfaction with social relationships* (for a detailed description of how all these variables were measured, see Appendix D).

In order to test the univariate effects of the covariates, models were specified that included, in addition to functional health constraints, *one* of the covariates as a latent factor. Models testing the joint effects of covariates belonging to a set (e.g., sociodemographic characteristics), included all of these covariates as constructs (e.g., years of education, gender, and living alone).

The analyses of covariates revealed that the effect of functional health constraints on emotional well-being was robust (the net effects of functional health constraints on the two components of emotional well-being are tabled in Appendix E, Table E1).[20] The univariate analy-

[20] All of the 14 covariates that were tested showed theoretically meaningful and significant relationships with functional health constraints, the two components of emotional well-being, or both. They are tabled in Appendix E, Table E2.

ses showed that when statistically controlling for the 14 covariates, the effect of functional health constraints on negative affect remained nonsignificant, while the effect of functional health constraints on positive affect remained significant and basically unchanged. The average *net* effect of functional health constraints on positive affect was $\beta = -.38$, varying between $\beta = -.32$ (when controlled for overall investment level in activities) and $\beta = -.51$ (when controlled for other-rated number of functional health constraints).

Testing the multivariate effects of the covariates provides a more rigorous test of the robustness of the effects of functional health constraints on emotional well-being. The respective analyses revealed that even when controlled simultaneously for several covariates (e.g., for the three covariates covering sociodemographic characteristics), the effect of functional health constraints on positive affect remained significantly negative, while the effect of functional health constraints on negative affect remained nonsignificant. One exception to this pattern was the significant inverse effect of functional health constraints on negative affect after controlling simultaneously for worries and feelings of worthlessness. Although this net effect reached conventional levels of significance, it should be noted that it was only small in magnitude ($\beta_{(t = -1.99;\ se = .06)} = -.11$).

In sum, the control analyses suggest that the effects of functional health constraints on emotional well-being remained basically unchanged when controlling for the 14 alternative predictors of the two components of emotional well-being, positive and negative affect.

Cross-Validation Analyses

This section addresses the question of whether the cross-sectional effects of functional health constraints on emotional well-being that were found in the parent sample of BASE ($N = 516$) can be cross-validated in the continuer sample ($N = 203$) and the noncontinuer sample ($N = 313$).[21] In particular, three validation analyses were employed. First, the final model based on the parent sample ($N = 516$) was cross-validated on the first-wave data of the continuer sample ($N = 203$; see Appendix F). Second, the model based on the continuer sample ($N = 203$) was cross-validated on the noncontinuer sample ($N = 313$; see Appendix G). Third, the model based on the continuer sample ($N = 203$) was cross-time validated on second wave data (see Appendix H).

These three validation analyses followed a two-step process. First, invariance of the measurement model was specified but no constraints were placed on the structural model components. Invariance was tested for two components: factor loadings and intercepts of the indicators. Second, assuming an acceptable fit for this model, structural invariance was tested for three components of the structural model—factor variances, factor means, and covariations between the latent factors.

The validation analyses revealed that the proposed cross-sectional model that was specified to test the effects of functional health constraints on emotional well-being was basically invariant across (a) the parent and continuer sample, (b) the continuer and noncontinuer sample, and (c) the continuer sample at the first and second wave of BASE (see Appendices F to H). The invariance was demonstrated on the measurement level and, with minor exceptions, on

[21] In contrast to the previous single-group model, MACS models were specified that include, in addition to variance-covariance information, mean-level information (i.e., the intercepts of all the indicators of the latent constructs were included). MACS models provide the advantage that invariance can be tested across samples or time in terms of both variance and covariance patterns and mean levels (see Method Chapter).

the structural level. In all of the three validation analyses, functional health constraints were shown to be inversely associated with positive affect. Functional health constraints showed no significant association with negative affect in the parent and noncontinuer sample, but were significantly associated with high negative affect in the continuer sample (see Appendix H, Figure H1). The significant effect of functional health constraints on negative affect in the continuer sample might be due to the fact that the continuer sample was significantly younger than all the other samples that were investigated. A follow-up analysis was consistent with this ad hoc explanation. Using a median split of the age variable, the parent sample was divided into young old participants (N = 258; M = 77.46; SD = 4.31) and very old participants (N = 258; M = 92.37; SD = 4.50). As was expected, functional health constraints predicted high negative affect in young old participants ($\beta_{(t = 2.22;\ se = .10)} = .22$) but not in very old participants ($\beta_{(t = 1.22;\ se = .09)} = .11$).[22]

Summary of the Cross-Sectional Results

The cross-sectional findings suggest that poor functional health is a particular risk factor for concurrent levels of positive affect. Unexpectedly, functional health constraints did not predict negative affect. The effects of functional health constraints on the two components of emotional well-being remained basically unchanged when controlling for 14 alternative predictors of emotional well-being.

The analysis of age as a covariate suggests, however, that the age-independent aspects of functional health constraints might be significantly associated with increased negative affect. That is, age suppressed the effect of age on negative affect. Moreover, age also suppressed the effect of functional health constraints on positive affect. The age-controlled effect of poor functional health on positive affect was significantly stronger than its simple effect.

The cross-validation analyses provided further evidence for the robustness of the effect of functional health constraints on positive affect. Functional health constraints were shown to be negatively associated with positive affect, not only in the parent sample of BASE but also in the noncontinuers and in the continuers of the longitudinal study. Although functional health constraints had no significant relationship to negative affect in the parent and noncontinuer samples, they were associated with high negative affect in the continuer sample. Given that the continuer sample was significantly younger than all the other samples that were investigated, this finding suggests that functional health constraints might have unfavorable consequences for negative affect in young old people but not in very old people. The finding of a follow-up analysis was consistent with this interpretation.

All findings considered, the first part of the cross-sectional Prediction 1a (i.e., poor functional health is a risk factor for positive affect) was supported. The data provided less support for the second part of Prediction 1a (i.e., poor functional health is a risk factor for negative affect).

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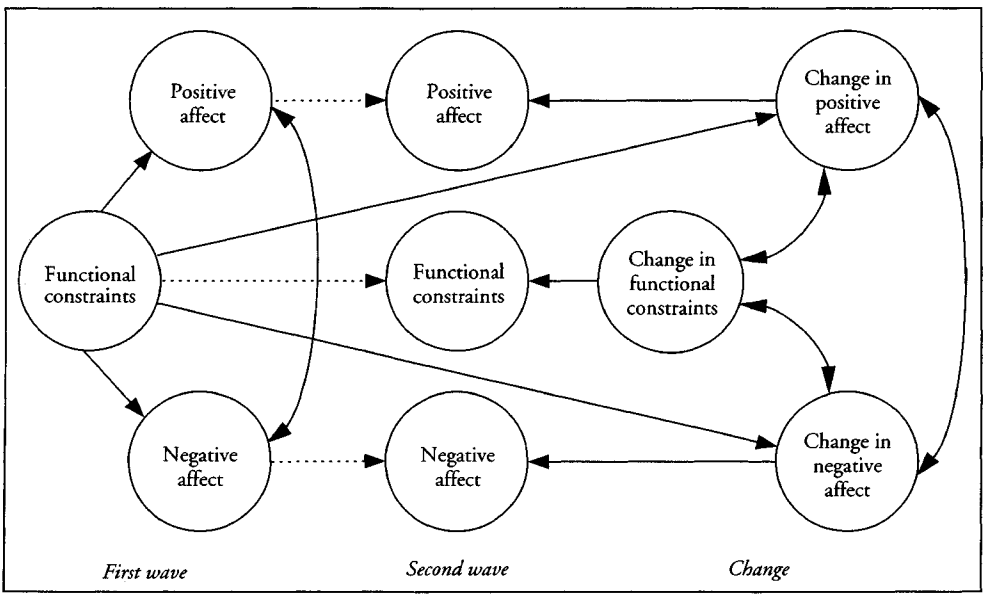
[22] Although the effect of functional health constraints on negative affect was shown to be significant only in young old participants, it should be noted that the comparison of a model in which the effect of functional health constraints on negative affect was enforced to be invariant over the two age groups and a less restricted model in which this effect was allowed to freely vary resulted in a nonsignificant $\Delta\chi^2$ value ($\Delta\chi^2_{(1)} = .75$; $p = .37$). When constrained to equality, the effect of functional health constraints on negative affect was significant and positive ($\beta_{(t = 2.41;\ se = .07)} = .16$).

Longitudinal Results

This section deals with analyses that address the longitudinal relations between functional health constraints and the two components of emotional well-being, positive and negative affect. All the analyses refer to the continuer sample ($N = 203$). The first longitudinal prediction was that those who have more constraints in functional health at the first wave should be more likely to experience a decline in positive affect and an increase in negative affect over time (see Section "Hypotheses," Prediction 1b). Second, it was predicted that those who experience more increases in functional health constraints over time should be more likely to experience a decline in positive affect and an increase in negative affect over time (see Section "Hypotheses," Prediction 1c).

In order to test these longitudinal predictions a two-wave covariance structures model was specified. This model is graphically depicted in Figure 8. As seen, functional health constraints and the two components of emotional well-being (i.e., positive and negative affect) were specified at two waves. In addition, three phantom factors were specified.[23] Each phantom factor

Figure 8
Initial Levels of Functional Health Constraints as Predictors of Differential Changes in Positive and Negative Affect: The Longitudinal Model



Note. In order to test the first longitudinal hypothesis (i.e., first-wave functional health status predicts differential change in emotional well-being), the relations between change in functional health constraints and change in the two components of emotional well-being were specified as correlations, while the relations between first-wave functional health and the change factors of positive and negative affect were specified as causal paths. To test the second longitudinal hypothesis (i.e., differential change in functional health status predicts differential change in emotional well-being), the reverse pattern was specified: The relations between change in functional health and change in the two components of emotional well-being were specified as causal paths, while the relations between first-wave functional health and the change factors of positive and negative affect were specified as correlations.

represents the change variance in one of the three latent constructs (i.e., the residual variance not explained by the respective first-wave construct). As was the case in the cross-sectional model, at the first wave, the relationships between functional health constraints and the two components of emotional well-being were specified as causal effects. In contrast, the relation between positive and negative affect was specified as bivariate correlation.

For purposes of model identification no relationships were specified between the second-wave latent constructs. Moreover, the variances of the first-wave factors and the change factors were fixed to 1.0, while the variances of the second wave constructs were fixed to zero. The three regressions between the change factors and the second-wave factors (i.e., the change variance) were freely estimated. The paths that are relevant to the first longitudinal prediction are the causal paths leading from functional health constraints at the first wave to the change factors of positive and negative affect. When testing the first prediction, all the relationships between the latent change constructs were specified as bivariate correlations.

On the measurement level (not presented in Figure 8), each construct was defined by three indicators (for more information, see Method Chapter). Often, when the same indicators are measured repeatedly, there is a tendency for the residuals in these indicators to correlate over time because of specific factors, memory, or other retest effects. To take these effects into account, each corresponding indicator's residual variance was allowed to correlate across time.

Assessing Model Fit

Table 23 reveals that the longitudinal model described above showed acceptable fit. Enforcing the loadings to be invariant over time resulted in a nonsignificant $\Delta \chi^2$ value ($\Delta \chi^2_{(6)} = 8.83$; $p = .18$). The specified longitudinal model possesses equivalent measurement properties over time.

Descriptive Statistics on Stability and Change

Before testing the longitudinal predictions that initial levels and differential changes in functional health constraints predict differential changes in positive and negative affect, some descriptive information about stability and change in these constructs is given. As seen in Table 24, on average, positive and negative affect were stable over time. That is, the means of positive and negative affect showed no indication of changes over the retest interval of approximately four years.

Table 23
Global Fit Indices of the Proposed Longitudinal Model:
Functional Health Constraints and Emotional Well-Being

Longitudinal Models	χ^2	*df*	*p*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Configural Invariance	110.64	115	.60	.00	1.0	.94	1.0	.91
Loadings invariant	119.47	121	.52	.00	1.0	.93	1.0	.91

[23] A phantom factor is a factor that is not anchored in the measurement level (i.e., a factor without indicators).

Table 24
Mean Level Stabilities for Two Components of Emotional Well-Being and Three Indicators of Functional Health

		Positive affect	*Negative affect*	*Functional health constraints*			
				Vision	*Hearing*	*Mobility*	*Combined*
Time 1	Mean	3.32	2.39	3.48	3.60	3.44	3.38
	STD	.50	.58	.89	1.01	.79	.83
Time 2	Mean	3.29	2.34	3.90	3.73	3.35	3.58
	STD	.55	.59	.86	1.01	.87	.86
$\Delta \chi^2$ Test	$\Delta \chi^2_{(1)}$	.70	.57	21.87	1.49	2.59	5.17
	p	.40	.45	.00	.22	.12	.02

Note. The means and standard deviations in Table 24 refer to the raw data level. In contrast, the $\Delta \chi^2$ values are based on the latent mean estimates (derived from a MACS model, see Appendix H). A $\Delta \chi^2$ value indicates whether a mean estimate can be constrained to be equal over time without losing model fit. A significant value suggests that a mean of an indicator or latent factor has to be freely estimated for the two waves of BASE (i.e., the mean significantly changed over time).

Although it is important to take the multidimensionality and multidirectionality of functional health constraints into account (i.e., the cross-validation analyses indicated that the three indicators of functional health, constraints in vision, hearing, and mobility, showed different degrees of mean-level change; see Appendix H, Table H2), it might nevertheless be useful to investigate stability and change of the composite score of these three indicators of functional health. Functional health constraints, on average, slightly increased over time (see right-hand column of Table 24). Investigating the three indicators of functional health constraints separately showed that this increase was due to an increase in visual constraints. While constraints in vision significantly increased, hearing and mobility constraints were, on average, stable.

Table 25 shows that the stability of individual differences in the three constructs, functional health constraints ($r = .80$), positive affect ($r = .70$), and negative affect ($r = .72$) were of considerable size. As expected, when corrected for measurement error, the stability coefficients slightly increased. The magnitude of the stability coefficients indicates that the rank ordering of the participants was largely the same at each wave.

As seen, the temporal stability of functional health constraints was somewhat higher than the stabilities of the two components of emotional well-being. Only 12 percent of the variance in functional health constraints at the second wave was not explained by functional health constraints at the first wave. Moreover, the temporal stability of functional health constraints was somewhat higher than the internal consistency of the respective measure. Taken as a whole, functional health constraints showed high temporal stability.

Regarding the two components of emotional well-being, some change for some participants did occur. On the one hand, the temporal stabilities were somewhat lower than the reliabilities of the scales. On the other hand, as seen in the right-hand column of Table 25, about one third of the variance in the two dimensions of emotional well-being at the second wave was not explained by the respective first-wave dimensions. For example, 62 percent of the variance in positive affect at the second wave was explained by positive affect measured at the

Table 25
Reliabilities and Relative Stabilities for Functional Health Constraints and the Two Dimensions of Emotional Well-Being, Positive and Negative Affect

	Reliability[1]		*Stability*		
	First wave	*Second wave*	*Raw correlations*	*Latent correlations*	*Explained variance*[2]
Functional constraints	.61	.63	.80	$.94_{(se = .08;\ t = 13.59)}$	
Positive affect	.82	.87	.70	$.79_{(se = .09;\ t = 10.12)}$	62%
Negative affect	.87	.87	.72	$.81_{(se = .07;\ t = 12.03)}$	66%

[1] As a measure of reliability, Cronbach's α was computed.

[2] The amount of explained variance (R^2) = square of the latent stability coefficient. R^2 reflects the amount of explained variance in a construct at the second wave by the respective first-wave construct.

first wave. This implies that 38 percent of the reliable variance in positive affect at the second wave remained unexplained and can be considered as representing "change" variance. The next section addresses whether interindividual differences in *intra*individual changes of positive and negative affect can be attributed to initial levels of functional health constraints and to differential changes in functional health constraints between the first and second wave of BASE.

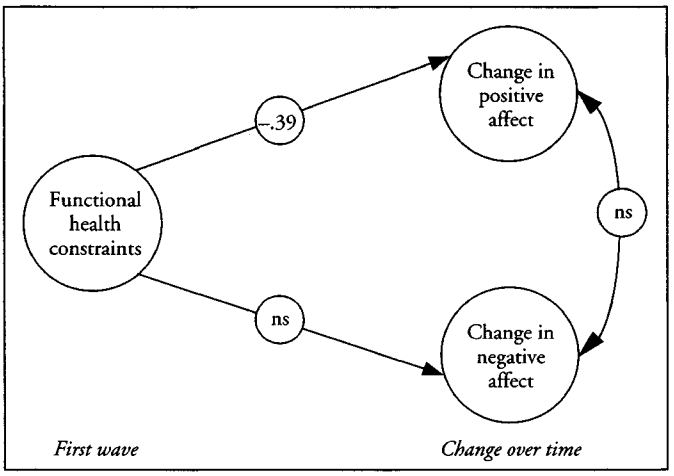
Functional Health Constraints at the First Wave: Do They Predict Differential Changes in Emotional Well-Being?

In order to test the first longitudinal prediction (i.e., functional health constraints at the first wave predict differential changes in positive and negative affect) the model described in Figure 8 was tested. For clarity of presentation, however, Figure 9 only presents the part of the longitudinal model that is relevant for testing the first longitudinal prediction. As seen, individual differences in functional health constraints at the first wave were negatively associated with individual differences in *intra*individual changes of positive affect ($\beta_{(t = -2.62;\ se = .16)} = -.39$).

Those with more constraints in functional health at the first wave were more likely to experience a decline in positive affect, whereas those with fewer constraints at the first wave were more likely to experience an increase in positive affect over time. Initial levels of functional health constraints explained 15 percent of the change variance in positive affect. Contrary to the first longitudinal prediction and consistent with the cross-sectional results in the parent sample, initial levels of functional health constraints did not predict differential changes in negative affect.

In order to test alternative directional hypotheses involving changes in functional health constraints and positive affect, a cross-lagged model was specified. Specifically, the effect of first-wave positive affect on differential changes in functional health constraints was compared with the effect of first-wave functional health constraints on differential changes in positive affect. The specified model showed acceptable fit ($\chi^2_{(46)} = 42.92$; $p = .60$). As seen in Figure 10, functional health constraints, assessed at the first wave, predicted differential changes in positive affect ($\beta_{(t = -2.64;\ se = .11)} = -.24$). However, first-wave positive affect did not predict differential changes in functional health constraints ($\beta_{(t = -.73;\ se = .09)} = .06$).

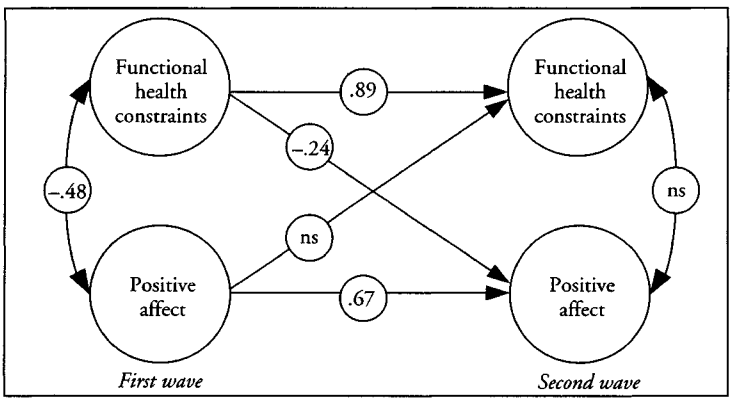
Figure 9
Initial Levels of Functional Health Constraints as Predictors of Differential Changes in Positive Affect



Note. For clarity of presentation, Figure 9 only presents the part of the longitudinal model that is relevant for testing the first longitudinal prediction. The full model is presented in Figure 8.

This finding is consistent with the position that poor functional health is an antecedent of decline in positive affect, but the evidence speaks against the reverse pattern: Positive affect does not appear to be an antecedent variable of changes in functional health. It should be noted, however, that the temporal stability of functional health constraints was considerably higher than the temporal stability of positive affect (see also Table 25). The relatively high sta-

Figure 10
Cross-Lagged Model: Functional Health Constraints and Positive Affect



bility of functional health constraints might be one reason for the finding that initial levels of positive affect did not predict differential changes in functional health constraints.

*Intra*individual Changes in Functional Health: Do They Predict Differential Changes in Emotional Well-Being?

In order to test the second longitudinal hypothesis, the model illustrated in Figure 8 was re-specified. That is, the relations between change in functional health and change in the two components of emotional well-being were specified as causal paths, while the relations between first-wave functional health constraints and the change factors of positive and negative affect were specified as bivariate correlations.

The data gave little support to the prediction that individual differences in *intra*individual changes of functional health constraints predict differential changes in positive and negative affect. Contrary to the second longitudinal hypothesis, individual differences in *intra*individual changes of functional health constraints were not significantly related either to differential changes in positive affect or to differential changes in negative affect.

A factor that may have worked against finding support for the second longitudinal prediction is that individual differences in functional health constraints were relatively stable (see Table 25). If more differential changes in functional health constraints had occurred, perhaps these changes would have been accompanied by differential changes in positive and negative affect.

The Analysis of Chronological Age as a Control Variable

Does chronological age predict differential changes in the two components of emotional well-being? In order to answer this question, a model was specified that included, in addition to functional health, chronological age as a predictor of differential changes in positive and negative affect (the "effects" of initial levels and changes in functional health constraints on changes in positive and negative affect were specified as bivariate correlations). The analysis showed that chronological age predicted differential changes in positive affect ($\beta_{(t = -4.46;\ se = .08)} = -.36$). The older the participants were, the more likely they experienced a decline in positive affect over time. Age explained $R^2 = 13\%$ of the change variance in positive affect. However, chronological age did not predict differential changes in negative affect. Thus, the longitudinal findings were consistent with the cross-sectional ones (see Appendix C, Table C1).

The question of whether chronological age and initial levels of functional health constraints were independent predictors of *intra*individual changes in the two components of emotional well-being was analyzed next. When chronological age and functional health constraints were allowed to jointly predict emotional well-being, the effects of these two predictors both became nonsignificant. Neither the specific variance component of age nor the specific variance component of functional health constraints predicted differential changes in positive or negative affect. When forcing the effects of chronological age and initial levels of functional health constraints to be equal, both effects were significant ($\beta_{(t = -4.64;\ se = .04)} = -.18$). Thus, chronological age did not suppress the longitudinal effects of functional health constraints on the two components of emotional well-being (i.e., the effects of functional health constraints on *intra*individual changes in positive and negative affect). This finding is inconsistent with the cross-sectional findings and can be considered as indicating that the representation of outcome variables in terms of sequences of individual differences versus differential *intra*-

individual changes leads to causal models that are not equivalent and not reducible to each other. A factor that may have contributed to the inconsistencies between the cross-sectional and longitudinal findings is the fact that the continuer sample was more homogenous regarding age (see Method Chapter), functional health, and positive affect (see Appendix F, Table F2) than the parent sample. Moreover, it might well be that the time interval between the two waves of BASE was too narrow to reveal the suppression effects shown in the cross-sectional analyses.

Two follow-up analyses were conducted. First, it was tested whether the cross-sectional finding in the parent sample, that age suppressed the effects of functional health constraints on emotional well-being, can be replicated in the continuer sample at both waves of data collection. The finding that age suppressed the effect of functional health on positive affect could not be replicated in the continuer sample (either at the first wave or at the second wave). However, age suppressed the unfavorable effect of functional health constraints on negative affect (see Appendix I, Table I1). Second, the parent sample was broken down into three subsamples each covering an age-range of approximately ten years. In these three cross-sectional subsamples, age did not suppress the effects of functional health constraints, either on positive affect or on negative affect (see Appendix I, Table I2). Taken together, the findings of the follow-up analyses support the idea that age would have suppressed the longitudinal effects of functional health constraints if the continuers had been more heterogeneous regarding age, functional health constraints, and positive affect, or if a longer time interval between the waves had existed.

The Analyses of Further Control Variables

Of 14 control variables that were tested in the cross-sectional analyses, only two showed significant associations with differential *intra*individual changes in one of the two components of emotional well-being (i.e., positive affect): self-reported functional health ($r_{(t = 3.10;\ se = .09)} = .29$) and other-reported functional health ($r_{(t = 3.05;\ se = .09)} = .28$). These two variables were tested as covariates.

When self-reported functional health and performance-based functional health constraints were allowed to jointly predict emotional well-being, the effects of these two predictors both became nonsignificant. However, when forcing the effects to be equal, both effects were significant ($\beta_{(t = -3.03;\ se = .04)} = -.13$). The same pattern was revealed when other-reported functional health was analyzed as a covariate. Neither the specific variance component of other-reported functional health nor the specific variance component of performance-based functional constraints predicted change in positive affect. When forcing the effects to be equal, however, both effects were significant ($\beta_{(t = 3.06;\ se = .05)} = -.14$). This finding is inconsistent with the cross-sectional finding that the effects of performance-based functional health constraints on concurrent emotional well-being remained unchanged when controlling for other facets of functional health (i.e., self-reported and other-reported functional health).

Summary of the Longitudinal Results

The longitudinal results provided further evidence for the hypothesis that poor functional health is a risk factor for older people's emotional well-being. Poor functional health at the first wave was demonstrated to be a precursor of decline in positive affect. The more individuals were faced with functional constraints at the first wave, the more likely they experienced a

decline in positive affect over time. However, individual differences in functional health at the first wave were not significantly related to differential changes in negative affect. Thus, the longitudinal findings were consistent with the cross-sectional findings in the parent sample: Functional health constraints were inversely associated with concurrent positive affect but were unrelated to concurrent negative affect.

Given that individual differences in functional health constraints showed high stability over time, it is understandable that the second longitudinal prediction (i.e., individual differences in *intra*individual changes of functional health predict differential changes in positive and negative affect) was not supported by the data. If more differential changes in functional health constraints had occurred, perhaps these changes would have been accompanied by differential changes in emotional well-being.

The analysis of chronological age as a control variable revealed that age and initial levels of functional health constraints did not independently predict individual differences in *intra*individual changes of positive affect. Contrary to the cross-sectional finding in the parent sample, age did not suppress the longitudinal effects of functional health constraints on the two components of emotional well-being. A reason for this inconsistency might be the relatively narrow time interval between the two waves of BASE. Cross-sectional follow-up analyses in subsamples of the parent sample covering smaller age ranges are consistent with the assumption that age would have suppressed the effects of functional health constraints on differential changes in positive and negative affect, if a longer time interval between the two waves of data collection had existed.

Taken together, the first part of the first longitudinal Prediction 1b (i.e., poor functional health is associated with a decline in positive affect over time) is supported. No support was found for the second part of Prediction 1b (i.e., poor functional health is associated with an increase in negative affect over time). In addition, Prediction 1c (i.e., differential changes in functional health status are associated with differential changes in positive and negative affect) was not supported by the data.

Perceived Control: Are all Facets Resources for Emotional Well-Being?

Cross-Sectional Results

In this section the analyses are presented that address the cross-sectional relations between three facets of perceived control and emotional well-being. First, it was predicted that personal responsibility for undesirable outcomes and perceived others' control both have unfavorable effects on emotional well-being. In contrast, personal control over desirable outcomes should be a resource for emotional well-being (see Section "Hypotheses," Prediction 2a). The second prediction was that, depending on the valence of the control domain, the self-related dimensions of perceived control are differentially associated with positive versus negative affect. Personal control over *desirable* outcomes should predict positive affect but not negative affect. Personal responsibility for *undesirable* outcomes should predict negative affect but not positive affect. Perceived others' control over *desirable* and *undesirable* outcomes should predict positive and negative affect (see Section "Hypotheses," Prediction 2b).

The model to be tested in Predictions 2a and 2b postulates a priori that perceived control is a three-factor structure, namely, perceived personal control over desirable outcomes, per-

ceived personal responsibility for undesirable outcomes, and perceived others' control over desirable and undesirable outcomes. The first two factors were defined by three measured variables each, the third factor was defined by two measured variables (see Method Chapter). As in previous models, emotional well-being consisted of two factors, positive and negative affect, each defined by three measured variables. Measurement error was taken into account for each measured variable, and the random errors of measurement and indicator uniqueness were specified to be uncorrelated. For purposes of identification all the latent factor variances were fixed to 1.0. In the first model, all possible relationships between the latent factors were specified as bivariate correlations.

Assessing Model Fit

Table 26 reveals that all of the fit indices uniformly indicate an acceptable fit for the model described above.

Table 27 presents the factor loadings and communalities of the measured variables in the hypothesized model. All estimates of the factor loadings were reasonable. In addition, the t-values associated with the estimated factor loadings ranged from 5.46 to 25.53, indicating that all estimated parameters were significantly different from zero and thus were important contributors to the hypothesized model. Furthermore, the standard errors were uniformly small and ranged from 0.02 to 0.06, which is highly acceptable.

The communalities (h^2 = 1 – standardized residual variance) were all acceptable. Notably, however, the parcel indicators (i.e., indicators that include more than one item) were far more reliable and homogeneous than single-item indicators.

The single-item indicators of personal control over desirable outcomes and responsibility for undesirable outcomes showed an average communality of .41, ranging from .15 to .57. In contrast, the parcel indicators' average communality was .66, ranging from .57 to .75.

In sum, the global fit indices (see Table 26) and the specific goodness-of-fit indices of the individual measurement model parameters (see Table 27) attested to an acceptable fit between the hypothesized model and the sample data. The precondition for testing the hypotheses that individual differences in the three dimensions of perceived control are associated with individual differences in positive and negative affect was met.

Table 26
Global Fit Indices of the Proposed Cross-Sectional Model:
Perceived Control and Emotional Well-Being

	χ^2	*df*	*p*	χ^2:*df*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Model	130.50	68	.00	1.92	.04	.97	.95	.97	.93

Table 27
Unstandardized Factor Loadings and Communalities of the Cross-Sectional Model: Perceived Control and Emotional Well-Being

Unstandardized factor loadings (se, t)					
Perceived personal control over desirable out-comes	*Perceived personal responsibility for undesirable outcomes*	*Perceived others' control*	*Positive affect*	*Negative affect*	h^2
.71 (t = 5.46; se = .05)					.54
.70 (t = 15.74; se = .04)					.57
.40 (t = 10.56; se = .04)					.25
	.39 (t = 7.45; se = .05)				.15
	.55 (t = 11.04; se = .05)				.41
	.70 (t = 11.91; se = .06)				.53
		.87 (t = 25.53; se = .03)			.60
		.87 (t = 25.53; se = .03)			.66
			.52 (t = 19.88; se = .03)		.64
			.50 (t = 18.63; se = .03)		.57
			.59 (t = 20.92; se = .03)		.69
				.54 (t = 23.17; se = .02)	.75
				.55 (t = 20.94; se = .03)	.65
				.63 (t = 21.89; se = .03)	.69

Note. Communality (h^2) = 1 – standardized residual variance. The communality reflects the amount of explained variance in the manifest indicators by its respective construct.

Three Dimensions of Perceived Control: Do They Predict Emotional Well-Being?

Bivariate correlations. Table 28 presents the bivariate correlations between three dimensions of perceived control and the two components of emotional well-being, positive and negative affect. Latent correlations are presented in the top half, correlations on the manifest (raw data) level are presented in the bottom half of Table 28. Two aspects of Table 28 deserve mention. The first aspect refers to the structure of perceived control. The two perceived control dimensions that refer to the self (i.e., personal control over desirable outcomes and personal responsibility for undesirable outcomes) were positively interrelated (i.e., on the latent level r = .33). This moderate correlation indicates that individuals who believe they can control the good things in life tend also to believe that they are responsible for the undesirable things in their lives. In contrast, perceived others' control was essentially independent of the two self-related dimensions of perceived control. The pattern of correlations between the three dimensions of perceived control supports the position that perceived control is a multidimensional construct.

Second, Table 28 gives a first indication that not all dimensions of perceived control are resources for older people's emotional well-being. To the contrary, personal control over desirable outcomes was the only dimension of perceived control that was positively correlated with emotional well-being. The other two perceived control dimensions (i.e., personal responsibility for undesirable outcomes and perceived others' control) were associated with lower levels of emotional well-being (i.e., with less positive affect, more negative affect, or both). A closer examination of Table 28 reveals that two of the three perceived control dimensions were dif-

Table 28
Correlations Between Three Dimensions of Perceived Control and Emotional Well-Being

	Perceived personal control over desirable outcomes	*Perceived personal responsibility for undesirable outcomes*	*Perceived others' control*	*Positive affect*	*Negative affect*
Perceived personal control over desirable outcomes	–	$.33_{(t = 5.58;\ se = .06)}$	$.09_{(t = .57;\ se = .06)}$	$.37_{(t = 7.32;\ se = .05)}$	$-.08_{(t = -1.42;\ se = .05)}$
Perceived personal responsibility for undesirable outcomes	$.21_{(p = .01)}$	–	$.01_{(t = .25;\ se = .06)}$	$.10_{(t = 1.65;\ se = .06)}$	$.15_{(t = 2.67;\ se = .06)}$
Perceived others' control	$.06_{(ns)}$	$.03_{(ns)}$	–	$-.15_{(t = -2.79;\ se = .05)}$	$.23_{(t = 4.50;\ se = .05)}$
Positive affect	$.31_{(p = .01)}$	$.06_{(ns)}$	$-.13_{(p = .01)}$	–	$-.04_{(t = .69;\ se = .05)}$
Negative affect	$-.06_{(ns)}$	$.12_{(p = .01)}$	$.19_{(p = .01)}$	$.04_{(ns)}$	–

Note. The top and bottom halves of this table are divided by cells marked with a dash (–). Correlations on the latent level are presented in the top half of this table, correlations on the manifest level are presented in the bottom half. The standard errors and t-values of the estimated latent correlations are presented in brackets.

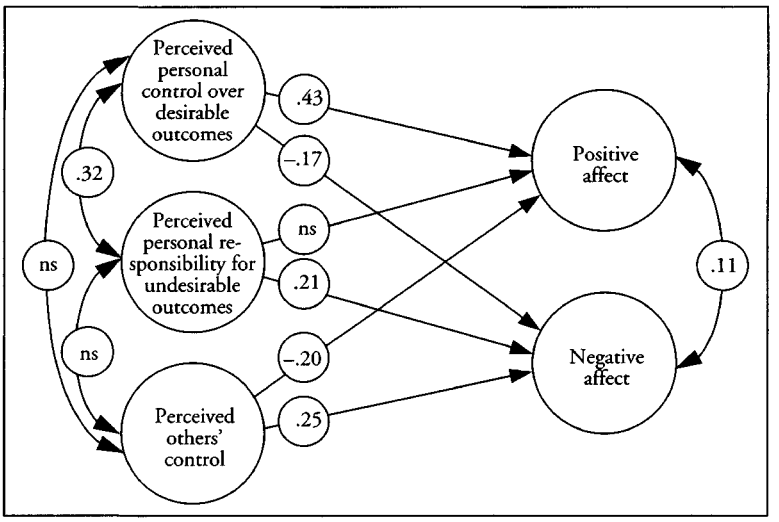
ferentially associated with positive and negative affect. Personal control over *desirable* outcomes was positively associated with *positive* affect but was not significantly related to negative affect. Personal responsibility for *undesirable* outcomes was inversely associated with *negative* affect but was not significantly related to positive affect. As expected, perceived others' control over *desirable* and *undesirable* outcomes was inversely associated with positive affect *and* positively related to negative affect.

Independent Effects. Given that the two self-related dimensions of perceived control were positively interrelated (on the latent level $r = .33$), the magnitude of their independent causal effects on positive and negative affect might be somewhat different than the respective zero-order correlations. In order to examine the independent effects of the three dimensions of perceived control, all possible relationships between the latent predictor and outcome factors were specified as causal effects. As seen in Figure 11, for the most part, the magnitude and direction of the causal effects of perceived control on positive and negative affect mirrored the correlational relationships. However, there was one exception:[24] The effect of personal control over desirable outcomes on negative affect was significantly negative ($\beta_{(t = -2.74;\ se = .06)} = -.17$). In contrast, the respective bivariate correlation was nonsignificant (see Table 28). It should be noted, however, the effect of personal control over desirable outcomes on negative affect was considerably smaller than its effect on positive affect ($\beta_{(t = 6.14;\ se = .07)} = .43$).

As was the case in the previous model, personal control over desirable outcomes was the only dimension of perceived control having beneficial effects on the two emotional well-being

[24] A second exception was that the correlation between residualized positive and negative affect was significantly positive ($r_{(t = 2.34;\ se = .05)} = .11$).

Figure 11
Cross-Sectional Effects of Perceived Control on Emotional Well-Being



outcomes. Perceived others' control predicted low positive affect ($\beta_{(t = -3.45;\ se = .06)} = -.20$) and high negative affect ($\beta_{(t = 4.47;\ se = .06)} = .25$). Personal responsibility for undesirable outcomes predicted high negative affect ($\beta_{(t = 3.19;\ se = .07)} = .20$), but was not significantly related to positive affect. Together, the three dimensions of perceived control explained 17 percent of the variance in positive affect, and 10 percent of the variance in negative affect. Thus, the cross-sectional findings were consistent with two predictions: (a) Perceived control can serve as a resource or risk factor for emotional well-being, depending on the dimension that is considered, and (b) whether perceived control predicts positive or negative affect depends on the valence of the control domain. To further test the latter prediction, a sequence of five nested models was tested; they are compared in Table 29. In the first model, all possible causal effects of the three dimensions of perceived control on positive and negative affect were freely estimated (see Figure 11). The second model differed from the first model in that the effect of personal responsibility for undesirable outcomes on positive affect was fixed to zero. As seen in Table 29 (see comparison of Model 1 vs. 2), this could be done without losing model fit. In addition, the effects of perceived others' control could be forced to be of equal magnitude (see Table 29; comparison of Model 2 vs. 3). In contrast, the effect of personal control over desirable outcomes on negative affect could not be fixed to zero without losing model fit (see Table 29; comparison of Model 3 vs. 4). However, the effect of personal control over desirable outcomes on positive effect was significantly stronger than its effect on negative affect; these two effects could not be forced to be of equal magnitude (see Table 29; comparison of Model 4 vs. 5).

In sum, the nested-model comparison analysis provided further support for the prediction that the valence of the control domain is important when it comes to the differential prediction of positive versus negative affect.

Table 29
Three Dimensions of Perceived Control: Are They Differential Predictors of Positive Versus Negative Affect?

				Comparison of models		
Models[1]	χ^2	*df*	χ^2:*df*	$\Delta\chi^2$	*df*	*p*
Model 1	130.50	68	1.92			
Model 2	130.73	69	1.90			
Model 3	131.13	70	1.87			
Model 4	138.76	71	1.99			
Model 5	180.39	71	1.97			
Model 1 versus 2				.23	1	.63
Model 2 versus 3				.40	1	.53
Model 3 versus 4				7.63	1	.01
Model 3 versus 5				49.26	1	.00

[1] In Model 1, all causal effects were freely estimated. In Model 2, the effect of personal responsibility for undesirable outcomes on positive affect was fixed to zero. In Model 3, the effects of perceived others' control on positive and on negative affect were enforced to be of equal size. In Model 4, the effect of personal control over desirable outcomes on negative affect was fixed to zero. In Model 5, the effects of personal control over desirable outcomes on positive and on negative affect were enforced to be of equal magnitude.

The Analysis of Chronological Age as a Control Variable

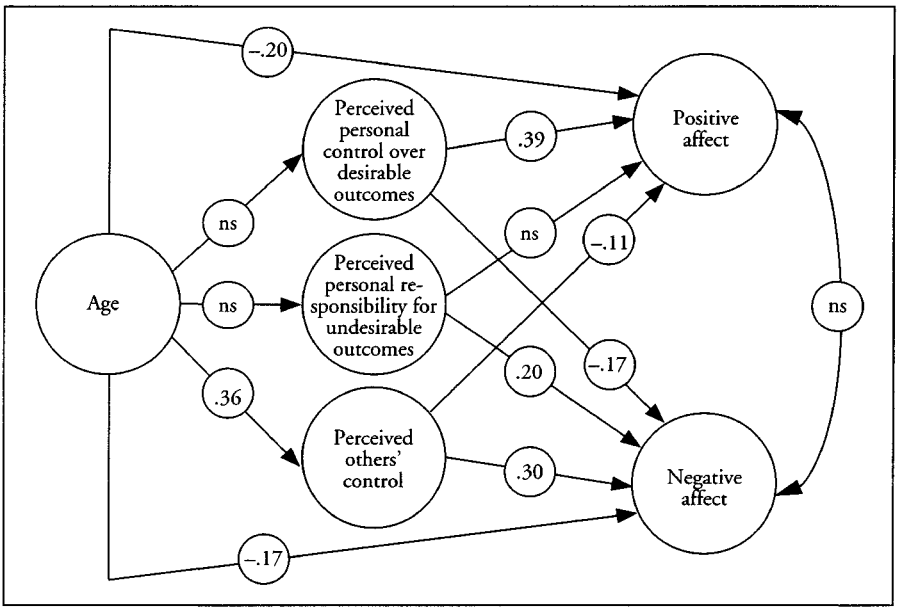
In order to test whether chronological age had a significant influence on the effects of perceived control on emotional well-being, a model was specified that included, in addition to the effects of perceived control, the effect of chronological age on the emotional well-being components.[25] Figure 12 presents a graphical presentation of this model, including the independent effects of age and perceived control on positive and negative affect.

Three aspects of Figure 12 deserve mention. First, chronological age predicted only one of the three dimensions of perceived control, namely, perceived others' control ($\beta_{(se = .05;\ t = 5.58)} = .36$; for correlations on the raw data level, see Appendix B). The moderate relationship indicates that getting older might, in some individuals, be accompanied with believing more and more that other people have control over one's personal affairs.

Second, the effects of the two self-related dimensions of perceived control remained basically unchanged when controlled for age. In contrast, the age-controlled effect of perceived others' control on positive affect was somewhat weaker ($\beta_{(se = .06;\ t = -2.04)} = -.11$) than the respective simple effect ($\beta_{(t = -3.45;\ se = .06)} = -.20$). Although this difference was not significant ($\beta_{(1)} = -.20$; $\beta_{(2)} = .11$; $\Delta z = 1.50$), the comparison of a model in which the effect of perceived control on positive affect and on negative affect were allowed to freely vary and a model in which these effects were constrained to be equal resulted in a significant $\Delta\chi^2$ value ($\Delta\chi^2_{(1)} = 4.95$; $p = .03$). In contrast, as was shown in Table 29, when not controlling for age, the effect of perceived others' control on positive and negative affect could be constrained to be equal. This finding indicates that part of the unfavorable effects of perceived others' control on posi-

[25] As was the case when controlling the effects of functional health constraints on emotional well-being, chronological age was specified as a single indicator construct. Because age was expected to have been measured without error, residual variances were fixed to zero. In addition, for scaling purposes the factor variance was fixed to 1.0.

Figure 12
Cross-Sectional Effects of Chronological Age and Perceived Control on Emotional Well-Being



Notes. To keep this figure clear and simple, the intercorrelations of the three dimensions of perceived control are not included. They can be seen, however, in Figure 11.

tive affect is due to its covariation with age. However, the effect of perceived others' control on negative affect remained unchanged when controlling for chronological age.

Third, when controlling for the effects of the three dimensions of perceived control, chronological age was associated with decreased levels of negative affect. This result provides further evidence for the assumption that age per se is not a risk factor for emotional well-being. The unfavorable effect of chronological age on positive affect, however, remained unchanged when controlling for perceived control.

The Analyses of Further Control Variables

The independent variance components of perceived control and emotional well-being, when taking the 14 covariates into account, were analyzed (for a description of all these covariates, see Appendix D, Table D1). The analyses revealed that the effects of the three dimensions of perceived control on the two components of emotional well-being remained basically unchanged when controlling for the 14 alternative predictors of positive and negative affect. (The net effects of the three dimensions of perceived control on the two components of emotional well-being are summarized in Appendix J, Tables J1, J2, and J3.)

Cross-Validation Analyses

This section addresses whether the effects of the three dimensions of perceived control on emotional well-being that were found in the parent sample ($N = 516$) can be cross-validated in the continuer ($N = 203$) and noncontinuer ($N = 313$) samples. The same procedures were applied that were used when cross-validating the effects of functional health constraints on emotional well-being.

The validation analyses revealed that the proposed cross-sectional model that was specified to test the effects of perceived control on emotional well-being was basically invariant across (a) the parent and continuer sample (see Appendix K), (b) the continuer and noncontinuer sample (see Appendix L), and (c) the continuer sample at the first and second wave (see Appendix M). The invariance was demonstrated on the measurement level and, with a few exceptions, on the structural level. In all three validation analyses, perceived others' control was shown to be associated with high negative affect and low positive affect. In contrast, personal control over desirable outcomes was shown to be significantly associated with high positive affect and with low negative affect. In the parent and noncontinuer samples, the effect of personal control over desirable outcomes on positive affect was significantly stronger than its effect on negative affect. However, in the continuer sample, the effects of personal control over desirable outcomes on positive and negative affect did not significantly differ. The effects of personal responsibility for undesirable outcomes on emotional well-being were less robust than the effects of the other two dimensions of perceived control. In the continuer sample, personal responsibility for undesirable outcomes showed no significant associations with the two components of emotional well-being (i.e., neither with positive affect nor with negative affect).

Summary of the Cross-Sectional Results

The cross-sectional findings suggest that perceived control is a multidimensional construct with each dimension having specific effects on the experience of emotional well-being. While one dimension of perceived control (i.e., personal control over desirable outcomes) was shown to be a resource for emotional well-being in old age, the other two dimensions of perceived control (i.e., personal responsibility for undesirable outcomes and perceived others' control) had less favorable effects.

As was expected, the two self-related dimensions of perceived control were differential predictors of positive and negative affect. In the parent sample, perceived personal control over *desirable* outcomes showed a significantly stronger association with *positive* affect than with negative affect. In contrast, perceived personal responsibility for *undesirable* outcomes was associated with *negative* affect but was essentially unrelated to positive affect. Perceived others' control over both desirable and undesirable outcomes was associated with positive *and* negative affect. These cross-sectional effects remained basically unchanged when controlling for chronological age and 14 alternative predictors of emotional well-being.

The cross-validation analysis in the continuer sample, however, provided some indication that the effects of personal responsibility for undesirable outcomes might be less robust than the effects of the other two dimensions of perceived control. In the continuer sample, this dimension of perceived control was not significantly related either to negative or to positive affect at both waves. Moreover, contrary to previous analyses in the parent sample, in the continuer sample, the effect of perceived control over desirable outcomes on positive affect did not significantly differ from its effect on negative affect.

With the reservation that personal responsibility for undesirable outcomes was less important to emotional well-being in the continuer sample, the cross-sectional Prediction 2a is supported: Personal responsibility for undesirable outcomes and perceived others' control are risk factors for emotional well-being. In contrast, personal control over desirable outcomes is a resource for emotional well-being. Prediction 2b was supported in the parent sample: Depending on the valence of the control domain, the two self-related dimensions of perceived control were differentially related to positive and negative affect. However, no differential prediction pattern occurred in the continuer sample.

Longitudinal Results

This section deals with analyses that address the longitudinal relations between perceived control and emotional well-being. All the analyses refer to the continuer sample ($N = 203$). The first longitudinal prediction was that individual differences in the three dimensions of perceived control at the first wave are associated with individual differences in *intra*individual changes of positive and negative affect (see Section "Hypotheses," Prediction 2c). The longitudinal effects should mirror the predicted cross-sectional effects (see Prediction 2b). Second, it was predicted that individual differences in *intra*individual changes of the three dimensions of perceived control over time should be associated with individual differences in *intra*individual changes of positive and negative affect (see Section "Hypotheses," Prediction 2d). The longitudinal effects should, again, mirror the predicted cross-sectional effects (see Prediction 2b).

In order to test these longitudinal predictions, a two-wave covariance structures model was specified. The specified longitudinal model followed exactly the same logic as was applied when testing the longitudinal relations between functional health constraints and emotional well-being (see Figure 8). The only difference from the previous model was the number of predictors. Instead of including one predictor, functional health constraints, the current model included three predictors, the three dimensions of perceived control (see Appendix N).

Assessing Model Fit

Table 30 reveals that the longitudinal model showed acceptable fit, indicating that the general structure is tenable. Enforcing the loadings to be invariant over time resulted in a nonsignificant $\Delta \chi^2$ value ($\Delta \chi^2_{(8)} = 3.54$; $p = .90$). The specified longitudinal model demonstrated equivalent measurement properties over time.

Table 30
Global Fit Indices of the Proposed Longitudinal Model:
Perceived Control and Emotional Well-Being

Longitudinal models	χ^2	*df*	*p*	χ^2:*df*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Configural invariance	461.34	307	.00	1.50	.05	.94	.84	.92	.80
Loadings invariant	464.88	315	.00	1.48	.05	.94	.84	.93	.81

Table 31
Mean Level Stabilities for Three Dimensions of Perceived Control

		Perceived personal control over desirable outcomes	*Perceived personal responsibility for undesirable outcomes*	*Perceived others' control*
Time 1	Mean	3.64	3.49	2.30
	STD	.68	.67	.88
Time 2	Mean	3.64	3.39	2.52
	STD	.59	.71	.88
$\Delta \chi^2$ Test	$\chi^2_{(1)}$	.26	3.04	6.41
	p	.61	.08	.01

Note. The means and standard deviations refer to the raw data level. The $\Delta \chi^2$ values are based on the latent mean estimates (derived from a MACS model, see Appendix M). A $\Delta \chi^2$ value indicates whether a mean estimate can be constrained to be equal across time without losing model fit. A significant value suggsts that the mean of a latent factor significantly changed over time.

Descriptive Statistics on Stability and Change

Before testing the longitudinal predictions that initial levels and changes in the three dimensions of perceived control predict changes in positive and negative affect, some descriptive information about stability and change in the three dimensions of perceived control is given first (for information about stability and change in positive and negative affect, see Tables 24 and 25).

As seen in Table 31, on average, the two dimensions of perceived control that refer to the self were stable over time. Neither the mean of personal control over desirable outcomes nor the mean of personal responsibility for undesirable outcomes changed significantly over the retest interval of approximately four years. In contrast, perceived others' control significantly increased from the first wave ($M = 2.30$) to the second wave ($M = 2.52$).

Table 32 shows that the stability of individual differences in all three dimensions of perceived control were of moderate size.

Table 32
Reliabilities and Relative Stabilities for Three Dimensions of Perceived Control

	Reliability[1]		*Stability*		
	First wave	*Second wave*	*Raw correlations*	*Latent correlations*	*Explained variance*[2]
Perceived personal control over desirable outcomes	.63	.63	.51	$.50_{(t = 6.80;\ se = .07)}$	25%
Perceived personal responsibility for undesirable outcomes	.61	.70	.50	$.74_{(t = 6.47;\ se = .11)}$	55%
Perceived others' control	.80	.83	.57	$.64_{(t = 8.63;\ se = .07)}$	41%

[1] As a measure of reliability the Cronbach's α was computed.

[2] The amount of explained variance (R^2) = Square of the latent stability coefficient. R^2 reflects the amount of explained variance in a construct at the second wave by the respective first-wave construct.

As expected, when corrected for measurement error, the stability coefficients (i.e., in particular, the stability of personal responsibility for undesirable outcomes) slightly increased. The magnitude of the stability coefficients of the three dimensions of perceived control implies considerable individual differences in *intra*individual changes, being most pronounced in personal control over desirable outcomes. The next section deals with the question whether initial levels and interindividual differences in *intra*individual changes of perceived control predict differential changes in positive and negative affect over time.

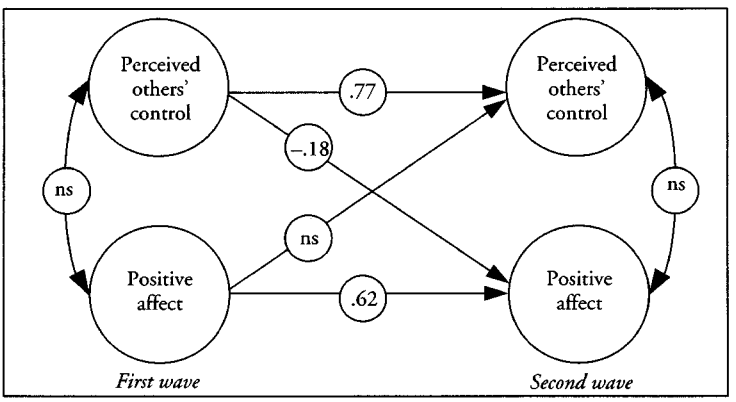
Three Dimensions of Perceived Control at the First Wave: Do They Predict Differential Changes in Emotional Well-Being?

In order to test the first longitudinal hypothesis (i.e., individual differences in perceived control at the first wave predict differential changes in emotional well-being), the model illustrated in Appendix N was tested. The data gave little support to the first longitudinal prediction. Perceived others' control was the only dimension of perceived control which predicted differential changes in one of the two components of emotional well-being—positive affect. The more individuals believed that they were dependent on others at the first wave of data collection, the more likely they experienced decline in positive affect over time ($\beta_{(se = .11;\ t = -2.94)} = -.31$). Initial levels of perceived others' control explained 10 percent of the change variance in positive affect.

In order to test alternative directional hypotheses involving changes in perceived others' control and positive affect, a cross-lagged model was specified (see Figure 13). Specifically, the effect of first-wave positive affect on differential changes in perceived others' control was compared with the effect of first-wave perceived others' control on differential changes in positive affect.

The specified model showed acceptable fit ($\chi^2_{(28)} = 32.13$; $p = .27$). As seen in Figure 13, perceived others' control, assessed at the first wave, predicted differential changes in positive affect ($\beta_{(t = -2.92;\ se = .07)} = -.18$). However, first-wave positive affect did not significantly predict

Figure 13
Cross-Lagged Model: Perceived Others' Control and Positive Affect



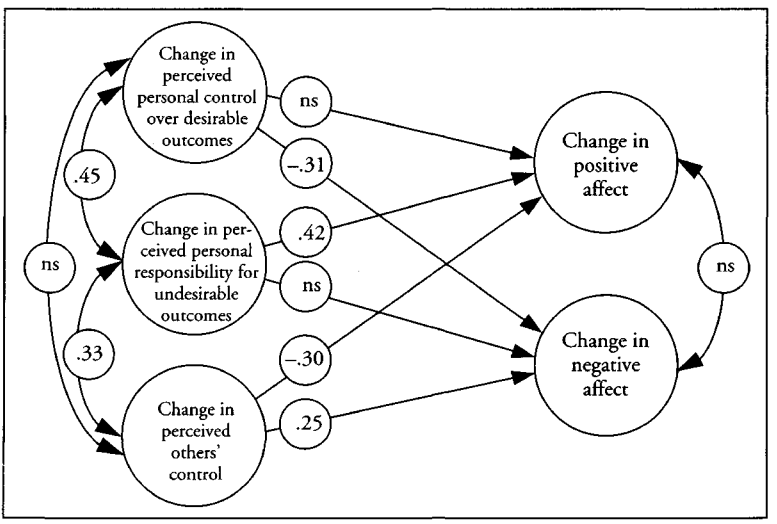
differential changes in perceived others' control ($\beta_{(t = -1.86;\ se = .07)} = -.13$). This finding is consistent with the position that perceived others' control is an antecedent of decline in positive affect, but the evidence speaks against the reverse pattern: Positive affect does not appear to be an antecedent variable of differential changes in perceived others' control.

Contrary to the first longitudinal hypothesis, individual differences in the two self-related dimensions of perceived control at the first wave were not associated with differential changes in the two components of emotional well-being. A factor that may have worked against finding support for the first hypothesis is that the participants of the present study differed considerably in the ways they changed in perceiving their control possibilities (see Table 32). Therefore, individual differences in *intra*individual changes of perceived control might be a better candidate for predicting differential changes in the two components of emotional well-being.

Intraindividual Changes in Three Dimensions of Perceived Control: Do They Predict Differential Changes in Emotional Well-Being?

Figure 14 presents the part of the longitudinal model that is relevant for testing the second longitudinal prediction (i.e., differential changes in perceived control predict differential changes in emotional well-being). Only the latent factors and paths that are directly related to this prediction are presented (the full model is illustrated in Appendix N). As seen, individual differences in *intra*individual changes of all three dimensions of perceived control predicted differential changes in positive affect, negative affect, or both. Together, individual differences in *intra*individual changes of the three perceived control dimensions explained 19 percent of

Figure 14
Differential Changes in Three Dimensions of Perceived Control as Predictors of Differential Changes in Emotional Well-Being



Note. For clarity of presentation, Figure 14 only presents the part of the longitudinal model that is relevant for testing the second longitudinal prediction. The full model is presented in Appendix N.

the change variance in positive affect, and 14 percent of the change variance in negative affect.

Unexpectedly, the effects of the differential changes in the two self-related dimensions of perceived control on differential changes in the two components of emotional well-being did not mirror the respective cross-sectional effects (see Figure 11 and Appendices K, L, and M).

The cross-sectional analyses revealed that personal control over desirable outcomes was positively associated with concurrent positive affect and inversely associated with concurrent negative affect (see Figure 11 and Appendix K, Figure K1). Differential changes in personal control over desirable outcomes, however, were inversely related to differential changes in negative affect ($\beta_{(se = .16;\ t = -2.03)} = -.31$) and showed no significant associations with differential changes in positive affect. Despite this qualification, the cross-sectional and longitudinal findings were consistent in that they showed personal control over desirable outcomes to be a resource for emotional well-being. That is, this facet of perceived control predicted high concurrent positive affect and low concurrent negative affect. In addition, the more the participants experienced an increase in personal control over desirable outcomes, the more likely they experienced a decrease in negative affect over time.

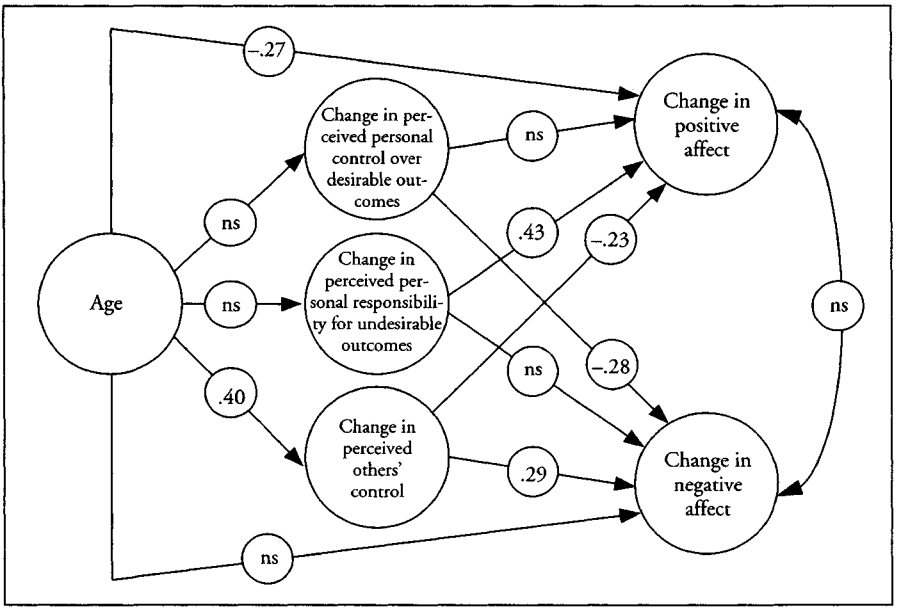
The cross-sectional and longitudinal results were less coherent regarding the effects of personal responsibility for undesirable outcomes on emotional well-being. Personal responsibility for undesirable outcomes was positively associated with concurrent negative affect and unrelated to concurrent positive affect in the parent (see Figure 11) and noncontinuer samples (see Appendix L, Figure L1). In the continuer sample, personal responsibility for undesirable outcomes was not significantly related either to concurrent positive affect or to concurrent negative affect (see Appendix M, Figure M1). As seen in Figure 14, differential changes in personal responsibility for undesirable outcomes were positively associated with differential changes in positive affect ($\beta_{(t = 2.45;\ se = .21)} = .42$). The more individuals experienced an increase in personal responsibility for undesirable outcomes, the more likely they experienced an increase in positive affect over time.

Perceived others' control was the only dimension of perceived control whose longitudinal effects on the two components of emotional well-being mirrored their cross-sectional effects. As expected, differential changes in perceived others' control predicted differential changes in positive affect ($\beta_{(t = -2.44;\ se = .14)} = -.30$) and negative affect ($\beta_{(t = 2.08;\ se = .13)} = .25$). The more individuals experienced an increase in perceived others' control, the more likely they experienced a decline in positive affect and an increase in negative affect over time.

The Analysis of Chronological Age as a Control Variable

In order to test whether chronological age and differential changes in the three dimensions of perceived control were independent predictors of individual differences in *intra*individual changes of the two components of emotional well-being, a model was specified that included age as a predictor of differential changes in positive and negative affect. Figure 15 presents a graphical presentation of this model, including only the paths that are relevant for present purposes. Two aspects deserve mention. First, age predicted differential changes in perceived others' control ($\beta_{(t = -4.61;\ se = .10)} = .40$), but was not associated with differential changes in the two self-related dimensions of perceived control. This finding mirrored the respective cross-sectional findings in the parent sample (see Figure 12).

Figure 15
Longitudinal Effects of Age and Perceived Control on Emotional Well-Being



Second, for the most part, the magnitude and direction of the age-controlled causal effects of the differential changes in perceived control on differential changes in positive and negative affect mirrored the simple effects (see Figure 14). However, two of the age-controlled effects of perceived control were only marginally significant: the effect of differential changes in personal control over desirable outcomes on differential changes in negative affect ($\beta_{(t = -1.89;\ se = .16)} = -.28$) and the effect of differential changes in perceived others' control on differential changes in positive affect ($\beta_{(t = -1.77;\ se = .14)} = -.23$).

Taken as a whole and consistent with the cross-sectional analyses, the effects of differential changes in perceived control on differential changes in emotional well-being remained basically unchanged when controlling for chronological age.[26]

The Analyses of Further Control Variables

As mentioned, of the 14 control variables that were tested in the cross-sectional analyses only two—self-reported and other-reported functional health—showed significant associations with differential changes in one of the two components of emotional well-being (i.e., positive affect). When controlled for these two facets of functional health, the effects of differential changes in perceived control on differential changes in emotional well-being remained basically unchanged (see Appendix O).

[26] The effect of first-wave perceived others' control on positive affect (see Figure 13) also remained significant when controlled for chronological age ($\beta_{(t = -2.31;\ se = .12)} = -.24$).

Summary of the Longitudinal Results

The longitudinal results provided further evidence for the hypothesis that perceived control is an important contributor to older people's emotional well-being. Individual differences in *intra*individual changes of three dimensions of perceived control were associated with differential changes in the two components of emotional well-being. Moreover, the longitudinal effects of perceived control on emotional well-being remained basically unchanged, when controlling for chronological age and two facets of functional health. Unexpectedly, the longitudinal relationships of the two self-related perceived control dimensions (i.e., personal control over desirable outcomes and personal responsibility for undesirable outcomes) did not mirror their respective cross-sectional effects.

Personal control over desirable outcomes was associated with high concurrent positive affect and low concurrent negative affect. Differential changes in this facet of perceived control, however, were associated with differential changes in only one component of emotional well-being (i.e., negative affect). The more the participants experienced an increase in personal control over desirable outcomes, the more they experienced a decrease in negative affect over time. *Personal responsibility for undesirable outcomes* was shown to be (a) a risk factor for concurrent negative affect in the parent and noncontinuer samples, (b) a neutral factor regarding concurrent negative and positive affect in the continuer sample, and (c) a resource for favorable changes in positive affect over time. *Perceived others' control* was the only dimension of perceived control whose longitudinal effects were consistent with its effects on concurrent emotional well-being. As expected, the more individuals experienced an increase in perceived others' control, the more likely they experienced a decline in positive affect and an increase in negative affect over time.

Given that individual differences in the three dimensions of perceived control were relatively unstable over time, it is understandable that the first longitudinal prediction (i.e., individual differences in perceived control at the first wave predict differential changes in emotional well-being) found little support in the data. The only dimension of perceived control in which initial levels predicted differential changes in one component of emotional well-being (i.e., positive affect) was perceived others' control. The more individuals believed that other people had control over their lives at the first wave, the more likely they experienced a decline in positive affect over time.

Taken together, the data provided little support for the longitudinal Prediction 2c (i.e., individual differences in perceived control at the first wave are associated with differential changes in emotional well-being). In contrast, the first part of the longitudinal Prediction 2d (i.e., differential changes in perceived control predict differential changes in emotional well-being) was supported. However, the longitudinal effects of the two self-related dimensions of perceived control did not mirror their respective cross-sectional effects.

Three Dimensions of Perceived Control: Are Their Influences on Emotional Well-Being Conditioned by Functional Health Constraints?

Cross-Sectional Results

In this section, the cross-sectional analyses are presented that address the question whether functional health moderates the relationships between the three dimensions of perceived con-

trol and emotional well-being. Three cross-sectional hypotheses were formulated: First, the beneficial effect of perceived *personal control over desirable outcomes* on positive affect is stronger in older individuals with good functional health status than in those with poor functional health status (see Section "Hypotheses," Prediction 3a). Second, the unfavorable effect of perceived *personal responsibility for undesirable outcomes* on negative affect is weaker in older individuals with poor functional health status than in those with good functional health status (see Section "Hypotheses," Prediction 3b). Third, the unfavorable effect of perceived *others' control over desirable and undesirable outcomes* on positive and negative affect is weaker in older individuals with poor functional health status than in those with good functional health status (see Section "Hypotheses," Prediction 3c).

In order to test these predictions, two-group covariance structure models were specified. That is, the effects of the three dimensions of perceived control on emotional well-being were tested in two groups that differed in the functional health status (the first group involved participants with good functional health status, whereas the second group comprised participants with poor functional health status).[27] Testing invariance followed a two-step process. First, invariance for the measurement model (i.e., factor loadings) was specified, but no constraints were placed on the structural model components. Second, assuming an acceptable fit for this model, structural invariance was tested for three components of the structural model: the factor *variances*, factor *covariances*, and the *causal effects* of perceived control on emotional well-being. The invariance of the causal effects is particularly relevant for the hypotheses that were described above.

Testing Invariance Across Two Functional Health Groups of the Parent Sample

Table 33 reveals that the model for the effects of perceived control on emotional well-being showed acceptable fit when tested in the two functional health groups of the parent sample. When invariance of the loadings was enforced, the overall model fit was still acceptable (*IFI* = .97; *NNFI* = .96).

Moreover, enforcing the loadings to be invariant across the two groups resulted in a non-significant $\Delta \chi^2$ value ($\Delta \chi^2_{(8)} = 10.44$; $p = .24$). Thus, the constructs have equivalent measurement properties and are comparable across participants differing in functional health status.

As seen in Table 33, the factor variances were not invariant across groups (see Model 2 vs. 3). Follow-up analyses revealed that the factor variances that differed were those of positive affect (see Model 2 vs. 3a), negative affect (see Model 2 vs. 3b), and perceived others' control (see Model 2 vs. 3c). These three factor variances were significantly greater in the poor functional health group than in the good functional health group. In order to test equivalence of the other components of the structural model, the latent covariances were decomposed into variances and correlations by introducing yoked phantom factors (for the underlying logic of this procedure, see Method Chapter). Table 33 shows that the factor covariances were invariant across the two functional health groups (see Model 3e vs. 4).

[27] The subgroups were derived by using a median split of first wave scores on overall functional health constraints, that is, the mean score of the three indicators of poor functional health, constraints in vision, hearing, and mobility (see Method Chapter).

Table 33
Testing Invariance Across Two Functional Health Groups of the Parent Sample

	Global fit indices					*Comparison of models*		
Models	χ^2	*df*	χ^2:*df*	*IFI*	*NNFI*	$\Delta\chi^2$	*df*	*p*
Measurement level								
1) Configural	202.07	136	1.49	.97	.96			
2) Loadings	212.51	144	1.48	.97	.96			
Structural level								
3) Factor variances	241.48	149	1.62	.96	.95			
a) Positive affect	221.45	145	1.53	.97	.96			
b) Negative affect	223.17	145	1.54	.97	.96			
c) Others' control	222.75	145	1.54	.97	.96			
d) Personal control over desirable outcomes	212.75	145	1.47	.97	.96			
e) Personal responsibility for undesirable outcomes	212.79	146	1.46	.97	.96			
4) Factor covariances	214.91	150	1.43	.97	.97			
5) Causal effects	220.61	156	1.42	.97	.97			
Model 1 versus 2						10.44	8	.24
Model 2 versus 3						28.97	5	.00
Model 2 versus 3a						8.94	1	.00
Model 2 versus 3b						10.66	1	.00
Model 2 versus 3c						10.24	1	.00
Model 3c versus 3d						.24	1	.62
Model 3d versus 3e						.04	1	.84
Model 3e versus 4						2.12	4	.71
Model 4 versus 5						5.70	6	.46

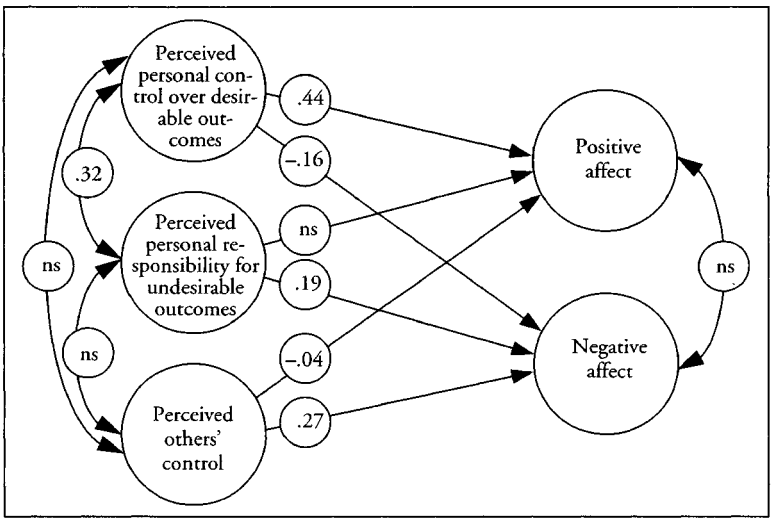
Functional Health: A Moderator of the Effects of Perceived Control on Emotional Well-Being?

As seen in Table 33, the causal effects of the three dimensions of perceived control on positive and negative affect did not differ across the two functional health groups (see Model 4 vs. 5). Contrary to the hypotheses, the effects of the three dimensions of perceived control could be forced to be equal across the two groups without losing model fit, as indicated by the nonsignificant $\Delta\chi^2$ value ($\Delta\chi^2_{(6)} = 5.70$; $p = .46$). The effects of perceived control on the two components of emotional well-being, when constrained to be equal across the two functional health groups, are presented in Figure 16.

As seen, the effects of the two self-related dimensions of perceived control (i.e., personal control over desirable outcomes and personal responsibility for undesirable outcomes) mirrored those that were found when analyzing the parent sample as a whole (see Figure 11). In contrast, the effect of perceived others' control on positive affect was nonsignificant in the present analyses ($\beta_{(t = -.81;\ se = .06)} = -.04$), while this effect was significantly negative in the parent sample as a whole ($\beta_{(t = -3.45;\ se = .06)} = -.20$).

In sum, the findings reported so far suggest that generalized dimensions of perceived control regulate older people's positive and negative affect, independent of their functional health status.

Figure 16
Cross-Sectional Effects of Perceived Control on Emotional Well-Being in Participants of the Parent Sample With Poor and Good Functional Health



Cross-Validation Analyses

This section addresses the question of whether functional health moderated the cross-sectional effects of perceived control on emotional well-being in the continuer sample at the first and second wave. In order to answer this question, the effects of perceived control were tested in the two functional health groups of the continuer sample.[28] Testing invariance followed the same logic as was applied when testing invariance in the functional health groups of the parent sample.

The Continuer Sample at the First Wave

Testing Invariance

Table 34 reveals that the model for the effects of perceived control on emotional well-being showed acceptable fit when tested in two functional health groups of the continuer sample at the first wave. When invariance of the factor loadings was enforced, the overall model fit was still acceptable (*IFI* = .96; *NNFI* = .95). Based on a modeling rationale, the measurement model is, therefore, considered to be invariant across groups. Note, however, that enforcing the loadings to be invariant across the two groups resulted in a significant $\Delta \chi^2$ value ($\Delta \chi^2_{(8)}$ = 17.56; p = .03). A follow-up analysis indicated that the only loading that differed was that of the third indicator of personal control over desirable outcomes which was greater in the good

[28] As described in the Method Chapter (see Method Chapter, Table 16), the sample split was based on the median of first-wave continuer sample scores on overall functional health (i.e., the mean score of the three indicators of poor functional health, constraints in vision, hearing, and mobility).

Table 34
Testing Invariance Across Two Functional Health Groups of the Continuer Sample at the First Wave

	Global fit indices					*Comparison of models*		
Models	χ^2	*df*	χ^2:*df*	*IFI*	*NNFI*	$\Delta\chi^2$	*df*	*p*
Measurement level								
1) Configural	158.28	136	1.16	.97	.96			
2) Loadings	175.84	144	1.22	.96	.95			
a) Loadings (partial)[1]	161.30	143	1.13	.98	.97			
Structural level								
3) Factor variances	170.67	148	1.15	.97	.97			
4) Factor covariances	172.58	152	1.14	.98	.97			
5) Causal effects	186.40	158	1.18	.97	.96			
a) Causal effect[2]	212.59	153	1.39	.93	.91			
b) Causal effect	173.86	153	1.14	.98	.97			
c) Causal effect	174.19	154	1.13	.98	.97			
d) Causal effect	178.11	155	1.15	.97	.97			
e) Causal effect	177.49	155	1.15	.97	.97			
f) Causal effect	178.27	156	1.14	.97	.97			
Model 1 versus 2						17.56	8	.03
Model 1 versus 2a						3.02	7	88
Model 2a versus 3						9.37	5	.10
Model 3 versus 4						1.91	4	.75
Model 4 versus 5						13.82	6	.03
Model 4 versus 5a						40.01	1	.00
Model 4 versus 5b						1.28	1	.26
Model 4 versus 5c						.33	1	.57
Model 4 versus 5d						3.92	1	.05
Model 4 versus 5e						3.30	1	.07
Model 4 versus 5f						.78	1	.38

[1] The loading of one of the indicators of personal control over desirable outcomes was allowed to freely vary across the two functional health groups.

[2] The effect of (a) personal control over desirable outcomes on positive affect, (b) personal control over desirable outcomes on negative affect, (c) personal responsibility for undesirable outcomes on positive affect, (d) personal responsibility for undesirable outcomes on negative affect, (e) perceived others' control on positive affect, and (f) perceived others' control on negative affect.

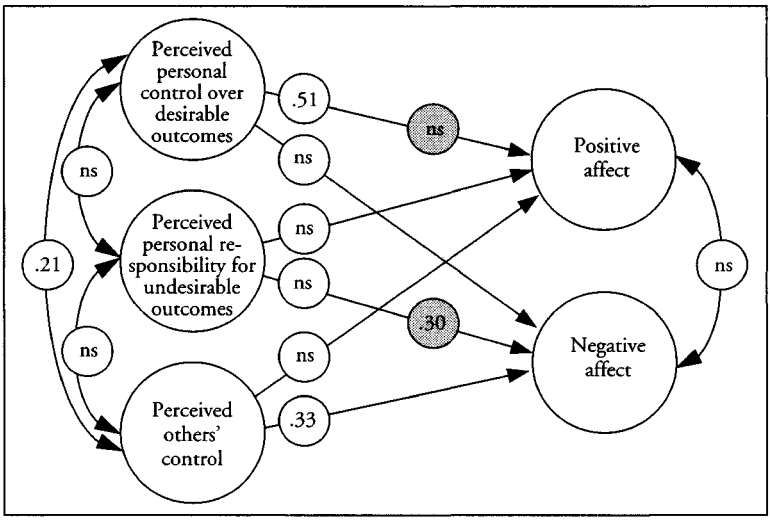
functional health group than in the poor functional health group. The comparison of a model in which this loading was allowed to freely vary (i.e., Model 2a) with the configural model (i.e., Model 1) resulted in a nonsignificant $\Delta\chi^2$ value ($\Delta\chi^2_{(7)} = 3.02$; $p = .88$).

Table 34 shows that the factor variances (see Model 2a vs. 3) and the factor covariances (see Model 3 vs. 4) were invariant across the two functional health groups.

Functional Health: A Moderator of the Effects of Perceived Control on Emotional Well-Being?

As seen in Table 34 (see Model 4 vs. 5), the causal effects of the three dimensions of perceived control on positive and negative affect differed across the two functional health groups. Enforcing the effects of the three dimensions of perceived control on emotional well-being to be equal across the two groups revealed a significant $\Delta\chi^2$ value ($\Delta\chi^2_{(6)} = 13.82$; $p = .03$). Follow-up analyses (see Models 5a–5f) indicated that two effects differed: the effect of personal

Figure 17
Cross-Sectional Effects of Perceived Control on Emotional Well-Being in Participants With Poor and Good Functional Health of the Continuer Sample at the First Wave



Note. Presented are the effects of three dimensions of perceived control on positive and negative affect in two functional health groups of the continuer sample at the first wave. The estimates that were yielded for the poor functional health group are presented in the dark circles.

control over desirable outcomes on positive affect and the effect of personal responsibility for undesirable outcomes on negative affect.

As seen in Figure 17, the effect of personal control over desirable outcomes on positive affect was significantly positive in the good functional health group ($\beta_{(t = 3.80;\ se = .15)} = .51$), but nonsignificant in the poor functional health group. Although consistent with the hypothesis, this moderation effect is difficult to interpret because it was not found in the parent sample and also did not exist at the second wave of data collection. The second effect that differed across groups was the effect of personal responsibility for undesirable outcomes on negative affect. Contrary to the hypotheses, this effect was significantly positive in the poor functional health group ($\beta_{(t = 2.21;\ se = .14)} = .30$), but nonsignificant in the good functional health group. This moderation effect is as difficult to interpret as the one described above because it was not replicated at the second wave of data collection and was also not found in the parent sample.

The Continuer Sample at the Second Wave

Testing Invariance

Table 35 reveals that the model for the effects of perceived control on emotional well-being showed acceptable fit when tested in two functional health groups of the continuer sample at the second wave.

When invariance of the loadings was enforced, the overall model fit was still acceptable (*IFI* = .93; *NNFI* = .91). Enforcing the loadings to be invariant across the two functional

Table 35
Testing Invariance Across Two Functional Health Groups of the Continuer Sample at the Second Wave

	Global fit indices					*Comparison of models*		
Models	χ^2	*df*	χ^2:*df*	*IFI*	*NNFI*	$\Delta\chi^2$	*df*	*p*
Measurement level								
1) Configural	205.41	136	1.51	.93	.91			
2) Loadings	213.52	144	1.48	.93	.91			
Structural level								
3) Factor variances	219.74	149	1.48	.91	.91			
4) Factor covariances	221.34	153	1.45	.93	.92			
5) Causal effects	237.72	159	1.50	.92	.91			
a) Causal effect[1]	222.44	154	1.44	.93	.92			
b) Causal effect	222.55	155	1.44	.93	.92			
c) Causal effect	223.91	156	1.44	.93	.92			
d) Causal effect	226.25	157	1.44	.93	.92			
e) Causal effect	236.05	158	1.49	.92	.92			
f) Causal effect	227.98	158	1.44	.93	.92			
Model 1 versus 2						8.11	8	.42
Model 2 versus 3						6.22	5	.29
Model 3 versus 4						1.60	4	.81
Model 4 versus 5						16.38	6	.01
Model 4 versus 5a						1.10	1	.29
Model 4 versus 5b						.11	1	.74
Model 4 versus 5c						1.36	1	.24
Model 4 versus 5d						2.34	1	.13
Model 4 versus 5e						9.80	1	.02
Model 4 versus 5f						1.73	1	.19

[1] The effect of (a) personal control over desirable outcomes on positive affect, (b) personal control over desirable outcomes on negative affect, (c) personal responsibility for undesirable outcomes on positive affect, (d) personal responsibility for undesirable outcomes on negative affect, (e) perceived others' control on positive affect, and (f) perceived others' control on negative affect.

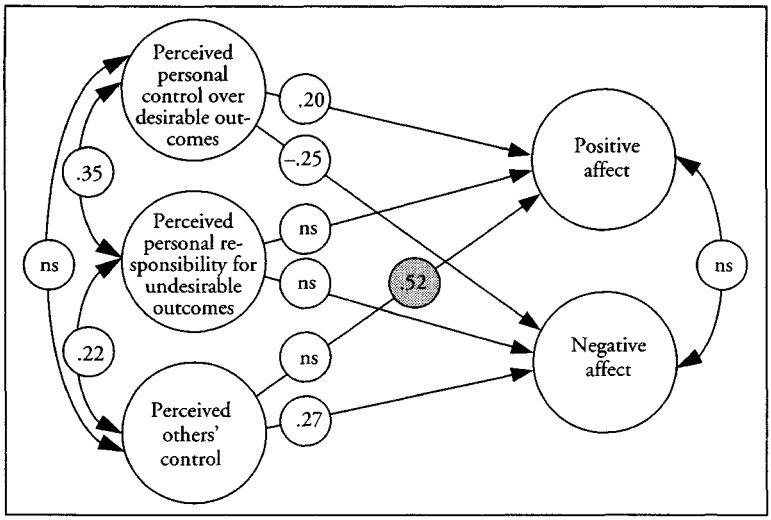
health groups of the continuer sample at the second wave resulted in a nonsignificant $\Delta\chi^2$ value ($\Delta\chi^2_{(8)} = 8.11$; $p = .42$). The measurement model is, therefore, considered to be invariant across groups.

Table 35 shows that the factor variances (see Model 2 vs. 3) and the factor covariances (see Model 3 vs. 4) were also invariant across the two functional health groups.

Functional Health: A Moderator of the Effects of Perceived Control on Emotional Well-Being?

As was the case at the first wave, the causal effects of the three dimensions of perceived control on positive and negative affect differed across the two functional health groups (see Model 4 vs. 5). Enforcing the effects of the three dimensions of perceived control on emotional well-being to be equal across the two groups revealed a significant $\Delta\chi^2$ value ($\Delta\chi^2_{(6)} = 16.38$; p = .01). Follow-up analyses (see Models 5a–5f) indicated that only one effect differed across the groups: the effect of perceived others' control on positive affect. As seen in Figure 18, the effect of perceived others' control on positive affect was significantly negative in the poor functional health group ($\beta_{(t = -4.15;\ se = .14)} = -.52$) but nonsignificant in the good functional health group.

Figure 18
Cross-Sectional Effects of Perceived Control on Emotional Well-Being in Participants With Poor and Good Functional Health of the Continuer Sample at the Second Wave



Note. Presented are the effects of three dimensions of perceived control on positive and negative affect in two functional health groups of the continuer sample at the second wave. The estimates for the poor functional health group are presented in the dark circle.

This moderation effect is inconsistent with the hypothesis that perceived others' control is less unfavorable for participants in poor functional health. Given that this moderator effect was not found either in the continuer sample at the first wave nor in the parent sample, it is difficult to interpret.

In sum, the cross-sectional findings based on the parent sample provided little support for the prediction that the effects of the three dimensions of perceived control on emotional well-being are moderated by functional health constraints. In the continuer sample, several moderation effects were found; however, they were inconsistent across waves and are, therefore, difficult to interpret.

Longitudinal Results

This section addresses the question of whether the longitudinal relations between perceived control and emotional well-being were moderated by first wave functional health status. Three longitudinal hypotheses were formulated: First, the beneficial effect of perceived *personal control over desirable outcomes* (i.e., initial levels and *intra*individual changes) on *intra*individual changes in positive affect is stronger in older individuals with good functional health status than in those with poor functional health status (see Section "Hypotheses," Prediction 3d). Second, the unfavorable effect of perceived *personal responsibility for undesirable outcomes* (i.e.,

initial levels and *intra*individual changes) on *intra*individual changes in negative affect is weaker in older individuals with poor functional health status than in those with good functional health status (see Section "Hypotheses," Prediction 3e). Third, the unfavorable effects of perceived *others' control over desirable and undesirable outcomes* (i.e., initial levels and *intra*individual changes) on *intra*individual changes in positive and negative affect are weaker in older individuals with poor functional health status than in those with good functional health status (see Section "Hypotheses," Prediction 3f).

In order to test these predictions, the same longitudinal covariance structure model that was analyzed in the continuer sample as a whole (see Appendix L) was specified as a longitudinal two-group model (i.e., in two groups differing in first-wave functional health). [29]

Testing Invariance

Table 36 reveals that the longitudinal model for the effects of perceived control on emotional well-being showed acceptable fit, when tested in the two functional health groups of the continuer sample. When invariance of the loadings was enforced, the overall model fit was still acceptable (*IFI* = .92; *NNFI* = .90). Based on a modeling rationale, the measurement model is, thus, considered to be invariant over time.

Note, however, while enforcing the loadings to be invariant over time resulted in a nonsignificant $\Delta \chi^2$ value ($\Delta \chi^2_{(16)} = 11.31$; $p = .79$), the loadings differed across the two functional health groups. As was expected (given the results of the invariance tests in the continuer sample at the first wave), the only loading that differed was that of the third indicator of personal control over desirable outcomes at the first wave, which was greater in the good functional health group. A comparison of the model in which all the loadings, except the loading of the third indicator of personal control over desirable outcomes, were constrained to be equal across groups and time (i.e., Model 2c) with the less restricted model in which the loadings were only constrained to be invariant over time (i.e., Model 2a) resulted in a nonsignificant $\Delta \chi^2$ value ($\Delta \chi^2_{(12)} = 13.37$; $p = .50$).

Table 36 shows that the factor variances (see Model 2c vs. 3) and the factor covariances (see Model 3 vs. 4) were invariant across the two functional health groups and over time.

The Longitudinal Effects of Perceived Control on Emotional Well-Being Were not Moderated by Functional Health Constraints

As seen in Table 36, the longitudinal causal effects of the three dimensions of perceived control on positive and negative affect did not differ across the two functional health groups. Contrary to the hypotheses, the longitudinal effects of the three dimensions of perceived control on differential changes in positive and negative affect could be forced to be equal across the two groups without losing model fit. This finding was true for the effects of first wave perceived control (see Model 4 vs. 5) and for the effects of individual differences in *intra*individual changes of perceived control (see Model 5 vs. 6).

The effects of differential *intra*individual changes in perceived control on differential *intra*individual changes in the two components of emotional well-being when constrained to

[29] As described in the Method Chapter (see Table 16), the sample split was based on the median of first-wave continuer sample scores on overall functional health (i.e., the mean score of the three indicators of poor functional health, constraints in vision, hearing, and mobility).

Table 36
Testing Invariance Across Time and Two Functional Health Groups

Models	Global fit indices					Comparison of models		
	χ^2	*df*	χ^2:*df*	*IFI*	*NNFI*	$\Delta\chi^2$	*df*	*p*
Measurement level								
1) Configural	817.08	614	1.33	.92	.90			
2a) Loadings over time	828.39	630	1.32	.92	.90			
2b) Loadings across groups	856.31	643	1.31	.92	.90			
2c) Loadings across groups (partial)[1]	839.76	642	1.31	.92	.90			
Structural level								
3) Factor variances across groups and time	849.13	647	131	.92	.90			
4) Factor covariances across groups and time	853.59	655	130	.92	.91			
5) Causal effects of initial levels of perceived control across groups	856.43	661	130	.92	.91			
6) Causal effects of change in perceived control across groups	861.68	667	130	.92	.91			
Model 1 versus 2a						11.31	16	.79
Model 2a versus 2b						27.92	13	.01
Model 2a versus 2c						13.37	12	.50
Model 2c versus 3						9.37	5	.10
Model 3 versus 4						4.46	8	.81
Model 4 versus 5						2.84	6	.83
Model 5 versus 6						5.25	6	.51

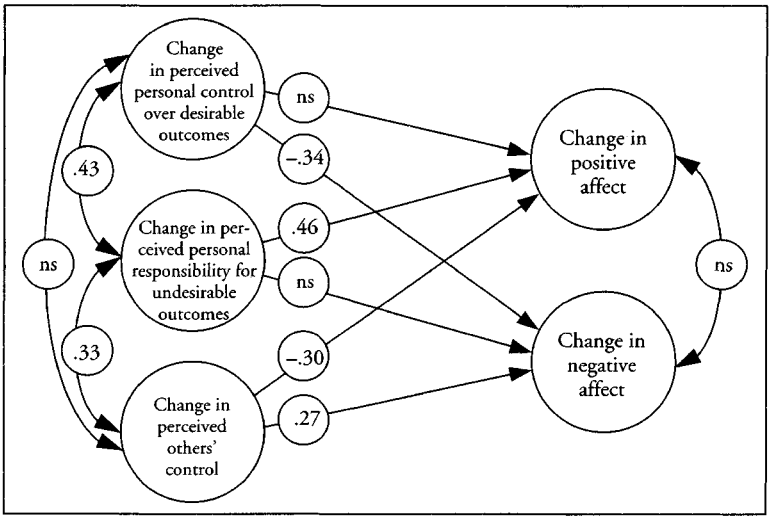
[1] The loading of one of the indicators of personal control over desirable outcomes was allowed to freely vary across the two functional health groups.

be equal across the two functional health groups are presented in Figure 19. As seen, the effects mirrored those that were found when analyzing the continuer sample as a whole (see Figure 14).[30]

In sum, consistent with the cross-sectional results, the longitudinal findings suggest that generalized dimensions of perceived control regulate older people's positive and negative affect, independent of their functional health status.

[30] Like in the longitudinal analysis of the continuer sample as a whole, perceived others' control was the only dimension of perceived control that predicted change in one of the two components of emotional well-being (i.e., positive affect). In both functional health groups, initial levels of perceived others' control were inversely associated with positive affect ($\beta_{(t = -2.95;\ se = .11)} = -.31$).

Figure 19
Longitudinal Effects of Perceived Control on Emotional Well-Being in Participants With Poor and Good Functional Health



Summary of the Main Results

The last section of the results chapter aims at summarizing the main results of the present study. They are presented in Table 37.

Table 37
Summary of the Hypotheses and Main Results

Prediction	*Prediction supported?* *Cross-sectional*	*Longitudinal*
The effects of functional health constraints		
Poor functional health is a risk factor for positive affect.	YES The more individuals were confronted with functional health constraints, the more they reported low positive affect.	YES The more individuals were confronted with functional health constraints at the first wave, the more they experienced decline in positive affect over time.
Poor functional health is a risk factor for negative affect.	NO with two exceptions: 1) The age-independent aspects of functional health were positively associated with negative affect. 2) In young old individuals functional health constraints were positively associated with negative affect.	NO Neither initial levels of functional health constraints nor individual differences in *intra*individual changes were associated with individual differences in *intra*individual changes of negative affect.
The effects of perceived control		
Perceived personal control over desirable outcomes is a resource for positive affect.	YES The more individuals believed in personal control over desirable outcomes, the more they reported high positive affect.	NO Neither initial levels of personal control over desirable outcomes nor individual differences in *intra*individual changes were associated with individual differences in *intra*individual change of positive affect.
Perceived personal control over desirable outcomes is a resource for negative affect.[1]	YES The more individuals believed in personal control over desirable outcomes, the more they reported low negative affect.	YES The more individuals experienced an increase in personal control over desirable outcomes, the more they experienced a decrease in negative affect over time.
Perceived personal responsibility for undesirable outcomes is a risk factor for positive affect.[1]	NO Individual differences in personal responsibility for undesirable outcomes were not associated with individual differences in positive affect.	NO The more individuals increased their belief in personal responsibility for undesirable outcomes, the more they experienced an *increase* in positive affect over time.
Perceived personal responsibility for undesirable outcomes is a risk factor for negative affect.	YES and NO *In the parent sample:* The more individuals believed in personal responsibility for undesirable outcomes, the more they reported low negative affect. This was not found in the *continuer sample:* no significant association with negative affect existed.	NO Neither initial levels nor individual differences in *intra*individual changes were associated with individual differences in *intra*individual change of negative affect.

[1] Note that this was an unexpected finding rather than a prediction.

Table 37 (continued)

Prediction	*Prediction supported?* *Cross-sectional*	*Longitudinal*
Perceived others' control over desirable and undesirable outcomes is a risk factor for positive affect.	YES The more individuals believed in others' control, the more they reported low positive affect.	YES The more individuals experienced perceived others' control at the first wave, the more they experienced a decrease in positive affect over time. The more individuals experienced an increase in perceived others' control, the more they experienced a decrease in positive affect over time.
Perceived others' control over desirable and undesirable outcomes is a risk factor for negative affect.	YES The more individuals believed in others' control, the more they reported high negative affect.	YES The more individuals experienced an increase in perceived others' control, the more they experienced an increase in negative affect over time.
The interactive effects of functional health and perceived control		
Personal control over desirable outcomes is more adaptive in older people with good functional health.	NO The effects were independent of functional health status. The only exception was the continuer sample at the first wave: In participants with poor health, personal control over desirable outcomes showed no significant relation to positive affect.	NO The effects of initial levels and interindividual differences in *intra*individual changes were independent of functional health status.
Personal responsibility for undesirable outcomes is less dysfunctional in older people with poor functional health.	NO The effects were independent of functional health status. The only exception was the continuer sample at the first wave: In participants with poor health, responsibility for undesirable outcomes was associated with high negative affect, while no association existed for participants in relatively good health.	NO The effects of initial levels and interindividual differences in *intra*individual changes were independent of functional health status.
Perceived others' control over desirable and undesirable outcomes is less dysfunctional in older people with poor functional health.	NO The effects were independent of functional health status. The only exception was the continuer sample at the second wave: In participants with poor health, others' control was associated with low positive affect, while no association existed for participants in relatively good health.	NO The effects of initial levels and interindividual differences in *intra*individual changes were independent of functional health status.

Discussion

The final chapter of this dissertation is divided into three main sections. The first section addresses the central findings of the study. The role of functional health constraints in older people's emotional well-being is discussed first. The findings regarding perceived control as a predictor of emotional well-being in old age are discussed thereafter. Subsequently, the interactive effects of functional health constraints and perceived control on emotional well-being are addressed. The second section outlines the strengths and limitations of this study. The discussion ends with five tentative solutions to the stability-despite-loss paradox of subjective well-being that was described in the introduction.

The Main Findings of the Present Study

A central purpose of this study was to investigate the usefulness of defining emotional well-being in terms of two components: positive and negative affect. Consistent with earlier studies (e.g., Kercher, 1992; Watson, 1988; Watson et al., 1988), the present findings supported a two-component model. That is, in the present sample of old and very old people, specific positive emotions (e.g., enthusiasm, interest, or alertness) and specific negative emotions (e.g., anger, hostility, or anxiety) constituted two highly distinct dimensions. Thus, emotional well-being represents two different phenomena that should be investigated separately. This study addressed the question whether older people's positive and negative affect may have different antecedents (i.e., whether they are multicausal). To date, little empirical attention has been allocated to this question. Earlier studies with older people have typically focused on either predicting the negative side of emotional well-being (i.e., negative affect, including anxiety and depression) or general adjustment (e.g., Ryff & Essex, 1991b; Smith, Fleeson, Geiselmann, Settersten, Nitschke, & Kunzmann, 1996; Staudinger & Fleeson, 1996).

As detailed below, the present study's findings provided strong support for the usefulness of conceptualizing the positive and negative side of emotional well-being separately. The risk factors and resources examined—constraints in functional health and three facets of perceived control—were differentially related to the two components of emotional well-being. Seen in a broader context, two conclusions can be derived from the findings: (a) Not all dimensions of subjective well-being may be affected by all the risks associated with old age, and (b) not all personality characteristics may be equally helpful in regulating all dimensions of subjective well-being.

Poor Functional Health is a Risk Factor for Positive Affect

The findings of the present study suggest that poor functional health is a risk factor particularly for older people's positive affect. The more older individuals were confronted with functional health constraints, the more likely they reported experiencing low positive affect. Functional health constraints explained 16 percent of the variance in positive affect. This finding corroborates Larson's (1978) estimate that health accounts for 4 to 16 percent of the variance in concurrent subjective well-being scores, and is consistent with six studies that were also based on older people and have found poor health to be associated with low positive affect (see Theory Chapter, Table 3). The interpretation of poor functional health as a risk factor for older people's positive affect was strengthened by the finding that the association between functional health constraints and positive affect held when controlling for multiple alternative predictors of positive affect (e.g., gender, education, satisfaction with social relationships, assimilative coping style, activity level). Clearly, one can never be entirely sure that all relevant confounding variables have been included in a study and adequately measured. However, the present study points to an impressive robustness of the relationship between functional health constraints and positive affect. It was not possible to explain this association through third variables covering a wide range of alternative predictors of positive affect.

Taking a Closer Look at the Longitudinal Evidence

The present study provided not only cross-sectional but also longitudinal evidence: Constraints in functional health assessed at the first wave of data collection predicted differential changes in positive affect over time. Functional health at the first wave explained 15 percent of the change variance in positive affect. Individuals with more functional health constraints at the first wave were more likely to experience a decline in positive affect, whereas those with fewer constraints were more likely to experience an increase in positive affect over time.

Models of subjective well-being developed in the framework of habituation theory have emphasized that most people are capable of adjusting to negative events in a relatively short period of time (e.g., Brickman et al., 1978; Headey & Wearing, 1989, 1991; Suh et al., 1996). Following habituation theory, the adverse consequences of stressful events such as age-associated losses in functional health vanish over time. In this theoretical framework, functional health constraints are expected to have short-term but not long-term effects on people's emotional well-being. Contrary to these expectations, functional health constraints were shown to predict long-term changes in positive affect over a time period of approximately four years. This finding points to the limits of self-regulatory processes and the capability to adjust to all the losses associated with old age (Smith & Baltes, 1996). In the face of functional health constraints, the experience of positive affect may be a criterion for adjustment that is relatively difficult to achieve. The finding that individuals with poor functional health were more likely to experience a decline in positive affect over time speaks against complete adjustment to functional health constraints. The proposition of habituation models that emotional well-being is relative may be true for some but certainly not for all dimensions of this construct.

There is a second implication of the finding that functional health predicted change in positive affect over time, namely, this finding supports the view that poor functional health *causes* low positive affect. While functional health constraints predicted changes in positive affect, the data did not support the reverse causal chain: Positive affect did not predict change

in functional health. This finding is consistent with bottom-up theories of subjective well-being. Here, subjective well-being is seen as a reflection of objective life conditions rather than a predictor of life conditions (Andrews & Withey, 1976; Bradburn, 1969; Veenhoven, 1991). However, the results of the present study must be interpreted with caution. Most important, the high temporal stability of individual differences in functional health made it impossible to rule out a model in which functional health and emotional well-being were reciprocally related. This qualification notwithstanding, the findings point to the risk for older people's positive affect inherent in poor functional health.

The Perception of Health is not More Important Than Actual Health

Given the debate in the literature about the role of objective (vs. self-reported) health for emotional well-being, it is important to note that functional health constraints were assessed using objective performance-based measures. Several researchers have found objective measures of health to be poorer predictors of emotional well-being than self-reported health (e.g., Brief et al., 1993; George & Landerman, 1984; Okun et al., 1984). Moreover, Watson and Pennebaker (1989) interpreted this finding as indicating that the association between self-reported health and emotional well-being is likely to be spurious and due to reasons other than actual health (see also Costa & McCrae, 1985b, 1987). The findings of the present study are inconsistent with this view and interpretation of the former empirical evidence. The association of positive affect with objective, performance-based functional health was as high as the association with self- and other-reported functional health. In addition, the cross-sectional analyses indicated that the effects of performance-based functional health on positive affect are independent of the effects of the two other facets of functional health.

I had expected that objective constraints in functional health would have unfavorable effects on positive affect. Differences in measuring objective health between this study and previous ones may explain the contradictory evidence. As it seems, objective health measures of previous studies often are not sufficiently representative of individuals' actual health (for a review, see Watson & Pennebaker, 1989). That is, physician-rated health (LaRue, Bank, Jarvik, & Hetland, 1979), single biological markers (Costa & McCrae, 1985b, 1987; Costa, Fleg, McCrae, & Lakatta, 1982) or specific health behaviors (Brief et al., 1993) may be invalid reflections of the facets of health that are objectively important to people's emotional well-being. In contrast, the performance-based functional health tests employed in the current study capture those aspects of poor health that are more relevant for the daily life of older people (i.e., the ability to see, hear, and move).

In sum, the present study's findings support a perspective on emotional well-being that has been labeled as a "naive realism position" (Costa & McCrae, 1985b), namely "health causes well-being." Although one should remain open to the possibility that complex relationships between health and well-being may exist, this study supports the simplest and most straightforward model: Poor health causes low emotional well-being.

The Experience of Negative Affect: Unaffected by Poor Functional Health?

An important qualification of this general conclusion (i.e., poor health causes low emotional well-being) was that it may not generalize to all dimensions of emotional well-being. Contrary to positive affect, negative affect appeared to be less, if at all, influenced by poor functional health. In other words, functional health constraints did not predict negative affect, neither cross-sectionally nor longitudinally. This finding is inconsistent with the results

of several earlier studies that were also based on samples of old and very old individuals (see Theory Chapter, Table 3). Differences in measures of functional health, emotional well-being, or both between this study and previous ones may explain the inconsistent evidence. Specifically, earlier studies did not assess emotional well-being with pure measures of positive and negative affect. In addition, these studies did not employ performance-based measures of functional health. Before providing some tentative explanations for the unexpected finding (see Section "Suggestions for Future Research"), two exceptions to the differential prediction pattern of functional health are detailed below.

Negative Affect May be Affected by Functional Health Constraints Beyond Age Expectations

Chronological age suppressed the unfavorable effects of functional health constraints on positive and negative affect, indicating that the age-independent aspects of functional health constraints may be particularly unfavorable for positive affect and may also cause higher negative affect. In other words, older people may be at greater risk for experiencing high levels of negative affect (and low levels of positive affect) when faced with functional health constraints untypical for their age cohort, that is, with functional health constraints that are not congruent with age-normative conceptions. This consideration is consistent with the emphasis of lifespan psychology that subjective conceptions of the life course and expectations about development play a salient role in the way people evaluate their current condition and changes—decline or improvement—in functioning (e.g., Baltes et al., in press; Heckhausen & Baltes, 1991).

It might be easier to cope with functional health constraints that are normative for a given age for two reasons. On the one hand, normative changes in functioning may have less unfavorable effects on emotional well-being because they can be expected to take place long before they actually occur. As a consequence, people are in a position to proactively prepare themselves for the potential adverse consequences. At an early stage, they can take measures to offset or lessen potential unfavorable consequences of the losses typically accompanying old age. Given that age-normative functional health constraints are more or less expected to occur, people are, for example, able to disengage from goals that are likely to be blocked in the future, and to invest in other goals more congruent with imagined future competencies. Investing one's effort and time in life goals that can be achieved even when faced with functional decline might facilitate coping with these losses.

In addition, the unfavorable consequences of functional health constraints that are typical for a certain age can be lessened through social downward comparisons with people who are worse off (Filipp & Klauer, 1991; Schulz, 1985; Taylor, 1983; Taylor & Lobel, 1989; Wills, 1981; Wood, 1989). If an older person is struck by age-normative functional health constraints, there are usually others who have experienced the same or worse. The possibility for downward comparisons may enhance emotional well-being by making people feel that they are doing *relatively* well. A person who is confronted with functional health constraints that are untypical for his or her age cohort, has more difficulties to find people of the same age who have experienced the same or worse. In this case, perceiving oneself as doing relatively well might often be impossible. The emotional consequences of functional health constraints that are beyond of what can be expected at a certain age, might even be exaggerated if a person has to realize that others within the same age-group are typically *better* off.

Negative Affect May be Affected by Poor Functional Health in Young Olds

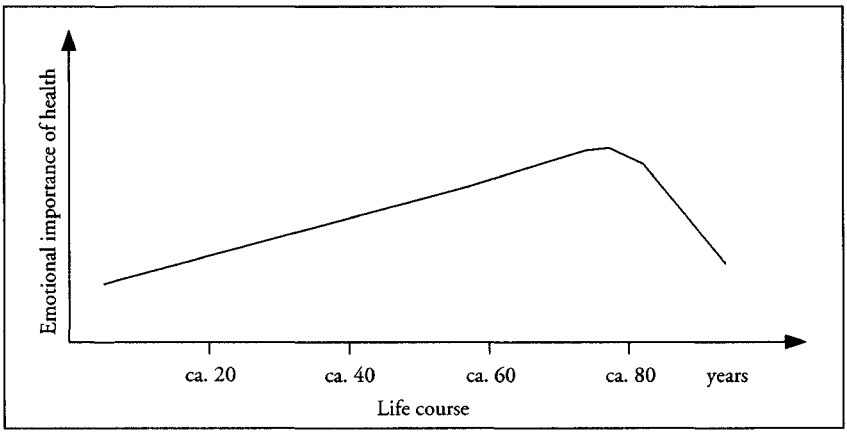
The second qualification of the finding that poor functional health was generally not associated with negative emotions refers to the observation that this may not be true for individuals of all ages. While functional health constraints were not significantly associated with negative affect in the parent and noncontinuer samples, they predicted enhanced negative affect in the continuer sample (i.e., a sample that was considerably younger than the other ones). In fact, a follow-up analysis in the parent sample showed that functional health constraints predicted enhanced negative affect in "young old" individuals ($M = 77.46$; $SD = 4.32$) but not in very old people ($M = 92.37$; $SD = 4.50$). This observation indicates what has been labeled as "predictive discontinuity" (Lindenberger & Baltes, 1994) and is consistent with the more general proposition of lifespan psychology that current concerns, commitments, and goals may shift across the lifespan (e.g., Baltes et al., in press; Brandtstädter & Rothermund, 1994; Carstensen, 1991; Ryff & Baltes, 1976).

Does the emotional importance of health change across the lifespan? The few studies that have investigated age as a moderator of the consequences of poor health for adjustment were concerned with relatively small segments of the lifespan and focused on young and middle-aged adults (e.g., George, Okun, & Landerman, 1985; Okun et al., 1984; Ryff, 1989b). These studies have found that the importance of health increases with age. Based on the sparse empirical evidence, a hypothetical trajectory of age-related changes in the emotional importance of functional health is presented in Figure 20. As seen, the influence of functional health on emotional well-being is assumed to become more and more pronounced as individuals pass adolescence, enter the second life phase (i.e., adulthood), and finally reach the third phase of life (i.e., old age). The emotional meaning of health might exhibit a peak in individuals aged between 60 and 80 years. In advanced old age, however, the salience and importance of health as a contributor to emotional well-being might again decrease. It must be emphasized that especially the last assumption is largely speculative. The unexpected finding of the present study that functional health constraints predicted enhanced negative affect in young old individuals but not in very old individuals, however, may be seen as first empirical support. A finding reported by Borchelt, Gilberg, Horgas, and Geiselmann (1996) is also relevant to the present idea. Using data of the Berlin Aging Study, the authors found that with increasing age, subjective evaluations of one's health were less and less based on indicators of objective health (e.g., the number of medical diagnoses).

In the life period directly preceding death, concerns other than objective health might be relatively more important for subjective self-evaluations and feelings of emotional well-being. As, for example, Peck (1959) argues, "transcendence out of the body" might become the central and emotionally relevant theme in the very last period of life. To reconstruct one's biography, to give meaning to one's own life, as it was, and to integrate one's lifelong experiences are often assumed as being related to the concern of bringing one's life to an end, and preparing oneself for death and dying (see Erikson, 1959; Havighurst, 1972; Staudinger, 1989). In comparison to these concerns, recovering from illnesses or staying healthy might be relatively less important at the very end of life.

In sum, this study provides evidence for an association between functional health constraints and positive affect in old age. Unexpectedly, however, functional health constraints were not associated with negative affect. Two qualifications of the general finding exist. First, functional health constraints that are beyond age norms may be particularly unfavorable for older people's emotional well-being and may cause the frequent experience of negative affect.

Figure 20
The Emotional Importance of Health Across the Lifespan: A Hypothetical Trajectory



Second, the emotional importance of health may change in very old age. While functional health constraints were associated with high negative affect in "young old" individuals, they did not predict negative affect in the oldest old.

Suggestions for Future Research

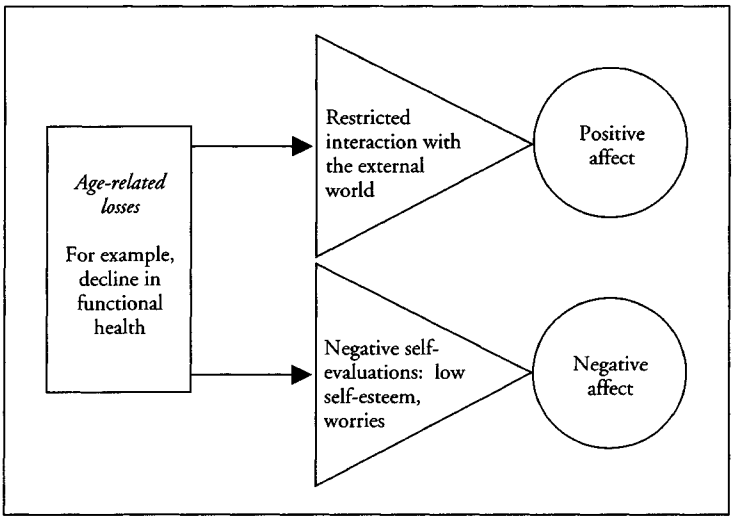
The present study provided empirical evidence that poor functional health is a risk factor for older people's positive affect but may generally not be involved in the regulation of negative affect. This section aims at providing two tentative explanations for this differential effect. Future studies should follow up these explanations and may further investigate the mechanisms through which functional health influences older people's positive and negative affect.

Suggestions From Research on the Consequences of Health

Given the finding that poor functional health is associated with low positive affect but not with high negative affect, the question arises whether the consequences or mechanisms linking functional health with positive affect may differ from those connecting functional health with negative affect. To date, little empirical attention has been allocated to this question.

Figure 21 illustrates a theoretical model suggesting that one class of poor functional health consequences—limitations in effectively interacting with the external world—most likely leads to lowered positive affect but not necessarily to enhanced negative affect. In contrast, a second class of consequences—unfavorable cognitive evaluations (e.g., low self-esteem, worries, uncertainty)—is probably especially responsible for heightened levels of negative affect (see also Theory Chapter, Section "Why is it Important to Study the Emotional Consequences of Functional Health Constraints in Old Age?"). Based on this theoretical model, a reason for the finding that functional health constraints predicted positive affect but not negative affect might be that they led to limitations regarding interactions with the external world but had no unfavorable consequences for self-evaluations.

Figure 21
Differential Consequences of Functional Health Constraints in Old Age



In fact, in the present study, functional health constraints showed only a small association, if at all, with two indicators of negative self-evaluations (worries and feelings of worthlessness), which in turn were associated with higher negative affect but not with lower positive affect (see Appendix E). This correlational pattern may explain the finding that functional health constraints had no influence on negative affect. If functional health constraints were associated with negative self-evaluations they would probably have influenced negative affect.

In contrast—and as expected—functional health constraints were associated with a restricted range of activities (i.e., an indicator for the ability to effectively interact with the external world), which in turn was associated with lower positive affect but not with (higher) negative affect (see Appendix E).

In sum, one reason for the current finding that functional health constraints predicted positive affect but not negative affect might be that they led to limitations in effectively interacting with the external world but had no unfavorable consequences for self-evaluations. Although this conclusion was supported by the data, it should be noted that the two classes of functional health consequences were less well operationalized than the central constructs of this study. Future studies should further investigate the differential relationships between functional health constraints and the two components of emotional well-being by employing sound measures of both functional health and its consequences.

Suggestions From Research on Coping

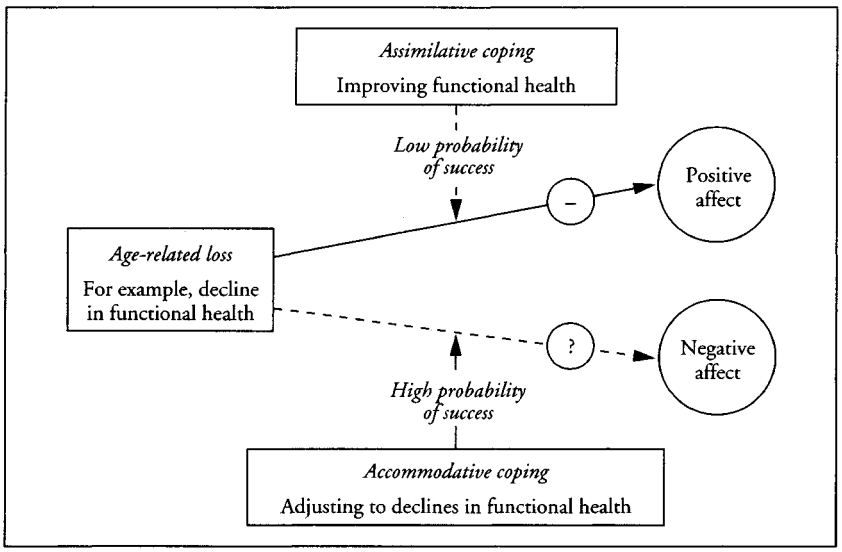
A second explanation exists for the present study's finding that functional health constraints predicted positive but not negative affect. From the perspective of coping research, older people may only possess the coping resources and strategies that mitigate the effects of functional health constraints on negative but not on positive affect. Coping styles are often

viewed as moderating the effects of age-related stressors such as functional health constraints on indicators of psychological adjustment (e.g., Brandtstädter & Greve, 1994; Heckhausen, 1995; Kunzmann et al., 1996; Schulz, Heckhausen, & O'Brien, 1994; Staudinger et al., 1996). Are coping strategies that buffer the effects of age-associated losses on positive affect less successful than those buffering the effects of age-associated losses on negative affect? Given that empirical studies on coping as a stress buffer typically do not investigate specific dimensions of psychological adaptation but rather global adjustment or negative affective states, no empirical evidence exists to answer this question. However, Figure 22 illustrates a possible answer to the question that is derived from theoretical considerations.

Assuming that positive affect primarily results from achievements and gains, coping strategies that buffer the effects of functional health constraints on positive affect most likely are assimilative or primary coping strategies. Those strategies aim at changing the situation according to a person's wishes and desires (Brandtstädter & Renner, 1990; Heckhausen & Schulz, 1995; Lazarus, 1991). In order to be successful, assimilative strategies should improve the functional health status of an individual. Given that changing functional health to the better is often impossible in very old age, the respective coping strategies might generally be inappropriate or unsuccessful. In other words, these strategies cannot lessen the influence of functional health constraints on positive affect

Assuming that older people may regulate negative affect primarily by cognitively adjusting to losses and failures, coping strategies that buffer the effects of functional health constraints on negative affect are most likely accommodative or secondary coping strategies. Those strate-

Figure 22
Assimilative and Accommodative Coping Styles as Moderators of the Effects of Age-Related Losses on Positive and Negative Affect



gies aim at changing perceptions and self-evaluations according to situational requirements (Brandtstädter & Greve, 1994; Heckhausen & Schulz, 1995; Lazarus, 1991). In order to be successful, accommodative strategies should help an individual to find acceptable ways of living with his or her losses in functional health. Research has shown that when faced with problems and adversities, older people make use of accommodative coping strategies (e.g., Brandtstädter & Renner, 1990; Staudinger et al., 1996). Thus, older individuals might be able to prevent increases in negative affect when faced with functional health constraints by finding ways to accept these constraints. The question whether coping strategies that help older individuals to cope with functional health constraints are more useful for regulating negative rather than positive affect awaits investigation.

The Effects of Perceived Control on Emotional Well-Being

Following the discussion of the emotional consequences of functional health, this section focuses on feelings of control and their relationships to older people's emotional well-being. As detailed below, beliefs about control as contributors to emotional well-being are just as important as the objective potential to exert control (as indicated by older people's functional health status). The findings point to a complex relationship between perceived control and emotional well-being. As was expected, no general answer exists to the question whether perceived control is a resource or a risk factor for older people's emotional well-being. The adaptivity of perceived control may depend on three factors: (a) the dimension of perceived control, (b) the dimension of emotional well-being, and (c) the time perspective (i.e., whether concurrent emotional well-being or change in emotional well-being is the focus of the investigation). These three qualifications are discussed in the following sections.[31]

Not All Dimensions of Perceived Control are Resources for Positive and Negative Affect

The findings of this study were consistent with the notion that perceived control is a multidimensional construct (e.g., Bandura, 1996; Levenson, 1981; Little, 1995; Skinner, 1995, 1996). As expected, the indicators of perceived control investigated in the present study constituted three distinct dimensions of generalized perceived control: perceived personal control over desirable outcomes, perceived personal responsibility for undesirable outcomes, and perceived others' control over desirable and undesirable outcomes. The confirmation of the multidimensional structure of perceived control and its integrity over time and across multiple subgroups of older individuals (e.g., continuers vs. noncontinuers, poor functional health vs. good functional health groups) is a worthwhile finding. Perhaps more important, however, the multidimensional structure of perceived control was a necessary precondition for examining whether the individual components of perceived control may have different consequences for emotional well-being.

The effects of perceived personal control over desirable outcomes. As was expected, this type of perceived control was shown to be a resource for older people's emotional well-being. Personal

[31] A potential fourth qualification—context—in the sense of objective control competencies is discussed in Section "The Interactive Effects of Functional Health and Perceived Control on Emotional Well-Being."

control over desirable outcomes was associated with both high levels of positive affect and low levels of negative affect. In addition, the present study provided longitudinal evidence: Differential changes in perceived personal control over desirable outcomes were associated with differential changes in negative affect. The more individuals perceived desirable outcomes to be under personal control at the first wave, the more likely they experienced a decrease in negative affect over the test-retest interval of approximately four years.

These findings are consistent with prominent theories of perceived control positing that the belief in personal control is a contributor to a wide range of indicators of psychological adjustment (e.g., Bandura, 1996; Deci & Ryan, 1985, 1991; Heckhausen & Schulz, 1995). While earlier studies conducted in the 1970s and 1980s established that personal control over desirable outcomes is a resource for minimizing negative affect (i.e., depression), the present study provided evidence that this type of perceived control may also be involved in maximizing positive affect. Given the finding of high adaptivity of personal control over desirable outcomes, the lack of focus on this dimension of perceived control in current research appears unfortunate. As discussed in the theoretical part of this study, the adaptivity of personal control over *undesirable* outcomes (e.g., over HIV infection, cancer, or other serious illnesses) is investigated far more often. Future research on the adaptivity of perceived control may benefit from a shift to the adaptational consequences of personal control over desirable outcomes instead of focusing exclusively on the adaptivity of perceived personal control over undesirable outcomes.

The effects of perceived personal responsibility for undesirable outcomes. The question whether perceived personal responsibility for undesirable outcomes is a risk factor or a resource for emotional well-being cannot be answered clearly. The inconsistent results of this study join the mixed evidence provided by numerous earlier studies. Responsibility for undesirable outcomes has been shown to be a resource (e.g., Bulman & Wortman, 1977), a neutral factor (e.g., Newsom et al., 1996), or a risk factor (e.g., Peterson et al., 1988) for psychological adaptation. The cross-sectional analyses of the present study showed that personal responsibility for undesirable outcomes was associated with high negative affect in the parent sample. Unexpectedly, however, personal responsibility for undesirable outcomes did not predict negative affect in the continuer sample. Two factors may explain the contradictory effects. First, the inconsistency may be due to reduced variances which may have attenuated the causal effects in the continuer sample. However, the cross-validation analyses revealed that the variances of personal responsibility for undesirable outcomes and negative affect did not differ across the samples (see Appendix K, Table K2). Given these results, it is relatively unlikely that reduced variances explain the inconsistent effects of personal responsibility for undesirable outcomes.

A second explanation of the inconsistent effects refers to differences in resource availability between the samples. The continuers had generally more resources at their disposal than the members of the other two samples (i.e., parent and noncontinuer sample). For example, compared to the parent and noncontinuer samples, continuers were younger, healthier, better educated, and possessed more favorable personality traits (see Method Chapter). In the presence of all these resources, personal responsibility for undesirable outcomes may have less unfavorable implications for older people's negative affect. More specifically, generalized perceived personal responsibility for undesirable outcomes may be less deleterious when individuals possess the potential (i.e., the resources) to avoid undesirable *future* outcomes. A follow-up analysis in the parent sample supported this post hoc explanation. That is, a regression analysis

indicated that resource availability[32] moderated the effect of personal responsibility for undesirable outcomes on negative affect ($F_{(1)} = 4.24$; $p = .04$). Personal responsibility for undesirable outcomes was associated with high negative affect in the group of individuals with low resource availability ($r = .20$; $p > .01$), but showed no significant association with negative affect in the group with high resource availability ($r = .02$).[33]

The longitudinal results were also consistent with the hypothesis that personal responsibility for undesirable outcomes may not be a risk factor for older people with relatively high resource availability. To the contrary, those participants of the continuer sample who experienced an increase in perceived personal responsibility for undesirable outcomes over time were more likely to also experience an increase in positive affect. However, it is an open question whether the longitudinal finding would also apply to older people with low resource availability, because most of these individuals dropped out of the study.

Taken together, generalized perceived personal responsibility for undesirable outcomes might be a risk factor for less privileged people but a neutral factor or even a resource for those individuals who have the capabilities to influence potentially negative events in the future. Seen in a more broader context, this observation points to the importance of taking contextual factors into account when investigating the effects of risk factors for emotional well-being.

The effects of perceived others' control. As hypothesized, the cross-sectional and longitudinal analyses showed that perceived others' control over desirable and undesirable outcomes was associated with both low positive affect and high negative affect. This finding notwithstanding, perceived others' control might not always have unfavorable consequences for emotional well-being. The adaptivity of perceived others' control most likely depends on the exact definition of this facet of perceived control. In particular, one characteristic seems to be critical to the adaptive value of perceived others' control: Perceived others' control can reflect *confidence* in or *dependence* on other people (Baltes, 1996). Perceived control in the sense of trusting other people to act on one's own behalf is likely to be adaptive in old age. Defined in this manner, perceived others' control reflects the belief that one can profit from the control potential of other people (e.g., from their intelligence, power, or knowledge; Bandura, 1996; Skinner et al., 1988).

In contrast, this study conceptualized perceived others' control as perceived power of others to influence oneself. Thus, strong beliefs in the control of other people do not reflect confidence that other people respect one's own feelings, needs, and desires. To the contrary, perceived others' control defined in this manner reflects the perception that one is dependent on powerful other people who act primarily to fulfill their own needs. As expected, this feeling of dependency had deleterious implications for older people's emotional well-being. Future studies should simultaneously investigate the adaptivity of the different meanings that underlie perceived others' control.

Taken together, the present findings give credence to the dominant psychological paradigm regarding perceived control: (a) Perceiving personal control over desirable outcomes is a posi-

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[32] This variable was derived by computing the mean (i.e., a unit weighted composite index) of the following resources for emotional well-being: openness to experience, extraversion, low neuroticism, physical health, education, and age. All variables were coded such that a higher score signified higher resource availability.

[33] The groups were derived by using a median split of the scores on resource availability.

tive influence with the more control you perceive, the better off you are; and (b) perceiving dependency on others is a negative influence with the more you perceive dependency the worse off you are. The present findings suggest, however, that self-related perceived control may not always be beneficial. Personal responsibility for undesirable outcomes was shown to be unfavorable for emotional well-being (i.e., negative affect) in older individuals with average (i.e., parent sample) or low resource availability (i.e., noncontinuer sample), indicating that the effects of perceived personal responsibility for undesirable outcomes may be conditioned by contextual factors.

Taking a Closer Look at the Longitudinal Evidence

Despite considerable evidence for the adaptive value of perceived control in the literature, some important issues remained unresolved. Perhaps the most important concerns causality (e.g., Newsom et al., 1996; Taylor et al., 1991). Unlike the large experimental literature that examines the adaptivity of manipulated domain-specific perceptions of control, the cross-sectional nature of most studies investigating self-generated generalized feelings of control makes it unclear whether perceived control produces a certain level of adjustment or whether adjustment causes perceived control. The present study addressed this issue.

Did perceived control predict change in the two components of emotional well-being? The answer to this question is largely "no." The evidence suggests that individual differences in the two self-related dimensions of perceived control at the first wave were not significantly associated with change either in positive or in negative affect. The only exception was perceived others' control, which was associated with change in one of the two dimensions of emotional well-being—in positive affect. As was expected, those with higher beliefs in others' control were more likely to experience decreases in positive affect over time.

Taken as a whole, the longitudinal findings provided little evidence regarding the question whether perceived control is an antecedent or consequence of emotional well-being. What factors may have worked against finding support for the hypothesis that perceived control causes emotional well-being? The relatively low temporal stability of individual differences in perceived control might be one explanation.

In particular, the temporal stability of individual differences in the two self-related dimensions of perceived control was low. For example, only 25 percent of the variance in perceived personal control over desirable outcomes at the second wave was explained by perceived personal control over desirable outcomes measured at the first wave of data collection. This implies that 75 percent of the reliable variance in perceived personal control over desirable outcomes remained unexplained and can be considered as representing change variance. Although individual differences in the two other dimensions of perceived control were somewhat higher, they also point to a considerable variability in patterns of change. Given the low stability of individual differences, it is understandable that perceived control assessed at the first wave did not predict changes in the two components of emotional well-being over time.

However, consistent with the findings of intervention studies, differential changes in all of the three dimensions of perceived control were associated with differential changes in positive affect, negative affect, or both: The more individuals managed to enhance their belief in personal control over desirable outcomes, the more likely they experienced a decrease in negative affect. Moreover, the more individuals experienced an increase in perceived responsibility for undesirable outcomes, the more likely they experienced an increase in positive affect. Finally,

those who experienced an increase in perceived others' control were more likely to experience a decrease in positive affect and an increase in negative affect.

Perceived Control: A Differential Predictor of Positive Versus Negative Affect?

Based on the two-component model of emotional well-being, the question arose whether both components of emotional well-being—positive and negative affect—are equally affected by the three dimensions of perceived control that were investigated in this study. Earlier studies on perceived control have not addressed this question. The present study's hypotheses were derived by incorporating the findings reported in research on daily hassles and uplifts into the area of perceived control. This research has shown that positive events influence people's positive affect but not their levels of negative affect. In contrast, negative events influence people's negative affect but not their levels of positive affect (e.g., Neale et al., 1987; Reich & Zautra, 1983; Zautra & Reich, 1983; Zautra et al., 1994). Analogously, in this study, perceived personal control over *desirable* outcomes was predicted to be a resource for *positive* affect and perceived personal responsibility for *undesirable* outcomes was predicted to be a risk factor for *negative* affect. Did the findings support these two hypotheses?

The cross-sectional analyses in the parent sample showed that the effects of the two self-related dimensions of perceived control were consistent with these hypotheses. Perceived personal control over desirable outcomes showed a stronger cross-sectional association with positive affect than with negative affect. In addition, perceived personal responsibility for undesirable outcomes was associated with high negative affect but was not significantly related to positive affect.

Unfortunately, the cross-sectional results in the continuer sample were somewhat less convincing. That is, the effects of personal control over desirable outcomes on positive and negative affect did not significantly differ from each other. Moreover, the effect of personal responsibility for undesirable outcomes on negative affect was nonsignificant. How can these inconsistencies be reconciled? The correspondence of the effects of personal control over desirable outcomes on positive and negative affect in the continuer sample is most likely due to a statistical problem, namely, the variance of positive affect was significantly smaller in the continuer sample than in the parent sample (see Appendix F, Table F2). This reduced variance may be responsible for the attenuated effect of personal control over desirable outcomes on positive affect and therefore explains that the effects of personal control over desirable outcomes on positive and negative affect could be forced to be equal.

As discussed above, a substantial reason is most likely responsible for the finding that personal responsibility for undesirable outcomes was a neutral factor for negative affect in the continuer sample. The continuers had more resources at their disposal, which may have lessened the unfavorable effect of perceiving personal responsibility for failures.

Despite the inconsistencies between the parent and continuer sample, the cross-sectional findings suggest that perceiving personal control over desirable outcomes may be as favorable for positive affect as the desirable outcomes themselves. In contrast, perceiving personal responsibility for undesirable outcomes may be (under certain circumstances) as unfavorable for negative affect as the undesirable outcomes themselves.

Contrary to the cross-sectional findings, the longitudinal results were clearly inconsistent with the hypotheses that perceived personal control over desirable outcomes primarily fosters positive affect, while perceived personal responsibility for undesirable outcomes primarily causes negative affect. To the contrary, differential changes in personal control over *desirable*

outcomes were associated with differential changes in *negative* affect. Differential changes in personal responsibility for *undesirable* outcomes were associated with differential changes in *positive* affect. At this point, it is difficult to offer a substantive reason for the contrasting results. Clearly, developmental researchers have repeatedly emphasized that predicting (a) differences between individuals at a given point in time and (b) differences between individuals in *intra*individual change may yield different results. The representation of outcome variables in terms of sequences of individual differences versus differential *intra*individual changes leads to causal models that are not equivalent and not reducible to each other (e.g., Baltes & Nesselroade, 1973; Baltes et al., 1978; Labouvie, 1987). This general remark notwithstanding, the differences between the cross-sectional and longitudinal effects of the two self-related dimensions of perceived control are puzzling.

The longitudinal findings regarding the effects of perceived control on the two components of emotional well-being need to be replicated. Future studies should investigate the present hypotheses with a more comprehensive operationalization of perceived control than was employed in the present study. Further suggestions are detailed below.

Suggestions for Future Research

Elaborating the Assessment of Perceived Control

The present study's findings provided strong support for the usefulness of investigating personal control over desirable outcomes and personal responsibility for undesirable outcomes separately. These two facets of perceived control were shown to constitute distinct dimensions of perceived control. Perhaps more important, they were related to emotional well-being in rather different ways. Given these findings, it is worthwhile for future research to invest more effort in exploring the nature and function of this differentiation. As a first step, a more exact and more comprehensive operationalization of these two facets of perceived control may be advantageous. For example, perceived personal control differs not only regarding the valence of the control domain (desirable vs. undesirable) but also regarding the time orientation (future, present, past, or time-less). Furthermore, in order to narrow down the leeway to interpret perceived personal responsibility for undesirable outcomes as reflecting high versus low competence, more attention should be allocated to the exact wording of the items. Table 38 presents a classification of perceived personal control according to the time orientation and the valence of control domain, including examples that unambiguously reflect beliefs of high rather than low control capacity. Defined in this manner, all of the facets of perceived personal

Table 38
A Classification of Self-Related Perceived Control According to the Valence of Control Domain and the Time Orientation

	Time orientation		
Valence	*Future-oriented*	*Past-oriented*	*Time-less*
Desirable	I will be able to make sure that good things come my way.	Good things happened to me, because I worked hard for them.	I can make sure that good things come my way.
Undesirable	I will be able to avoid that bad things happen to me.	Bad things did not happen to me, because I worked hard to avoid them.	I can make sure that bad things do not happen to me.

control most likely are beneficial for older people's emotional well-being. However, personal control over desirable outcomes may be primarily involved in *maximizing positive* affect, whereas perceived personal control over undesirable outcomes may be primarily involved in *minimizing negative* affect. Future research may benefit from simultaneously investigating multiple facets of perceived personal control over desirable versus undesirable outcomes.

Similar considerations apply to the third dimension that was investigated in the present study—perceived others' control. The analyses of the present study showed that the indicators of perceived others' control constitute only one dimension. This finding indicates that the valence of the control domain is less important when perceiving control of other people as opposed to personal control. As it seems, if older people perceive dependency on other people when achieving positive outcomes, they also tend to perceive dependency on others when avoiding negative outcomes and vice versa. However, given that perceived others' control over desirable versus undesirable outcomes was assessed by only two items each, the present finding should be interpreted with caution. It may well be that a differentiation between perceived others' control over desirable versus undesirable outcomes emerges when operationalized through multiple indicators that more precisely differentiate desirable versus undesirable outcomes.

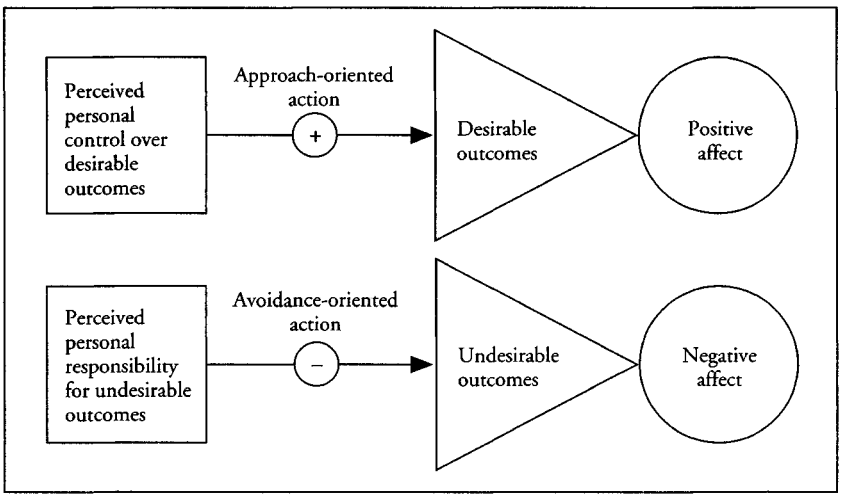
Pathways From Perceived Control to Emotional Well-Being in Old Age

The relation between perceived control and emotional well-being is a function of the specific dimensions considered. As a consequence, the question arises whether different pathways exist that connect individual components of perceived control with individual components of emotional well-being.

This study predicted one characteristic of control beliefs—the valence of the control domain—to be important when it comes to the differential regulation of either positive or negative affect. Perceiving control over desirable outcomes was predicted to be as favorable for positive affect as the desirable outcomes themselves. On the other hand, perceiving personal responsibility for undesirable outcomes was predicted to be as unfavorable for negative affect as the undesirable outcomes themselves. Action-theoretical models of perceived control can easily explain this correspondence. These models posit that the primary psychological mechanism by which perceived control influences psychological adaptation is through its effects on action and action regulation (Bandura, 1996; Heckhausen & Schulz, 1995; Lopez & Little, 1996; Skinner, 1995). As depicted in Figure 23, according to action-theoretical models, perceived personal control over desirable outcomes (e.g., being successful at work, finding a new partner, being at a desired weight) fosters the engagement in goal-relevant behaviors that make desirable outcomes more likely. Perceived responsibility for undesirable outcomes may function in the opposite way. Perceiving personal responsibility for undesirable outcomes (e.g., becoming seriously ill, loosing one's job, being socially refused) undermines the motivation to engage in behaviors that aim at avoiding failures in the future.

For the purpose of this discussion, it is sufficient to state that the mechanisms outlined above may also apply to perceived others' control. People who believe that other people generally arrange for the good things in life may be more likely to make demands on other people who then help to achieve the desirable outcomes. Similarly, the belief that other people generally make sure that nothing goes wrong in one's life may reduce negative affect through its motivational effects on seeking social support that helps to avoid undesirable outcomes. Future studies should investigate whether desirable and undesirable outcomes that actually

Figure 23
How Perceived Personal Control Over Desirable and Undesirable Outcomes Operates



Note. The findings of this study suggest that the consequences of personal responsibility for undesirable outcomes for motivation and avoidance-oriented action may be conditioned by resource availability. That is, in the face of multiple resources, this facet of perceived control may foster avoidance-oriented action. Under low resource circumstances, avoidance-oriented action may be less likely.

occur in people's lives mediate the effects of perceived control over these outcomes on the two components of emotional well-being.

The Interactive Effects of Functional Health and Perceived Control on Emotional Well-Being

Following two models of subjective well-being advanced in research on perceived control (i.e., the positive illusion and the reality-fit model of subjective well-being), this study predicted that the congruence between objective and subjective control is important to the adaptivity of perceived control. Contrary to earlier field studies (see Theory Chapter, Table 7), this study failed to provide evidence for the hypothesis that individuals profit emotionally from the degree of congruence between subjective and objective control. The present findings suggest that three types of generalized *perceived* control regulate older people's emotional well-being, independent of *actual* control competencies. Four potential factors that may have worked against finding support for the hypothesis are discussed below: (a) the operationalization of objective control competence as functional health status, (b) the difficulty to empirically determine incongruence between objective control competencies and subjective evaluations of control, (c) goal adjustment, and (d) environmental compensation.

Functional Health Status: A Reasonable Indicator of Objective Control?

The idea that beliefs about control should be congruent with objective control competencies is prominent in current research on perceived control (e.g., Affleck et al., 1987; Helgeson, 1992; Taylor et al., 1991). However, objective control competence is a difficult variable to measure in field research. Although this variable has a more precise operationalization in experimental studies, those studies often lack ecological validity. In experimental studies, objective control potential is typically defined by the chances of solving a problem or winning a game. The advantage of this definition lies in its precision. The disadvantage is that experimentally manufactured tasks lack psychological significance. For example, to misinterpret one's control possibilities when playing a game or solving a problem has no (long-term) implications for individuals' daily lives.

In field research, "real-life" stressors such as serious illnesses (e.g., cancer, HIV infection, or coronary heart disease) are typically considered as proxy variables for individuals' objective control potential. Earlier field studies provided convincing evidence that it is important to perceive one's control competence realistically, when confronted with long lasting adverse experiences of low control. Based on this evidence, I decided to define objective control competence as older people's constraints in functional health (i.e., a real-life stressor against which a transitory experimental "low control" condition pales).

However, the specific operationalization of functional health might have tapped processes too distal from daily living routines. Clearly, to stand upright and keep position, to be able to perform a 360 degree turn, to see, and to hear are important indicators of older people's objective control potential. An alternative operationalization would have been to ask the participants whether their functional health problems keep them from doing things they wished to do. To assess health objectively (through performance-based measures) and subjectively (by asking for a description of various health characteristics including experienced consequences) might have resulted in a more comprehensive reflection of individuals' objective potential to exert control. Given the debate in the literature whether self-reported functional health can be regarded as a valid reflection of individuals' *objective* functional health status, it was decided to measure functional health exclusively through performance-based tests.

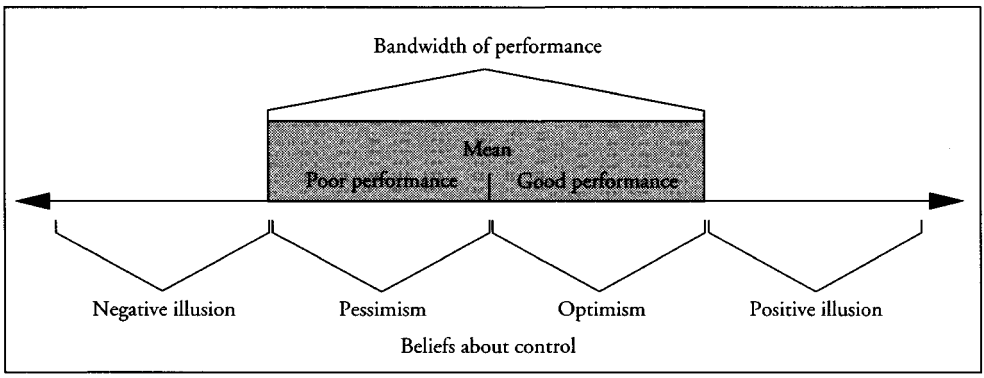
Future studies may benefit from employing performance-based tests of functional health that are more relevant for the daily lives of older individuals. These tests should comprise those activities that are typically included in self-report measures of functional health. In those tests, participants should, for example, be asked to perform concrete activities such as to drink from a cup, to brush their teeth, to sign their name, to put on and remove a slipper, to pick up small objects and place them in a can, or to transfer kidney beans from a table top to a can using a spoon (for reviews of functional health measures, see Guralnik et al., 1989; Kempen et al., 1996).

Defining Incongruence Between Objective and Subjective Control is a Problem

In many cases, it is difficult to empirically determine whether a particular control belief is inside the boundaries of a person's bandwidth of performances (i.e., the gray part in Figure 24) or whether it is outside. As seen in Figure 24, overestimating one's competencies is not always illusory or unrealistic, but might still be within the boundaries of one's actual control competence (i.e., optimistic).

Optimistic beliefs of control refer to the upper limits of a person's actual control competence (e.g., a woman diagnosed with an ulcer believes she will recover, given that it is possible

Figure 24
Beliefs About Control Within and Outside the Bandwidth of Performances



to influence the course of this illness by following a proper diet). In contrast, positive control illusions—even under ideal conditions—are clearly beyond what a person can actually control (e.g., a 70-year-old woman believes she can make her wrinkles disappear by applying super-moisturing lotion to her skin).

Analogously, pessimistic beliefs of control refer to the lower limits of a person's actual competence, reflecting concerns that are justified by one's competence (e.g., a relatively healthy old man believes he is not capable of climbing the stairs to his apartment because he is tired and exhausted from a sleepless night). Finally, negative control illusions—even under the worst conditions—*cannot* be justified by actual control competencies. Those beliefs underestimate one's competence to a great degree (e.g., the same old man believes that he will never be able to climb the stairs to his apartment again). It should be noted, that the proposed classification also applies to beliefs about others' control. A positive control illusion, for example, is the belief of an old disabled man that he does not need others to get along in his daily life. A negative control illusion, on the other hand, is illustrated by the belief of a cognitively fit older woman that she needs others' help for balancing her checkbooks.

Classifying beliefs as either being inside the bandwidth of performances (i.e., optimistic and pessimistic beliefs) or outside (i.e., a positive or negative illusion) is important. As many researchers have argued, it is the gross miscalculation of one's control possibilities (i.e., a positive or negative control illusion) that gets one into trouble. In contrast, mild over- or underestimations of one's control competence (i.e., optimistic or pessimistic beliefs) can be advantageous (e.g., Bandura, 1989; Baumeister, 1989; Lopez, Little, Oettingen, & Baltes, 1998). In order to empirically define whether a particular control belief is realistic or illusory, one needs longitudinal data. An example may illustrate this point. Consider a man with a *low* score on performance-based tests of functional health. In addition, this man reported to perceive *high* personal control over the good things in life. Is this belief illusory? The answer to this question depends on whether his performance was at the upper or lower limits of the actual span of competence. It may well be that, for example, momentary factors such as mood or fatigue produced a temporary downward shift in his performance. As a consequence, the man's generalized high belief in personal control may be a valid reflection of his objective competence in

general (i.e., the mean level of performances), although this belief clearly overestimated his specific performance.

In sum, it may not be possible to determine the illusory nature of a generalized control belief by comparing it with a single performance score. Instead, the mean score of multiple performances may be a more valid basis for estimating individuals' objective control competencies.

Goal Adjustment

The realistic or illusory nature of older people's generalized control beliefs may not only depend on their functional health status. Imagine an old woman who holds the belief "I can make sure that good things come my way." Whether this control belief is realistic or illusory depends on her objective control competence but also on the specific good things she considers. Lifespan theory emphasizes that a key mechanism of successful aging is the selection of domains and life priorities that are congruent with current life conditions and competencies (e.g., Baltes, 1991, 1997; Baltes & Carstensen, 1996; Brandtstädter & Rothermund, 1994; Brim, 1988, 1992; Staudinger et al., 1996). If older individuals adjust their goals and desires to what they can actually achieve, to perceive personal control over desirable outcomes might be realistic, even if actual control competencies are low.

A real-life story reported by Brim (1988) illustrates this point. After his retirement, a college professor decided to live on a farm in a valley surrounded by lovely hills. Taking care of this farm and its surroundings became a central component of his daily life. As the physical limitations of age appeared, he reduced his horizon of goals and expectations step by step. First, care of the hills stopped; he gave up care of the meadows in the valley next. Finally, he could not tend his garden. When the man reached very old age, his daily activities concentrated on the window box in his living room. This window box became the primary focus of his attention and productivity. If someone had asked this man, on a yearly basis, whether he believed that he had personal control over the desirable outcomes in his life, his *valid* answers probably would have been consistently "yes." At each stage of the aging process, he selected those control domains that were congruent with his current competencies. Thus, although his objective control competencies declined over time, his generalized belief in personal control over desirable outcomes remained realistic, because the desirable outcomes he considered had changed considerably and were adjusted to the increasing physical limitations of the aging process.

Generally speaking, seen from the perspective of the universe of potential desirable outcomes that are beyond personal control in view of functional impairments, the belief "I have control over desirable outcomes" is likely to be illusory. Analogously, the belief "I need others to achieve desirable outcomes" might be realistic. However, if functionally impaired individuals let go of goals and desires that are incongruent with what they are actually able to achieve, the perception of personal control over desirable outcomes is not illusory. Likewise, the belief that one needs others to achieve desirable outcomes may not be realistic. Thus, it might be impossible to estimate the illusory nature of generalized perceived control without taking goal adjustment processes into account. This insight points to the advantage of investigating domain-specific rather than generalized perceptions of control. Defining whether a domain-specific control belief (e.g., If I want to, I can walk without help) is illusory is much easier than estimating the illusory nature of a generalized belief about control (e.g., If I want to, I can make sure that good things happen to me).

Environmental Compensation

A second principle may be involved when estimating whether a particular belief about control is realistic or illusory: environmental compensation. Environmental characteristics either facilitate or hinder achieving desirable or avoiding undesirable outcomes. Consequently, what older people are actually able to control may be a function of their functional health status and environmental factors. This point of view is consistent with the proposition that disability is a gap between personal competencies and environmental demands (e.g., Lawton & Lawrence, 1994; Verbrugge, 1990). An example might illustrate this point. Consider two women confronted with major functional health constraints: Depending on environmental factors (e.g., special aids or structural arrangements at home), these two women may differ regarding their actual ability to control the desirable outcomes in their lives. Suppose, woman A lives in a protective and optimal environment that compensates her low control competencies; she might generally be able to achieve desirable outcomes, and the respective control belief "I have control over the desirable outcomes in my life" might therefore be completely realistic. In contrast, woman B lives in disadvantaged circumstances that exaggerate her low control competencies. Perceiving personal control over the desirable events in this context is more likely to be a positive illusion of control. For the purpose of this discussion it should be sufficient to mention that these considerations also apply to other facets of perceived control (e.g., perceived others' control).

To summarize, future studies may benefit from taking four factors into account when investigating the notion that a fit between subjective and objective control may be advantageous for older people's emotional well-being. First, it is difficult to measure objective control in field research. If objective control competence is operationalized as health status, performance-based tests should be employed that assess a wide range of concrete activities of daily life. Second, estimating a person's objective control competence should be based on performances in multiple assessments. Third, two principles should be taken into account when estimating the illusory nature of generalized beliefs about control: (a) People tend to adjust their goals according to what is feasible and (b) characteristics of a person's environment may compensate functional impairments.

Suggestions for Future Research or the Need for an Integrative Theoretical Model

At first glance, the two models of subjective well-being that have been advanced in research on perceived control—the reality-fit model and the positive illusion model—appear to be mutually exclusive. The reality-fit model proposes that control beliefs should be congruent with objective control competencies in order to be adaptive. In contrast, the positive illusion model maintains that overestimating one's control competence is particularly adaptive when faced with stressful and uncontrollable events.

Interestingly, the empirical evidence generally points to the adaptivity of both, realism and optimism. In some situations, realistic control beliefs have been demonstrated to be associated with better psychological adjustment (e.g., Taylor et al., 1991), in others optimistic beliefs were shown to be adaptive (e.g., Alloy & Clements, 1992). It seems that general statements such as "realistic control beliefs are adaptive" need qualification. For example, Taylor and Gollwitzer (1995) have shown that people use realistic thinking when setting goals and more positive thinking when implementing them. This finding suggests that people do not hold either realistic or illusory beliefs about control. People can be realistic and optimistic at the same time, depending on the specific situation and the goals they pursue.

The positive illusion model and the reality-fit model of subjective well-being may be integrated by assuming that access to a wide repertoire in functioning is a key precondition to successful development. It may well be that individuals who hold realistic *and* optimistic beliefs of control, benefit most from the advantages of both kinds of beliefs. At the same time, they might be less vulnerable to the inherent risks of both, optimistic and realistic control beliefs.

The availability of multiple beliefs about control may be most conducive to subjective well-being. For example, a functionally impaired person who maintains his or her perception of personal control (i.e., optimistic) *and* also perceives that other people might sometimes be more powerful in achieving desirable or avoiding undesirable outcomes (i.e., realistic) should be better off than a functionally impaired person who exclusively perceives either personal or others' control.

One advantage of perceiving both modes of control is that flexible coping is more likely (Staudinger & Fleeson, 1996). Depending on the specific circumstances, a person may exert personal control, search for help from other people, or use both coping strategies in an integrated way. Thus, different modes of coping can be used at different points in time, in different person-situation interactions, as well as during various developmental phases. Similar to a multifaceted self-definition (e.g., Freund, 1995; Markus & Nurius, 1986; Showers & Ryff, 1996; Thoits, 1983), a multifaceted perceived control profile might play a protective role in the face of stressful circumstances. Future studies should examine whether adaptation to stressful events is more likely when multiple ways of perceiving control are available.

Strengths and Limitations of the Present Study

This section aims at describing the present study's strengths and limitations in a more systematic way and on a more general level than has already been done in the discussion of the main findings. A well designed study of risk factors and resources for emotional well-being should meet several criteria: (a) use of a longitudinal design in which the participant's initial status of emotional well-being is known, (b) recruitment of a representative sample, (c) the sample size should be large enough to provide adequate power, (d) there should be minimal attrition over time, (e) adequate assessments of the dependent and independent variables, and (f) employment of multivariate analyses (e.g., Baltes et al., 1978; Nesselroade, 1990; Schaie & Hertzog, 1982). As detailed below, the present study met some of these criteria (e.g., use of a representative sample, multivariate analyses), but others may be improved in future research (e.g., in-depth assessments of the dependent and independent variables).

The Sample

One of the strengths of this study is the local representativeness and heterogeneity of the participants at the first wave through random sampling from the obligatory city register (see Baltes et al., 1996). However, because BASE was initiated before the unification of Germany, the data collection is restricted to the area of former West Berlin. The question arises whether West Berlin is unique. It is unknown whether the findings would apply to old people in former East Berlin or to old people in other regions of Germany. In other words, the findings may be city specific and do, for example, not provide generalizable information for variables

affected by distinctions between urban and rural settings. For example, the proportion of old people without children is especially high in West Berlin. Poverty may be less widespread among old people in West Berlin than in rural areas (see Mayer & Wagner, 1996). The special features of West Berlin may have an influence on the psychological functioning of its citizens and may limit the generalizability of the findings. Thus, when interpreting the findings of this study, one may want to consider the possibility that life and aging in West Berlin had different aspects than in other cities.

A second problem of generalizability, which particularly concerns a longitudinal study dealing with old age, is selective survival (e.g., Baltes et al., 1978; Baltes et al., 1996; Kruse et al., 1993; Schaie, 1996). Although the longitudinal method has the advantage of measuring change in the same individuals over time, a major disadvantage is that the findings must be limited to those who continued participation in the longitudinal assessment. As described in the Method Chapter, almost two thirds of the parent sample (60.1%) did not continue in the longitudinal study; most of the noncontinuers died between the two waves of data collection (65.5%). Aware of this limitation, analyses of differences between those who continued and those who dropped out were performed. As expected, the continuers were a positively selected group, they possessed more favorable sociodemographic characteristics, more favorable personality traits, and were healthier than the noncontinuers and the parent sample. In addition, the continuers differed from the noncontinuers and the parent sample regarding some of the central constructs of the present study. Continuers were younger, in better functional health, experienced more positive affect, and had lower perceived others' control. Moreover, the continuers were more homogeneous regarding these variables.

As discussed, the differences between the continuers and the other two samples (i.e., the noncontinuers and the parent sample) may be responsible for some of the inconsistencies between the cross-sectional and longitudinal results. Despite the problem of comparing cross-sectional results in the parent sample with the longitudinal results, it is of great value to investigate the characteristics of surviving cohorts.

The Longitudinal Design

Longitudinal studies in old and very old age are very rare. A strength of the current study is the follow-up of 206 individuals of a heterogeneous sample comprising individuals aged 70 to 103 years. This follow-up made it possible to investigate the temporal stability of individual differences in emotional well-being as well as predictors of individual differences in *intra*-individual change in the two components of emotional well-being (i.e., positive and negative affect). The advantage of this longitudinal design for the study of risk factors and resources for emotional well-being is obvious. Perhaps most important, on the basis of longitudinal data it is feasible to make causal inferences about covariations between risk factors (or resources) and emotional well-being, especially if these are derived from elaborated theoretical considerations. The observation that the present study's cross-sectional findings did not always mirror the longitudinal results underlines the importance of the longitudinal approach. However, several pitfalls of descriptive longitudinal designs also exist (e.g., Baltes et al., 1978; Nesselroade, 1990; Schaie & Hertzog, 1982). Two caveats are: (a) the lack of experimental control over antecedent conditions and (b) the problem of defining appropriate test-retest intervals (other problems of descriptive longitudinal studies include effects of history such as

cohort and time-of-measurement effects, maturation, testing, and instrumentation; see Campbell & Stanley, 1967).

(a) *The lack of experimental control over antecedent conditions.* As mentioned, in comparison to cross-sectional studies, longitudinal studies provide more evidence for a directional interpretation of relationships by establishing a temporal sequence in which a putative cause precedes the assumed effect in time. A problem of descriptive longitudinal studies, however, is that they lack experimental control over the antecedent variables (e.g., Baltes et al., 1978; Kruse et al., 1993). A question of the present study may be used to exemplify the problem: Does poor functional health cause low emotional well-being? This question was specified in the following manner: At a given level of positive affect, do people with different functional health status change in different ways? This approach to test the causal order of functional health and positive affect appears appropriate because functional health cannot be changed easily. However, demonstrating the causal relationship would be enhanced if functional health were subjected to experimental manipulation or improved in intervention studies. Descriptive longitudinal studies may be conceived as a first step in establishing causality. In order to achieve a more complete picture of the causal processes underlying emotional well-being, it is necessary to move beyond the descriptive longitudinal method to methods that allow for greater experimental control over antecedent conditions.

(b) *The problem of defining appropriate test-retest intervals.* A second problem of longitudinal studies refers to defining appropriate test-retest intervals between the occasions of data collection. How long should be the time interval between measurement occasions? Of course, a general answer to this question cannot be given because the answer depends on the content area of interest. For example, if one's interest lies in the emotional implications of changes in functional health, a time interval between measurement occasions should be chosen that ensures the occurrence of changes in functional health. As discussed, what may have worked against finding support for the present hypothesis, namely, that differential changes in functional health predict differential changes in emotional well-being, is the fact that between the two waves of data collection virtually no differential changes in functional health occurred. On the one hand, a time interval of approximately four years may have been too long to be able to retest older participants with poor functional health at the first wave. These participants who presumably would have produced more change in functional health may have died before the second wave of data collection was under way. A shorter test-retest period may be a necessary precondition to test the emotional implications of differential changes in functional health in old and very old age. On the other hand, however, the shorter the test-retest interval, the less likely high functioning individuals experience change in functional status.

While functional health appeared as a stable risk factor with long lasting effects on differential changes in positive affect, the temporal stability of individual differences in perceived control were relatively low. In other words, the time period of approximately four years was long enough to ensure the occurrence of differential changes in perceived control. The low stability of perceived control may explain the findings that (a) individual differences in perceived control at the first wave did generally not predict changes in emotional well-being and (b) that differential changes in perceived control were associated with differential changes in emotional well-being.

Clearly, the length of the test-retest interval determines the amount of change in the investigated predictor (i.e., functional health and perceived control) and outcome variables (i.e., positive and negative affect) and should therefore be taken into account when interpreting the

present study's findings. Related to this caveat is an issue advanced by Nesselroade (1988, 1990), namely, that the understanding of long-term changes in attributes such as functional health, emotional well-being, and perceived control may be improved by recognizing short-term variability as well. Confounding state variation with variation that is construed to reflect stable individual differences can seriously threaten the validity of trait measures. For example, Roberts and Nesselroade (1986) reported that perceived control—internal and powerful others' control—exhibit coherent, day-to-day variability (see also Eizenman, Nesselroade, Featherman, & Rowe, 1997). This state variability can either inflate or attenuate test-retest stability estimates of observable variables depending, for example, on the similarity of state-evoking circumstances at the two occasions of measurement.

To come back to the present study, the interpretation that the low relative stability of perceived personal control over desirable outcomes over the time period of approximately four years represents individual differences in *long*-term changes may be misleading. The low stability may also be due to short-term variability. In order to get a deeper insight into the relationships between the stable components of attributes such as perceived control, functional health, and emotional well-being, their short-term fluctuations need to also be taken into account. Longitudinal designs which include multiple waves of data collections with test-retest intervals covering different time periods (e.g., one day to one year), may be advantageous for achieving a full understanding of the dynamics in emotional well-being. Moreover, in order to explore the relative importance of cohort differences in age-related change functions of emotional well-being or its antecedents, longitudinal studies involving multiple cohorts—cohort-sequential designs—are suited best (e.g., Baltes, 1968; Baltes et al., 1978).

The Instruments

The interdisciplinary nature of BASE guaranteed a wide-ranging data set collected in multiple sessions. Measures of four disciplines—internal medicine and geriatrics, psychology, sociology, and psychiatry—were employed assessing a comprehensive picture of the participants regarding psychological, sociological, and medical characteristics. The advantage of a large and interdisciplinary data set, however, has also its costs. That is, the decision to assess a *broad* spectrum of variables made it necessary to make concessions regarding the *depth* of assessment. Short scales were drawn from well-known and well-established scales and were revised to fit the time constraints of BASE. Special attention was given to (a) short and clear item wording and (b) generalized instead of domain-specific items. Moreover, many items had to be revised to be appropriate for a group of old people aged 70 years and above.

Due to space limitations in BASE, a special short measure of perceived control had to be developed. While this measure yielded moderate to high reliability and showed relationships to other variables that are consistent with the prior findings of many studies (see Appendix I), it may have unknown flaws that more well-established scales would have corrected. On the other hand, the items making up the perceived control scales were drawn from other, well-known and well-established measures (see Method Chapter). Thus, despite the possibility that unknown flaws may exist in the present measure of perceived control, it is unlikely that the general set of results would differ greatly when using more established measures.

Emotional well-being was also assessed using a brief measure, namely, the Positive Affect Negative Affect Schedules (PANAS), which were developed to be utilized in survey studies

(Watson et al., 1988). Although the PANAS are relatively well-established in the literature and possess favorable psychometric traits (e.g., Kercher, 1992; Watson, 1988; Watson et al., 1988), two potential problems of these scales need to be mentioned. First, based on the circumplex model of emotion (Watson & Clark, 1985; see Theory Chapter, Figure 1), the PANAS include only a few selected emotions indicating the positive and negative side of emotional well-being. Only those specific emotions were selected that had high loadings on positive affect and low loadings on negative affect or vice versa. Thus, the definition of emotional well-being is based on a statistical rationale rather than on theoretical considerations (i.e., the selection criterion was the orthogonality of positive and negative affect). A consequence of this approach is that a number of emotional states (e.g., satisfaction, sadness, depression) were not included in the definition of emotional well-being advanced by Watson et al. (1988). In addition, based on prominent emotion theories (e.g., Ekman, 1992; Izard, 1977; Levenson, 1992; Malatesta, 1988), it is questionable whether all of the adjectives included in the PANAS qualify as true emotions. For example, adjectives such as active, alert, determined may characterize positive states more than *feelings* in the strict sense of the concept.

In sum, a number of caveats must be considered in interpreting the present study's findings. However, I do not want to finish this section without emphasising the strengths of this study. The central features of the present study are (a) its heterogeneous sample, (b) its focus on old and very old individuals, (c) its multidisciplinarity that allowed to investigate a broad range of self-reported and objective psycho-social-physical variables, and finally (d) the longitudinal follow-up that made possible to examine about half of the old and very old participants longitudinally. This dissertation study ends with discussing the broader implications of its findings for the research on the stability-despite-loss paradox of subjective well-being that was outlined in the introduction.

Five Tentative Solutions to the Stability-Despite-Loss Paradox of Subjective Well-Being in Old Age

As outlined in the introduction, despite the many subjective and objective losses in functioning which accompany old age, older persons, in general, manage to maintain stable levels of subjective well-being (George et al., 1977; Herzog & Rogers, 1981; Horley & Lavery, 1995; Larson, 1978). Five complementary hypotheses were collected; each may provide some explanations for this seemingly counterintuitive, paradoxical finding. These five hypotheses are now evaluated in light of the present study's empirical findings.

First hypothesis: The paradox exists for some but not all indicators of subjective well-being. The present findings supported this hypothesis. A negative implication of old age—constraints in functional health—was unrelated to negative affect but showed a substantial, negative association with positive affect. The experience of positive affect may be a criterion for successful aging that is relatively difficult to achieve. Maintaining stable levels of positive affect in the face of age-related losses may be a more difficult task than regulating one's negative affect.

Second hypothesis: The paradox is less marked in individuals in the very last life phase. The present study provided evidence against this hypothesis. While functional health constraints were not significantly associated with negative affect in very old individuals (M = 92 years; SD = 4.32), they predicted higher levels of negative affect in young olds (M = 77.46 years; SD = 4.50). This observation indicates that the emotional importance of age-related losses in func-

tional health may shift in the last period of life. In advanced old age, the salience and importance of health as a contributor to emotional well-being might decrease. As a consequence, an increase in health-related losses in very old age might not cause accelerated decline in subjective well-being. In this life phase, concerns other than health might be relatively more important for feelings of subjective well-being (e.g., to give meaning to one's life, as it was, and to prepare oneself for death and dying; Erikson, 1959; Havighurst, 1972).

Third hypothesis: The paradox is less pronounced when older individuals are investigated longitudinally. Consistent with this hypothesis, the present analyses revealed moderate covariance stabilities for positive (r = .79) and negative affect (r = .81) over the time period of approximately four years. Although older people, as a group, showed no changes in positive and negative affect, the findings suggest that some change occurred for some people. Older people may vary regarding the amount and direction of *intra*individual changes in positive and negative affect. This is a first indication that the stability-despite-loss paradox might exist for some rather than for all aging people. Possible factors influencing stability and change in emotional well-being are elaborated in the following hypotheses.

Fourth hypothesis: The paradox is less pronounced if age-associated risk factors are examined instead of chronological age. The present findings supported this hypothesis. Age-related constraints in vision, hearing, and mobility were associated with low positive affect. Moreover, the simultaneous analysis of age and poor functional health revealed that a low or even positive association between age and emotional well-being does not contradict the sensitivity of emotional well-being to a negative implication of age (i.e., functional health constraints). In fact, the findings suggest that age per se is not a risk factor for emotional well-being. After taking the effects of functional health constraints on emotional well-being into account, age had *favorable* effects on both components of emotional well-being (i.e., positive and negative affect). Thus, if older individuals were able to maintain their functional health, old age and aging would probably be associated with an increase in emotional well-being. In the absence of age-related losses, positive implications of old age such as maturity, personal growth, and expertise may be responsible for age-related increases in emotional well-being. However, this scenario is relatively rare, given the strong and positive connection between age and functional health constraints.

Fifth hypothesis: The paradox might be due to the self and personality that help to maintain subjective well-being in the face of age-related losses. The present study provided support for this hypothesis. Older people's beliefs about control were shown to be important contributors to positive affect, negative affect, or both. The findings also suggest that control beliefs regulate emotional well-being, independent of the objective functional health status. This observation indicates that the functioning of older people's control beliefs does not become less effective in the face of age-related losses. In old age, personality characteristics—adaptive and dysfunctional facets—appear to play a major role in maintaining or losing emotional well-being.

To summarize, this study points to important qualifications of the stability-despite-loss paradox of subjective well-being. The present findings suggest that this paradox does not hold for all components of subjective well-being and is only true for some rather than all old people. Older individuals confronted with constraints in functional health are at risk for experiencing a decline in positive affect. This study also provided evidence for the notion that the functioning of the personality is important to the maintenance of subjective well-being in old age. Beliefs about control were shown to be substantial contributors to older people's positive and negative affect. In old age, emotional well-being depends on both objective control competencies (such as functional health) and subjective perceptions of control.

Appendix A
Indicators of the Present Study's Central Constructs

Descriptive Statistics

Indicators of Perceived Control

Table A1
Indicators of Perceived Control in the Parent Sample: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Perceived personal control over desirable outcomes								
Item 1	3.62	.96	1.00	5.00	−.78	.12	4	8
Item 2	3.65	.93	1.00	5.00	−.78	.31	4	8
Item 3	3.76	.79	1.00	5.00	−.78	.70	6	16
Perceived personal responsibility for undesirable outcomes								
Item 1	3.36	1.01	1.00	5.00	−.53	−.50	4	6
Item 2	3.65	.87	1.00	5.00	−.63	.16	5	8
Item 3	3.36	.96	1.00	5.00	−.47	−.47	7	8
Perceived others' control								
Parcel 1	2.61	1.03	1.00	5.00	.32	−.71	3	8
Parcel 2	2.63	1.08	1.00	5.00	.29	−.90	3	5

Note. The indicators for personal control over desirable outcomes and personal responsibility for undesirable outcomes are single items (see Method Chapter, Table 20). In contrast, the indicators of perceived others' control comprises two items each (for information about how items were collapsed into parcels see Method Chapter, Section "Aggregating Items Into Subscales"). N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A2
Indicators of Perceived Control in the Continuer Sample at Time 1: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Perceived personal control over desirable outcomes								
Item 1	3.54	1.01	1.00	5.00	–.67	–.14	1	3
Item 2	3.57	.94	1.00	5.00	–.82	.44	2	2
Item 3	3.82	.68	1.80	5.00	–.45	.49	–	6
Perceived personal responsibility for undesirable outcomes								
Item 1	3.35	1.00	1.00	5.00	–.45	–.53	–	3
Item 2	3.80	.76	2.00	5.00	–.36	–.07	1	4
Item 3	3.30	.91	1.00	5.00	–.21	–.56	1	3
Perceived others' control								
Parcel 1	2.33	.96	1.00	5.00	.60	–.15	1	3
Parcel 2	2.28	.97	1.00	5.00	.69	1.01	1	2

Note. The indicators for personal control over desirable outcomes and personal responsibility for undesirable outcomes are single items (see Method Chapter, Table 20). In contrast, the indicators of perceived others' control comprises two items each (for information about how items were collapsed into parcels see Method Chapter, Section "Aggregating Items Into Subscales"). N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A3
Indicators of Perceived Control in the Continuer Sample at Time 2: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Perceived personal control over desirable outcomes								
Item 1	3.56	.88	1.00	5.00	–.64	–.12	–	3
Item 2	3.69	.75	1.00	5.00	–.85	.88	1	5
Item 3	3.68	.67	1.80	5.00	–.73	.57	–	3
Perceived personal responsibility for undesirable outcomess								
Item 1	3.33	.98	1.00	5.00	–.54	.39	–	3
Item 2	3.61	.82	1.00	5.00	–.79	.68	–	2
Item 3	3.23	.88	1.00	5.00	–.33	–.60	1	2
Perceived others' control								
Parcel 1	2.53	.88	1.00	4.50	.30	–.66	–	5
Parcel 2	2.51	1.02	1.00	5.00	.42	–.64	–	5

Note. The indicators for personal control over desirable outcomes and personal responsibility for undesirable outcomes are single items (see Method Chapter, Table 20). In contrast, the indicators of perceived others' control comprises two items each (for information about how items were collapsed into parcels see Method Chapter, Section "Aggregating Items Into Subscales"). N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A4
Indicators of Functional Health Constraints in the Parent Sample: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Functional health constraints								
Vision	4.0	1.0	1.27	6.01	−.19	−.53	–	4
Hearing	4.0	1.0	1.46	5.96	−.18	−.55	–	5
Mobility	4.0	1.0	1.72	6.44	.21	−.95	5	6

Note. Each indicator of functional health constraints (i.e., vision, hearing, and mobility) comprises two measures (see Method Chapter, Table 19). For information about how measures were collapsed into parcels, see Method Chapter, Section "Aggregating Items Into Subscales." Since each indicator of functional health covers items measured in a different metric, they were standardized to a mean of four and a standard deviation of one. In addition, the two items building the third indicator of functional health (i.e., mobility) were transformed using the natural logarithms (Ln). Raw items were either highly skewed (e.g., $skewness_{(turn\ 360°)} = 3.59$) and showed a high kurtosis (e.g., $kurtosis_{(turn\ 360°)} = 22.71$). N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A5
Indicators of Functional Health Constraints in the Continuer Sample at Time 1: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Functional health constraints								
Vision	3.48	.89	1.27	6.01	−.12	−.19	–	4
Hearing	3.60	1.01	1.46	5.96	.26	−.54	–	3
Mobility	3.44	.79	1.72	5.65	.70	−.09	–	4

Note. Each indicator of functional health constraints (i.e., vision, hearing, and mobility) comprises two measures (see Method Chapter, Table 19). For information about how measures were collapsed into parcels, see Method Chapter, Section "Aggregating Items Into Subscales." The indicators of functional health constraints were standardized to the mean and standard deviation of the parent sample. The two items of the third indicator of functional health were again transformed using the natural logarithms (Ln). As in the parent sample, raw items were either highly skewed (e.g., first wave-$skewness_{(turn\ 360°)} = 3.59$) and showed a high kurtosis (e.g., first wave-$kurtosis_{(turn\ 360°)} = 22.71$). N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A6
Indicators of Functional Health Constraints in the Continuer Sample at Time 2: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Functional health constraints								
Vision	3.90	.86	1.90	6.01	−.07	−.53	–	2
Hearing	3.73	1.01	1.32	5.95	.00	−.58	3	2
Mobility	3.35	.87	1.72	5.66	.63	.04	–	1

Note. Each indicator of functional health (i.e., vision, hearing, and mobility) comprises two measures (see Method Chapter, Table 19). For information about how measures were collapsed into parcels, see Method Chapter, Section "Aggregating Items Into Subscales." Because all indicators of functional health were standardized at the first wave, second wave indicators were standardized to the mean and standard deviation of first wave indicators. In addition, the two items of the third indicator of functional health were again transformed using the natural logarithms (Ln). As before, raw items were either highly skewed (e.g., second wave-skewness$_{(turn\ 360°)}$ = 1.71) and showed a high kurtosis (e.g., second wave-kurtosis$_{(turn\ 360°)}$ = 5.73). N_{miss} = Number of missing values; N_{out} = Number of outliers.

Indicators of Emotional Well-Being

Table A7
Indicators of Emotional Well-Being in the Parent Sample: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Positive affect								
Parcel 1	2.99	.65	1.25	4.75	.04	−.34	3	6
Parcel 2	3.26	.66	1.00	5.00	−.26	−.01	1	8
Parcel 3	3.36	.70	1.00	5.00	−.40	.17	3	11
Negative affect								
Parcel 1	2.08	.62	1.00	4.00	.35	−.13	2	7
Parcel 2	2.40	.68	1.00	4.33	.06	−.25	2	7
Parcel 3	2.52	.75	1.00	5.00	.29	−.05	2	12

Note. Positive and negative affect were measured by ten items each (see Method Chapter, Table 18). Two indicators of each dimension of emotional well-being comprise three items each. The third indicators of positive and negative affect cover four items. For information about how items were collapsed into parcels, see Method Chapter, Section "Aggregating Items Into Subscales." N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A8

Indicators of Emotional Well-Being in the Continuer Sample at Time 1: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Positive affect								
Parcel 1	3.12	.58	1.25	4.50	−.04	−.15	–	2
Parcel 2	3.38	.56	1.70	4.67	−.02	−.19	–	3
Parcel 3	3.48	.61	1.67	4.67	−.50	.46	–	3
Negative affect								
Parcel 1	2.13	.61	1.00	4.00	.57	.23	–	1
Parcel 2	2.48	.62	1.00	4.33	−.04	.21	–	4
Parcel 3	2.56	.71	1.00	5.00	.48	.22	–	4

Note. Positive and negative affect were measured by ten items each (see Method Chapter, Table 18). Two indicators of each dimension of emotional well-being comprise three items each. The third indicators of positive and negative affect cover four items. For information about how items were collapsed into parcels, see Method Chapter, Section "Aggregating Items Into Subscales." N_{miss} = Number of missing values; N_{out} = Number of outliers.

Table A9

Indicators of Emotional Well-Being in the Continuer Sample at Time 2: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*	N_{miss}	N_{out}
Positive affect								
Parcel 1	3.08	.63	1.00	4.75	−.32	−.30	–	5
Parcel 2	3.36	.61	1.40	4.67	−.34	−.06	–	4
Parcel 3	3.43	.62	1.33	5.00	−.50	.25	–	3
Negative affect								
Parcel 1	2.11	.62	1.00	4.50	.80	1.33	–	2
Parcel 2	2.41	.67	1.00	4.33	.14	.13	–	2
Parcel 3	2.50	.69	1.00	5.00	.51	.81	–	4

Note. Positive and negative affect were measured by ten items each (see Method Chapter, Table 18). Two indicators of each dimension of emotional well-being comprise three items each. The third indicators of positive and negative affect cover four items. For information about how items were collapsed into parcels, see Method Chapter, Section "Aggregating Items Into Subscales." N_{miss} = Number of missing values; N_{out} = Number of outliers.

Intercorrelations

Indicators of Perceived Control

Table A10
Indicators of Perceived Control in the Parent Sample: Intercorrelations

	Intercorrelations							
	Perceived personal control over desirable outcomes			*Perceived personal responsibility for undesirable outcomes*			*Perceived others' control*	
	Item 1	*Item 2*	*Item 3*	*Item 1*	*Item 2*	*Item 3*	*Parcel 1*	*Parcel 2*
Perceived personal control over desirable outcomes								
Item 1	–	.57**	.36**	–.01	.15**	.18**	.07*	.04
Item 2		–	.35**	.00	.16**	.18**	.08	.06
Item 3			–	.10	.24**	.15**	–.00	–.01
Perceived personal responsibility for undesirable outcomes								
Item 1				–	.25**	.30**	.03	.09*
Item 2					–	.46**	–.05	–.04
Item 3						–	–.00	.07
Perceived others' control								
Parcel 1							–	.68**
Parcel 2								–

Note. For Items see Method Chapter, Table 20.
* $p < .05$; ** $p < .01$.

Table A11
Indicators of Perceived Control in the Continuer Sample at Time 1 and 2: Intercorrelations

	Intercorrelations							
	Perceived personal control over desirable outcomes			*Perceived personal responsibility for undesirable outcomes*			*Perceived others' control*	
	Item 1	*Item 2*	*Item 3*	*Item 1*	*Item 2*	*Item 3*	*Parcel 1*	*Parcel 2*
Perceived personal control over desirable outcomes								
Item 1	–	.59**	.24**	–.04	.05	.22**	.17*	.16*
Item 2	.51**	–	.25**	–.12	.10	.09	.08	.06
Item 3	.33**	.25**	–	.10	.24**	.15**	–.00	–.01
Perceived personal responsibility for undesirable outcomes								
Item 1	.03	.10	.20**	–	.25**	.30**	.03	.09*
Item 2	.18**	.29**	.17*	.42**	–	.46**	–.05	–.04
Item 3	.13	.18**	.20**	.44**	.46**	–	–.00	.07
Perceived others' control								
Parcel 1	.02	.10	–.02	.02	.07	.21**	–	.68**
Parcel 2	–.03	.01	.06	.05	.05	.27**	.71**	–

Note. Correlations at Time 1 are presented in the top half of this table, correlations at Time 2 are presented in the bottom half.
* $p < .05$; ** $p < .01$.

Indicators of Functional Health Constraints

Table A12
Indicators of Functional Health in the Parent Sample: Intercorrelations

	Intercorrelations		
	Vision	*Hearing*	*Mobility*
Vision	–	.42**	.56**
Hearing		–	.47**
Mobility			–

* $p < .05$; ** $p < .01$.

Table A13
Indicators of Functional Health in the Continuer Sample at Time 1 and 2: Intercorrelations

	Intercorrelations		
	Vision	*Hearing*	*Mobility*
Vision	–	.28**	.46**
Hearing	.35**	–	.30**
Mobility	.39**	.35**	–

Note. Correlations at Time 1 are presented in the top half of this table, correlations at Time 2 are presented in the bottom half.
* $p < .05$; ** $p < .01$.

Indicators of Emotional Well-Being

Table A14
Indicators of Emotional Well-Being in the Parent Sample: Intercorrelations

	Intercorrelations					
	Positive affect			*Negative affect*		
	Parcel 1	*Parcel 2*	*Parcel 3*	*Parcel 1*	*Parcel 2*	*Parcel 3*
Positive affect						
Parcel 1	–	.59**	.66**	.05	.10*	–.00
Parcel 2		–	.64**	.04	.13**	.00
Parcel 3			–	–.00	.03	–.06
Negative affect						
Parcel 1				–	.69**	.72**
Parcel 2					–	.68**
Parcel 3						–

Note. For Items see Method Chapter, Table 18.
* $p < .05$; ** $p < .01$.

Table A15
Indicators of Emotional Well-Being in the Continuer Sample at Time 1 and 2: Intercorrelations

	Intercorrelations					
	Positive affect			*Negative affect*		
	Parcel 1	*Parcel 2*	*Parcel 3*	*Parcel 1*	*Parcel 2*	*Parcel 3*
Positive affect						
Parcel 1	–	.53**	.62**	–.02	.01	–.02
Parcel 2	.66**	–	.63**	–.04	.00	–.02
Parcel 3	.72**	.69**	–	–.12	–.00	–.13
Negative affect						
Parcel 1	–.03	–.05	–.15*	–	.68**	.71**
Parcel 2	.06	–.03	–.09	.69**	–	.67**
Parcel 3	–.01	–.12	–.22**	.72**	.66**	–

Note. Correlations at Time 1 are presented in the top half of this table, correlations at Time 2 are presented in the bottom half.
* $p < .05$; ** $p < .01$.

Appendix B
Central Constructs

Descriptive Statistics

Table B1
Parent Sample: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*
Functional health constraints	4.00	1.00	1.50	6.21	–.01	–.72
Positive affect	3.20	.58	1.31	4.69	–.30	.05
Negative affect	2.34	.61	1.00	4.22	.23	–.05
Perceived personal control over desirable outcomes	3.68	.71	1.00	5.00	–.81	1.11
Perceived personal responsibility for undesirable outcomes	3.46	.71	1.00	5.00	–.50	.54
Perceived others' control	2.62	.97	1.00	5.00	.33	–.71

Table B2
Continuer Sample at Time 1: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*
Functional health constraints	3.38	.83	1.51	5.81	.44	.20
Positive affect	3.32	.50	1.87	4.50	–.23	.16
Negative affect	2.39	.58	1.00	4.14	.32	.23
Perceived personal control over desirable outcomes	3.64	.69	1.27	5.00	–.71	1.06
Perceived personal responsibility for undesirable outcomes	3.49	.67	1.67	5.00	–.27	.24
Perceived others' control	2.31	.89	1.00	4.75	.68	–.09

Table B3
Continuer Sample at Time 2: Descriptive Statistics

	Mean	*SD*	*Min*	*Max*	*Skew*	*Kurt*
Functional health constraints	3.58	.86	1.24	6.05	.34	.22
Positive affect	3.29	.55	1.58	4.58	–.38	.02
Negative affect	2.34	.59	1.00	4.61	.59	1.08
Perceived personal control over desirable outcomes	3.64	.59	1.27	5.00	–.78	1.32
Perceived personal responsibility for undesirable outcomes	3.39	.71	1.00	5.00	–.63	.56
Perceived others' control	2.52	.88	1.00	4.75	.39	–.63

Intercorrelations

Table B4
Intercorrelations in the Parent Sample (N = 516)

	1	*2*	*3*	*4*	*5*	*6*
Functional health constraints	–					
Positive affect	–.33**	–				
Negative affect	–.02	.04	–			
Perceived others' control	.40**	–.13**	.19**	–		
Perceived personal control over desirable outcomes	.04	.31**	–.06	.06	–	
Perceived personal responsibility for undesirable outcomes	.03	.06	.12**	.03	.21**	–

* p < .05; ** p < .01.

Table B5
Intercorrelations in the Continuer Sample ($N = 203$)

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Time 1												
1. Functional health constraints	–											
2. Positive affect	–.36**	–										
3. Negative affect	.14	–.05	–									
4. Perceived others' control	.27**	–.11	.27**	–								
5. Personal control	.01	.25**	–.01	.15*	–							
6. Personal responsibility	.07	–.06	.09	.00	.08	–						
Time 2												
7. Functional health constraints	.80**	–.29**	.14	.29**	.04	.01	–					
8. Positive affect	–.43**	.70**	–.12	–.23**	.19**	–.02	–.38**	–				
9. Negative affect	.12	–.01	.72**	.22**	.00	.12	.11	–.09	–			
10. Perceived others' control	.42**	–.19**	.25**	.57**	.08	.01	.41**	–.30**	.30**	–		
11. Personal control	.08	.10	–.08	–.08	.51**	.03	.12	.17*	–.13	.03	–	
12. Personal responsibility	.02	–.00	.04	.01	.10	.50**	–.01	.13	.11	.15*	.26**	–

Note. Personal control = perceived personal control over desirable outcomes; personal responsibility = perceived personal responsibility for undesirable outcomes.
* $p < .05$; ** $p < .01$.

Figure B1
Positive Affect and Age
$r = -.23^{**}$

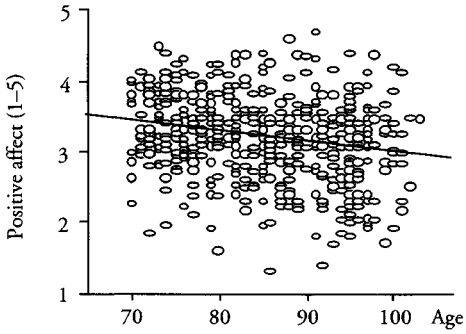


Figure B2
Perceived Others' Control and Age
$r = .32^{**}$

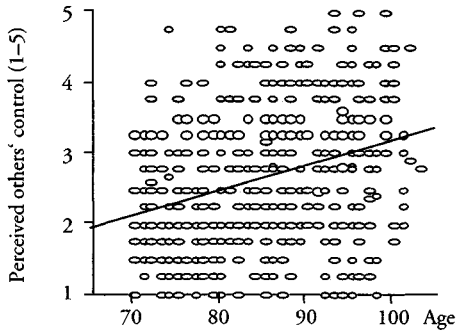


Figure B3
Negative Affect and Age
$r = -.06$

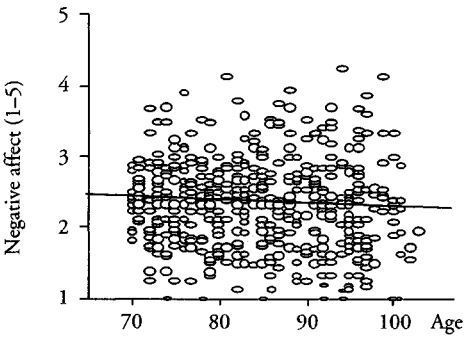


Figure B4
Perceived Personal Responsibility for Undesirable Outcomes and Age
$r = -.01$

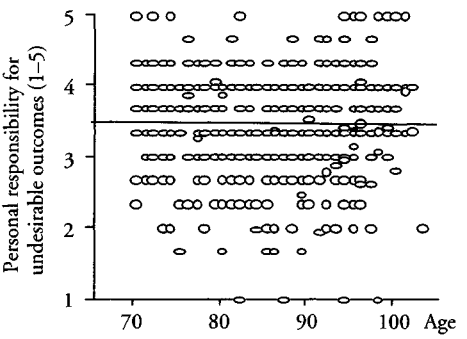


Figure B5
Functional Health Constraints and Age
$r = .73^{**}$

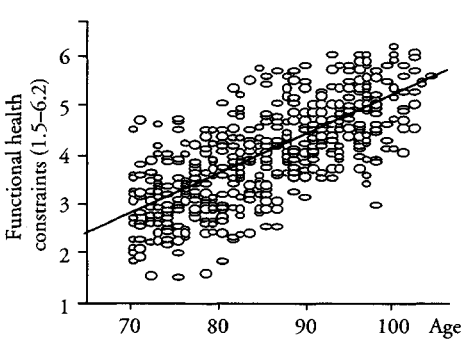
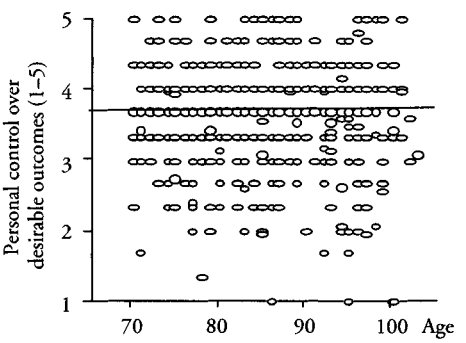


Figure B6
Perceived Personal Control Over Desirable Outcomes and Age
$r = .00$



Appendix C

Table C1
Bivariate Correlations Between Age, Functional Health Constraints, Positive Affect, and Negative Affect in the Parent Sample of BASE (N = 516)

	Chronological age	*Functional health constraints*	*Positive affect*	*Negative affect*
Chronological age	–	$.84_{(t = 39.67;\ se = .02)}$	$-.23_{(t = -4.80;\ se = .05)}$	$-.08_{(t = -1.72;\ se = .05)}$
Functional health constraints	$.73_{(p = .01)}$	–	$-.39_{(t = -7.72;\ se = .05)}$	$-.04_{(t = -.68;\ se = .06)}$
Positive affect	$-.23_{(p = .01)}$	$-.33_{(p = .01)}$	–	$.04_{(t = .72;\ se = .05)}$
Negative affect	$-.06_{(ns)}$	$-.02_{(ns)}$	$.04_{(ns)}$	–

Note. Correlations on the latent level are presented in the top half of this table, correlations on the manifest level are presented in the bottom half.

Appendix D

Description of Covariates

Table D1
Measures of Covariates

Covariate	Measure: Type	Measure: Content
Self- and other-reported health		
• Self-reported competence	Single item	• I am quite good at managing the demands of everyday life.
• Self-reported general health	Single item	• How would you rate your physical health at present?
• Self-reported number of functional health constraints	Two items[1]	• Do you have any hearing problems? Do you have any problems, when reading the newspaper (with glasses)?
• Other-reported number of functional constraints	Three items answered by interviewer[2]	• Does the participant have problems in the domain of vision? ... hearing? ... mobility?
Self-evaluation		
• Worries	Single item	• I often worry so much that I can't sleep.
• Feelings of worthlessness	Single item	• Sometimes I feel completely worthless.
Activities		
• Engagement in health-related issues	Single item	• Regarding your physical health, how much does it occupy your thinking and doing at present?
• Engagement in leisure- and work-related activities	Twelve items each representing one activity[3]	• In the last twelfe months, did you engage in sports? ... visiting a restaurant? ... dancing? ... making short trips? ... cultural activities? ... leisure activities? ... helping others? ... creative activities? ... traveling? ... playing games? ... continuing education? ... political activities?
Coping styles		
• Assimilative style	Single item	• I don't give up, even when the odds are stacked against me.
• Accommodative style	Single item	• I try to adapt to difficult situations rather than fight against them.
Satisfaction with social relations	Single item	• Consider all relationships, how satisfied are you with the things you do together, and with how you get along with each other?

[1] The construct was derived by building the sum of the two items. Values ranged from 1 to 3 (3 = *problems with hearing and vision,* 2 = *problems with one of the two functions,* 1 = *no problems*).

[2] The construct was derived by building the sum of the three items. Values ranged from 1 to 4 (4 = *problems with hearing, vision, and mobility,* 3 = *problems with two of the three functions,* 2 = *problems with one of the three functions,* 1 = *no problems*).

[3] The construct was derived by building the sum of the twelve items. Values ranged from 0 to 12 (0 = *no activities,* 12 = *all activities*).

Appendix E

The Robustness of the Relationship Between Functional Health Constraints and Emotional Well-Being

Table E1
The Effects of Functional Health Constraints on Emotional Well-Being When Controlling for 14 Covariates

	Functional health constraints: Net effects	
Covariates	*Positive affect*	*Negative affect*
Sociodemographic variables[1]	−.38 (se = .07; t = −6.07)	.01 (se = .06; t = .17)
• Education	−.38 (se = .07; t = −6.08)	.02 (se = .06; t = .31)
• Gender	−.39 (se = .07; t = −6.54)	.02 (se = .06; t = .30)
• Living alone	−.40 (se = .07; t = −6.62)	.04 (se = .06; t = .66)
Self- and other-reported health[1]	−.45 (se = .12; t = −4.47)	−.16 (se = .10; t = −1.74)
• Self-reported competence	−.35 (se = .07; t = −5.64)	−.05 (se = .06; t = −.86)
• Self-reported general health	−.36 (se = .07; t = −5.93)	−.05 (se = .06; t = −.96)
• Self-reported number of functional health constraints	−.40 (se = .09; t = −5.35)	−.03 (se = .09; t = −1.17)
• Other-reported number of functional constraints	−.51 (se = .10; t = −5.35)	.01 (se = .09; t = .08)
Self-evaluation[1]	−.32 (se = .07; t = −5.12)	−.11 (se = .06; t = −1.99)
• Worries	−.39 (se = .07; t = −6.55)	−.01 (se = .06; t = −.14)
• Feelings of worthlessness	−.35 (se = .07; t = −5.73)	−.07 (se = .06; t = −1.31)
Activities[1]	−.31 (se = .10; t = −3.65)	.14 (se = .09; t = 1.63)
• Engagement in health-related issues	−.38 (se = .07; t = −6.53)	.05 (se = .06; t = .89)
• Engagement in leisure- and work-related activities	−.32 (se = .09; t = −3.67)	.13 (se = .09; t = 1.51)
Coping styles[1]	−.37 (se = .07; t = −6.08)	.03 (se = .06; t = .56)
• Assimilative style	−.35 (se = .07; t = −6.02)	.02 (se = .06; t = .39)
• Accommodative style	−.41 (se = .07; t = −6.66)	.05 (se = .06; t = .82)
Satisfaction with social relations	−.37 (se = .07; t = −6.19)	.02 (se = .06; t = .38)

Note. For Lables see Appendix D, Table D1.

[1] To test for the joint effects of characteristics belonging to a specific domain, a model was specified that tested their effects simultaneously. For example, to test the multivariate effects of sociodemographic variables, a model included the three covariates, education, gender, and living alone.

Fourteen Covariates and Their Association With Functional Health Constraints and Emotional Well-Being

Table E2
Fourteen Covariates: Their Bivariate Correlations With Functional Health Constraints and Emotional Well-Being

	Central constructs of the present study		
Covariates	*Functional constraints*	*Positive affect*	*Negative affect*
Sociodemographic variables			
• Education	$-.29_{(se = .05;\ t = -6.19)}$	$.18_{(se = .05;\ t = 3.82)}$	$-.06_{(se = .05;\ t = -1.34)}$
• Gender	$.11_{(se = .05;\ t = 2.22)}$	$-.06_{(se = .05;\ t = -1.15)}$	$.19_{(se = .05;\ t = 4.12)}$
• Living alone	$.01_{(se = .05;\ t = .25)}$	$.03_{(se = .05;\ t = .53)}$	$-.01_{(se = .05;\ t = -.16)}$
Self- and other-reported health			
• Self-reported competence	$-.33_{(se = .05;\ t = -7.20)}$	$.23_{(se = .05;\ t = 4.92)}$	$-.26_{(se = .05;\ t = -5.58)}$
• Self-reported general health	$-.24_{(se = .05;\ t = -4.99)}$	$.23_{(se = .05;\ t = 4.75)}$	$-.37_{(se = .04;\ t = -8.74)}$
• Self-reported number of functional health constraints	$-.59_{(se = .04;\ t = -16.07)}$	$.21_{(se = .05;\ t = 4.48)}$	$-.14_{(se = .05;\ t = -3.02)}$
• Other-reported number of functional constraints	$-.70_{(se = .03;\ t = -23.46)}$	$.19_{(se = .05;\ t = 3.94)}$	$-.05_{(se = .05;\ t = -1.00)}$
Self-evaluation			
• Worries	$-.08_{(se = .05;\ t = -1.55)}$	$-.06_{(se = .05;\ t = -1.24)}$	$.37_{(se = .04;\ t = 8.64)}$
• Feelings of worthlessness	$.28_{(se = .05;\ t = 5.84)}$	$-.29_{(se = .05;\ t = -5.93)}$	$.37_{(se = .04;\ t = 8.83)}$
Activities			
• Engagement in health-related issues	$-.06_{(se = .05;\ t = -1.16)}$	$.26_{(se = .05;\ t = 5.59)}$	$.20_{(se = .05;\ t = 4.27)}$
• Engagement in leisure- and work-related activities	$-.69_{(se = .03;\ t = -22.70)}$	$.33_{(se = .04;\ t = 7.40)}$	$.04_{(se = .05;\ t = .90)}$
Coping styles			
• Assimilative style	$-.18_{(se = .05;\ t = -3.74)}$	$.28_{(se = .05;\ t = 6.18)}$	$-.08_{(se = .05;\ t = -1.76)}$
• Accommodative style	$.18_{(se = .05;\ t = 3.63)}$	$.00_{(se = .05;\ t = -.01)}$	$-.04_{(se = .05;\ t = -.88)}$
Satisfaction with social relations	$-.18_{(se = .05;\ t = -3.61)}$	$.20_{(se = .05;\ t = 4.13)}$	$-.09_{(se = .05;\ t = -1.96)}$

Note. For Lables see Appendix D, Table D1.

Appendix F

Cross-Validation Analyses of the Model Testing the Relationship Between Functional Health Constraints and Emotional Well-Being: Comparison of the Parent and Continuer Sample

Table F1 presents the overall model fit indices of the invariance models. Table F2 contains the $\Delta \chi^2$ tests testing for invariance across the parent and continuer sample on the measurement and structural level. As seen in Table F1, when invariance of the loadings and intercepts were enforced, the overall model fit was still acceptable. Based on a modeling rationale, the measurement model is, therefore, considered to be invariant across groups. In addition, when invariance of the loadings and intercepts was enforced, the differences in fit were statistically nonsignificant (see Table F2).

Table F1
Global Fit Indices of the Invariance Models Functional Health Constraints and Emotional Well-Being Across the Parent and Continuer Samples

Invariance models	χ^2	*df*	χ^2:*df*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Measurement level								
Configural	51.16	48	1.07	.01	.99	.97	.99	.96
Loadings	53.15	54	.98	.01	1.00	.97	1.00	.96
Intercepts	54.83	60	.91	.00	1.00	.97	1.00	.97
Structural level								
Factor variances	75.51	63	1.20	.02	.99	.96	.99	.95
Health	67.38	61	1.11	.00	.99	.96	.99	.96
Positive affect	61.83	61	1.01	.01	1.00	.97	.99	.96
Negative affect	56.52	61	.93	.00	1.00	.97	1.00	.96
Factor covariance	56.74	62	.92	.00	1.00	.97	1.00	.97
Causal effects	60.37	64	.94	.01	1.00	.97	1.00	.96
Factor means	137.03	67	2.05	.04	.96	.93	.96	.92
Functional health constraints	134.21	65	2.07	.04	.96	.93	.96	.92
Positive affect	65.37	65	1.00	.00	1.00	.97	1.00	.96
Negative affect	61.74	65	.95	.00	1.00	.97	1.00	.96

As seen in Table F2, the factor variances of functional health constraints and positive affect differed across the parent and continuer samples. The parent sample was more heterogeneous on both characteristics than the continuer sample. In order to test equivalence of the other components of the structural model, the latent covariances were decomposed into variances and correlations by introducing yoked phantom factors (for information about the underlying

logic and procedure, see Method Chapter, Section "Testing for Factorial Invariance in Longitudinal Multi-Sample Analyses").

Table F2 shows that the covariance between positive affect and negative affect was invariant across the parent and continuer samples. Moreover, the proposed causal effects of functional health constraints on positive and negative affect were also invariant across the samples.

Table F2
Testing Invariance Across the Parent and Continuer Sample

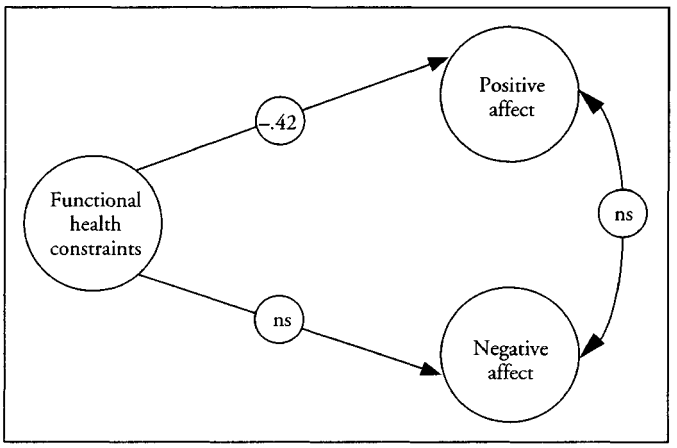
Invariance models	$\Delta \chi^2$	*df*	*p*
Measurement level			
Loadings	1.99	6	.92
Intercepts	1.68	6	.95
Structural level			
Factor variances	20.68	3	.00
Functional health	12.55	1	.00
Positive affect	7.00	1	.01
Negative affect	1.69	1	.19
Covariance positive/negative affect	.22	1	.64
Causal effects of functional health constraints	3.63	2	.16
Factor means	76.66	3	.00
Functional health constraints	73.84	1	.00
Positive affect	5.00	1	.03
Negative affect	1.37	1	.24

Figure F1 presents the effects of functional health constraints in the parent and continuer samples when constrained to be equal. As seen, functional health constraints predicted low positive affect ($\beta_{(t = -7.88;\ se = .06)} = -.42$) but were not significantly associated with negative affect ($\beta_{(t = 1.71;\ se = .05)} = .08$). Interestingly, when not constrained to be equal, the effect of functional health constraints on negative affect was significantly different from zero and positive ($\beta_{(t = 2.22;\ se = .10)} = .21$) in the continuer sample but nonsignificant in the noncontinuer sample ($\beta_{(t = .65;\ se = .06)} = .04$). However, as evidenced by the constraints in Figure F1, these values did not differ from each other and their joint effect did not differ from zero.

Finally, the factor means of functional health constraints and positive affect differed across the parent and continuer samples (see Table F2). The means of all the constructs are presented separately for the parent and continuer samples in Table F3.

Figure F1

The Effects of Functional Health Constraints on Positive and Negative Affect in the Parent and Continuer Samples



Note. Presented are the effects of functional health constraints on positive and negative affect in the parent and continuer samples when constrained to be equal.

Table F3

Mean Values of Functional Health Constraints and Two Components of Emotional Well-Being in the Parent and Continuer Samples

Sample	*Functional health constraints*	*Positive affect*	*Negative affect*
Parent			
Mean	4.00	3.20	2.34
SD	1.00	.58	.61
Continuer			
Mean	3.38	3.32	2.39
SD	.83	.50	.58
$\Delta \chi^2$ Test			
$\Delta \chi^2_{(1)}$	73.84	5.00	1.37
p	.00	.03	.24

Note. The means and standard deviations refer to the raw data level. In contrast, the $\Delta \chi^2$ values are based on the latent mean estimates. A $\Delta \chi^2$ 2 value indicates whether a mean estimate can be constrained to be equal across the samples without losing model fit. A significant value suggests that a mean of a latent factor has to be freely estimated (i.e., the mean significantly differed across the samples).

Appendix G

Cross-Validation Analyses of the Model Testing the Relationship Between Functional Health Constraints and Emotional Well-Being: Comparison of the Continuer and Noncontinuer Sample

Table G1 presents the overall model fit indices of the invariance models. Table G2 contains the $\Delta \chi^2$ tests testing for invariance across the continuer and noncontinuer sample on the measurement and structural level. As seen in Table G1, when invariance of the loadings and intercepts were enforced, the overall model fit was still acceptable. Based on a modeling rationale, the measurement model is, therefore, considered to be invariant across groups. In addition, when invariance of the loadings and intercepts was enforced, the differences in fit were statistically nonsignificant (see Table G2).

As seen in Table G2, the factor variance of positive affect differed across the samples, being greater in the noncontinuer than in the continuer sample. In contrast, the covariance between positive affect and negative affect and the causal effects of functional health constraints on positive and negative affect were invariant across the samples.

Table G1
Global Fit Indices of the Invariance Models Functional Health Constraints and Emotional Well-Being Across the Continuer and Noncontinuer Samples

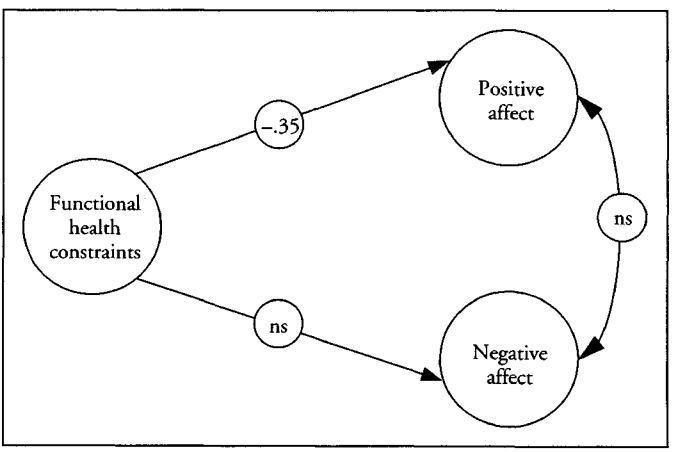
Invariance models	χ^2	*df*	χ^2:*df*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Measurement level								
Configural	55.24	48	1.15	.01	.99	.95	.99	.93
Loadings	57.83	54	1.07	.01	.99	.95	.99	.94
Intercepts	61.11	60	1.02	.00	.99	.95	.99	.94
Structural level								
Factor variances	79.09	63	1.26	.02	.99	.93	.98	.93
Functional health constraints	63.91	61	1.05	.00	.99	.95	.99	.94
Positive affect	106.92	62	1.73	.01	.96	.91	.95	.90
Negative affect	66.64	62	1.08	.00	.99	.94	.99	.94
Factor covariance	67.70	63	1.08	.00	.99	.94	.99	.94
Causal effects	70.38	65	1.08	.01	.99	.94	.99	.94
Factor means	233.74	68	3.44	.07	.86	.82	.85	.81
Functional health	227.45	66	2.45	.06	.86	.82	.85	.80
Positive affect	80.63	66	1.22	.02	.98	.93	.98	.93
Negative affect	73.44	66	1.11	.01	.99	.94	.99	.93

Table G2
Testing Invariance Across the Continuer and Noncontinuer Samples

Invariance models	$\Delta \chi^2$	*df*	*p*
Measurement level			
Loadings	2.59	6	.86
Intercepts	3.28	6	.77
Structural level			
Factor variances	17.98	3	.00
Functional health constraints	2.80	1	.09
Positive affect	43.01	1	.00
Negative affect	2.73	1	.10
Covariance positive/negative affect	1.06	1	.30
Causal effects	2.68	2	.26
Factor means	163.36	3	.00
Functional health	157.07	1	.00
Positive affect	10.25	1	.00
Negative affect	3.06	1	.08

Figure G1 presents the effects of functional health constraints in the continuer and noncontinuer samples, when constrained to equal. As seen, functional health constraints predicted low positive affect ($\beta_{(t = -6.13;\ se = .06)} = -.35$). However, functional health constraints were not significantly associated with negative affect ($\beta_{(t = 1.73;\ se = .06)} = .10$). As was the case when comparing the continuer sample with the parent sample, when not constrained to be

Figure G1
The Effects of Functional Health Constraints on Positive and Negative Affect in the Continuer and Noncontinuer Samples



Note. Presented are the effects of functional health constraints on positive and negative affect in the continuer and noncontinuer samples. All the causal effects could be forced to be equal across the samples.

equal across, the effect of functional health constraints on negative affect was significant and positive ($\beta_{(t = 2.34;\ se = .09)} = .22$) in the continuer sample, but nonsignificant in the noncontinuer sample ($\beta_{(t = .44;\ se = .08)} = .03$).

Finally, the factor means of functional health constraints and positive affect differed across the continuer and noncontinuer samples. On average, functional health constraints were higher in the noncontinuer sample ($M = 4.40$) than in the continuer sample ($M = 3.38$), whereas positive affect was higher in the continuer sample ($M = 4.32$) than in the noncontinuer sample ($M = 3.12$). The means of all the constructs are presented separately for the continuer and noncontinuer sample in Table G3.

Table G3
Mean Values of Functional Health Constraints and Two Components of Emotional Well-Being in the Continuer and Noncontinuer Samples

Sample	*Functional health constraints*	*Positive affect*	*Negative affect*
Continuer			
Mean	3.38	3.32	2.39
STD	.83	.50	.58
Noncontinuer			
Mean	4.40	3.12	2.30
STD	.89	.62	.63
$\Delta\ \chi^2$ Test			
$\Delta\ \chi^2_{(1)}$	157.07	10.25	3.06
p	.00	.00	.08

Note. The means and standard deviations refer to the raw data level. In contrast, the $\Delta\ \chi^2$ values are based on the latent mean estimates. A $\Delta\ \Delta\ \chi^2$ value indicates whether a mean estimate can be constrained to be equal across the samples without losing model fit. A significant value suggests that a mean of a latent factor has to be freely estimated (i.e., the mean significantly differed across the samples).

Appendix H

Cross-Validation Analyses of the Model Testing the Relationship Between Functional Health Constraints and Emotional Well-Being: Comparison of the First and Second Wave

Table H1 presents the overall model fit indices of the invariance models. Table H2 contains the $\Delta \chi^2$ tests testing for invariance across the first and second wave on the measurement and structural level. As seen in Table H1, when invariance of the loadings and intercepts were enforced, the overall model fit was still acceptable. Based on a modeling rationale, the measurement model is, therefore, considered to be invariant over time.

Note, however, enforcing the intercepts to be invariant over time resulted in a significant $\Delta \chi^2$ value (see Table H2). The inspection of modification indices revealed the intercepts of functional health constraints were not invariant across time. Specifically, the intercept (i.e., the mean level) of constraints in vision was not invariant, whereas the intercepts of hearing and mobility constraints could be constrained to be equal without losing model fit (the means of the indicators of functional health constraints are presented in Table 24 in the Result Chapter).

As seen in Table H2, all components of the structural model were invariant over time.

Figure H1 presents the effects of functional health constraints when constrained to be equal across the two waves of BASE. As seen, functional health constraints predicted low positive affect ($\beta_{(t = -6.18;\ se = .09)} = -.49$) and high negative affect ($\beta_{(t = 2.79;\ se = .07)} = .20$). Functional

Table H1
Global Fit Indices of the Invariance Models Functional Health Constraints and Emotional Well-Being Across the First and Second Wave of BASE

Invariance models	χ^2	*df*	χ^2:*df*	*RMSEA*	*IFI*	*NFI*	*NNFI*	*CFI*
Measurement level								
Configural	43.07	48	.98	.00	1.00	.95	1.00	.93
Loadings	47.28	54	.97	.00	1.00	.95	1.00	.93
Intercepts	76.30	60	1.27	.03	.98	.92	.97	.90
Except health	51.17	58	.88	.00	1.00	.94	1.00	.93
Including vision	73.03	59	1.24	.02	.98	.92	.98	.90
Including hearing	52.66	59	.89	.00	1.00	.94	1.00	.93
Including mobility	54.94	60	.92	.00	1.00	.94	1.00	.93
Structural level								
Factor variances	57.10	63	.90	.00	1.00	.94	1.00	.93
Factor covariance	57.42	64	.89	.00	1.00	.94	1.00	.93
Causal effects	58.63	66	.88	.00	1.00	.94	1.00	.93
Factor means	59.22	68	.87	.03	1.00	.93	1.00	.93

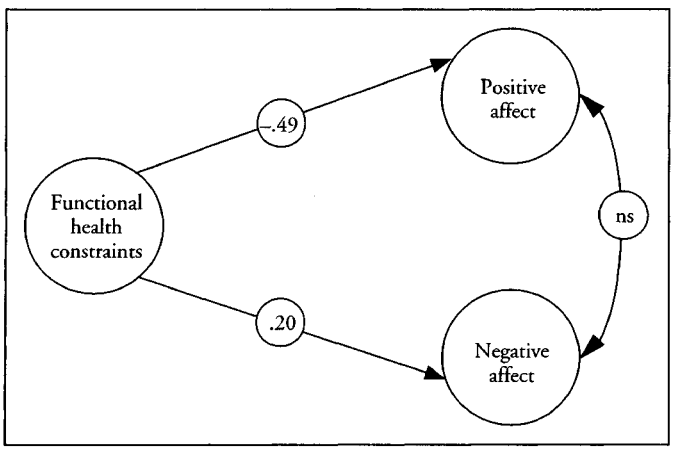
Table H2
Testing Invariance Across Time

Invariance models	$\Delta \chi^2$	*df*	*p*
Measurement level			
Loadings	4.21	6	.65
Intercepts	29.02	6	.00
Except functional health constraints	3.89	4	.42
Including vision	21.86	1	.00
Including hearing	1.49	1	.22
Including mobility	2.31	1	.13
Structural level			
Factor variances	2.13	3	.55
Covariance positive/negative affect	.32	1	.47
Causal effects of functional health constraints	1.21	2	.55
Factor means: positive and negative affect	.59	2	.75

health constraints explained 24 percent of the variance in positive affect and 4 percent of the variance in negative affect.

Interestingly, when not constrained to be equal over time, the effect of functional health constraints was only significant at the first wave ($\beta_{(t = 2.46;\ se = .10)} = .24$). At the second wave, this effect was only marginally significant different from zero ($\beta_{(t = 1.58;\ se = .10)} = .15$). However, as already described, this effect at the second wave did not differ from the effect at the first wave and, when constrained, yielded a joint .20 effect at both waves that was significantly different from zero.

Figure H1
The Effects of Functional Health Constraints on Positive and Negative Affect at the First and Second Wave of Data Collection



Note. Presented are the effects of functional health constraints on positive and negative affect at the first and second wave when constrained to be equal.

Appendix I

Independent Effects of Age and Functional Health on Positive and Negative Affect Replication in the Continuer Sample

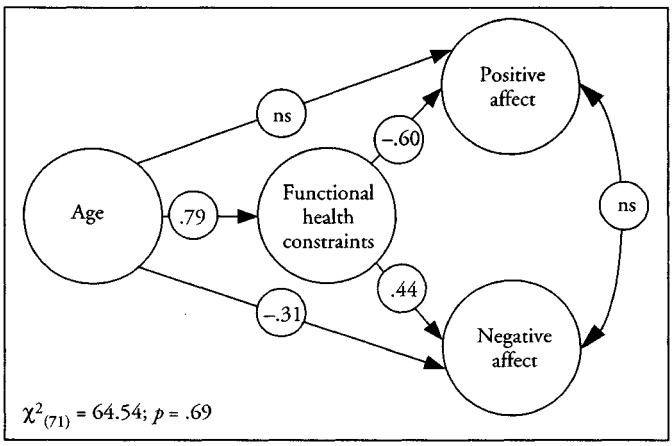
The finding that age suppressed the effect of functional health constraints on positive affect could not be replicated in the continuer sample neither at the first wave nor at the second wave. That is, the age-controlled effect of functional health constraints on positive affect did not significantly differ from the zero-order correlations (see Table I1). As seen in Table I1, however, age suppressed the effect of functional health constraints on negative affect.

Table I1
Zero-Order Correlations and Independent Effects in the Continuer Sample (N = 203)

	Functional health constraints		*Chronological age*	
	Association	*Significance*	*Association*	*Significance*
Positive affect		$\Delta z = 1.24$		$\Delta z = 1.50$
Correlation	$-.49_{(t = -8.05;\ se = .06)}$		$-.33_{(t = -6.35;\ se = .05)}$	
Effect[1]	$-.60_{(t = -3.86;\ se = .11)}$		$.15_{(t = 1.05;\ se = .16)}$	
Negative affect		$\Delta z = 3.10$		$\Delta z = 2.60$
Correlation	$.19_{(t = 2.84;\ se = .07)}$		$.03_{(t = .54;\ se = .06)}$	
Effect[1]	$.44_{(t = 2.97;\ se = .09)}$		$-.31_{(t = -2.31;\ se = .14)}$	

Note. The zero-order correlations and causal effects were enforced to be equal over time.
[1] Effect of functional health constraints when controlling for age and vice versa.

Figure I1
Independent Effects of Age and Functional Health Constraints on Positive and Negative Affect in the Continuer Sample



Note. Presented are the effects of age and functional health constraints on positive and negative affect at the first and second wave. When invariance of the causal effects was enforced, the difference in fit was statistically nonsignificant ($\Delta \chi^2_{(5)} = 4.49$; $p = .48$).

Replication in Three Subgroups of the Parent Sample

The finding that age suppressed the effects of functional health constraints on positive and negative affect could not be replicated in three subsamples of the parent sample. That is, the age-controlled effects of functional health constraints on positive and negative affect did not significantly differ from the zero-order correlations (see Table I2). Each subsample covered a more restricted age range (10 years) than the parent sample (30 years).

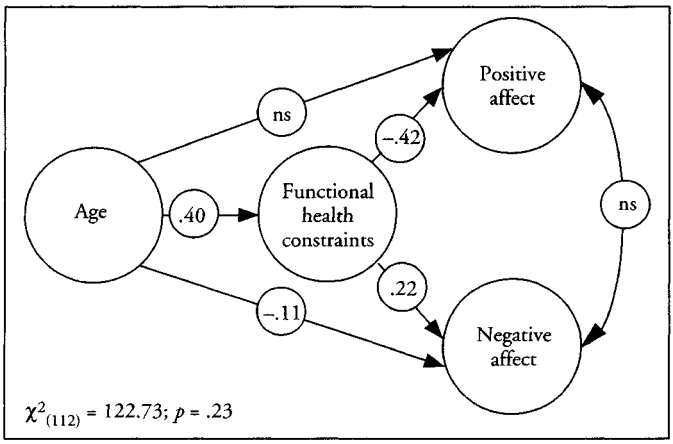
Table I2
Zero-Order Correlations and Independent Effects in Three Subsamples of the Parent Sample

	Functional health constraints		*Chronological age*	
	Association	*Significance*	*Association*	*Significance*
Positive affect		$\Delta z = .39$		$\Delta z = .08$
Correlation	$-.39_{(t = -6.02;\ se = .06)}$		$-.09_{(t = -1.82;\ se = .05)}$	
Effect[1]	$-.42_{(t = -4.81;\ se = .09)}$		$.08_{(t = 1.24;\ se = .07)}$	
Negative affect		$\Delta z = .17$		$\Delta z = 1.45$
Correlation	$.17_{(t = 2.61;\ se = .07)}$		$-.03_{(t = -.56;\ se = .05)}$	
Effect[1]	$.22_{(t = 2.78;\ se = .07)}$		$-.11_{(t = -1.95;\ se = .06)}$	

Note. The zero-order correlations and causal effects were enforced to be equal across the three subsamples of the parent sample.

[1] Effect of functional health constraints when controlling for age and vice versa.

Figure I2
Independent Effects of Age and Functional Health Constraints on Positive and Negative Affect in Three Subsamples of the Parent Sample



Note. Presented are the effects of age and functional health constraints on positive and negative affect in three subsamples of the parent sample ($N = 516$). When invariance of the causal effects was enforced, the difference in fit was statistically nonsignificant ($\Delta \chi^2_{(10)} = 1.93; p = .99$).

Appendix J

The Robustness of the Relationship Between Perceived Control and Emotional Well-Being

Table J1
The Effects of Personal Control Over Desirable Outcomes on Positive and Negative Affect When Controlling for 14 Covariates

	Personal control over desirable outcomes: net effects	
Covariates	*Positive affect*	*Negative affect*
Sociodemographic variables[1]	$.44_{(t = .07,\ se = -6.63)}$	$-.15_{(t = .06;\ se = -2.49)}$
Education	$.42_{(t = .07;\ se = 6.54)}$	$-.17_{(t = .06;\ se = -2.81)}$
Gender	$.40_{(t = .07;\ se = 6.16)}$	$-.15_{(t = .06;\ se = -2.54)}$
Living alone	$.40_{(t = .07;\ se = 6.16)}$	$-.17_{(t = .06;\ se = -2.76)}$
Self- and other-reported health[1]	$.32_{(t = .07;\ se = 5.25)}$	$-.15_{(t = .07;\ se = -2.62)}$
Self-reported competence	$.37_{(t = .06;\ se = 5.84)}$	$-.13_{(t = .06;\ se = -2.21)}$
Self-reported general health	$.38_{(t = .07;\ se = 5.98)}$	$-.13_{(t = .06;\ se = -2.36)}$
Self-reported number of functional health constraints	$.38_{(t = -.07;\ se = 6.04)}$	$-.16_{(t = .06;\ se = -2.66)}$
Other-reported number of functional constraints	$.38_{(t = .07;\ se = 5.99)}$	$-.17_{(t = .06;\ se = -2.80)}$
Activities[1]		
Engagement in health-related issues	$.36_{(t = .07;\ se = 5.68)}$	$-.20_{(t = .06;\ se = -3.20)}$
Engagement in leisure- and work-related activities	$.41_{(t = .07;\ se = 6.57)}$	$-.16_{(t = .06;\ se = -2.66)}$
Self-evaluation[1]	$.36_{(t = .07;\ se = 5.64)}$	$-.12_{(t = .06;\ se = -2.09)}$
Worries	$.36_{(t = .07;\ se = 6.15)}$	$-.10_{(t = .06;\ se = -2.91)}$
Feelings of worthlessness	$.40_{(t = .07;\ se = 5.64)}$	$-.11_{(t = .06;\ se = -1.77)}$
Coping styles[1]	$.36_{(t = .07;\ se = 5.56)}$	$-.14_{(t = .06;\ se = -2.33)}$
Assimilative style	$.35_{(t = .07;\ se = 5.51)}$	$-.16_{(t = .06;\ se = 2.52)}$
Accommodative style	$.40_{(t = .07;\ se = -6.21)}$	$-.16_{(t = .06;\ se = -2.58)}$
Satisfaction with social relations	$.38_{(t = .07;\ se = 6.01)}$	$-.16_{(t = .06;\ se = -2.61)}$

[1] To test for the joint effects of characteristics belonging to a specific domain, a model was specified that tested their effects simultaneously. For example, to test the multivariate effects of sociodemographic variables, a model included the three covariates education, gender, and living alone.

Table J2

The Effects of Personal Responsibility for Undesirable Outcomes on Positive and Negative Affect When Controlling for 14 Covariates

Covariates	*Personal responsibility for undesirable outcomes: net effects*	
	Positive affect	*Negative affect*
Sociodemographic variables[1]	$-.05_{(t = .07;\ se = -.75)}$	$.21_{(t = .07;\ se = -3.31)}$
Education	$-.04_{(t = .07;\ se = -.71)}$	$.20_{(t = .07;\ se = 3.22)}$
Gender	$-.03_{(t = .07;\ se = -.52)}$	$.21_{(t = .07;\ se = 3.32)}$
Living alone	$-.03_{(t = .07;\ se = -.54)}$	$.20_{(t = .07;\ se = 3.21)}$
Self- and other-reported health[1]	$-.03_{(t = .07;\ se = -.45)}$	$.22_{(t = .07;\ se = 3.69)}$
Self-reported competence	$-.04_{(t = .07;\ se = -.58)}$	$.21_{(t = .07;\ se = 3.44)}$
Self-reported general health	$-.03_{(t = .07;\ se = -.51)}$	$.21_{(t = .07;\ se = 3.45)}$
Self-reported number of functional health constraints	$-.03_{(t = -.07;\ se = -.49)}$	$.20_{(t = .07;\ se = 3.19)}$
Other-reported number of functional constraints	$-.03_{(t = .07;\ se = -.45)}$	$.20_{(t = .07;\ se = 3.18)}$
Activities[1]		
Engagement in health-related issues	$-.02_{(t = .07;\ se = -.41)}$	$.21_{(t = .07;\ se = 3.27)}$
Engagement in leisure- and work-related activities	$-.04_{(t = .07;\ se = -.60)}$	$.20_{(t = .07;\ se = 3.16)}$
Self-evaluation[1]	$.00_{(t = .07;\ se = -.05)}$	$.16_{(t = .07;\ se = 2.78)}$
Worries	$.00_{(t = .07;\ se = -.48)}$	$.15_{(t = .07;\ se = 3.36)}$
Feelings of worthlessness	$.00_{(t = .07;\ se = -.05)}$	$.17_{(t = .07;\ se = 2.49)}$
Coping styles[1]	$-.02_{(t = .07;\ se = -.37)}$	$.22_{(t = .07;\ se = 3.41)}$
Assimilative style	$-.04_{(t = .07;\ se = -.63)}$	$.20_{(t = .07;\ se = 3.21)}$
Accommodative style	$-.01_{(t = .07;\ se = -.21)}$	$.22_{(t = .07;\ se = 3.38)}$
Satisfaction with social relations	$-.04_{(t = .07;\ se = -.65)}$	$.21_{(t = .07;\ se = 3.29)}$

[1] To test for the joint effects of characteristics belonging to a specific domain, a model was specified that tested their effects simultaneously. For example, to test the multivariate effects of sociodemographic variables, a model included the three covariates education, gender, and living alone.

Table J3
The Effects of Perceived Others' Control on Positive and Negative Affect When Controlling for 14 Covariates

Covariates	*Perceived other's control: net effects*	
	Positive affect	*Negative affect*
Sociodemographic variables[1]	$-.15_{(t = .06;\ se = -2.94)}$	$.21_{(t = .06;\ se = 3.94)}$
Education	$-.15_{(t = .06;\ se = -2.80)}$	$.23_{(t = .06;\ se = 4.26)}$
Gender	$-.18_{(t = .06;\ se = -3.45)}$	$.21_{(t = .06;\ se = 4.06)}$
Living alone	$-.18_{(t = .06;\ se = -3.46)}$	$.24_{(t = .06;\ se = 4.50)}$
Self- and other-reported health[1]	$-.13_{(t = .06;\ se = -2.38)}$	$.20_{(t = .06;\ se = 3.64)}$
Self-reported competence	$-.16_{(t = .06;\ se = -3.13)}$	$.21_{(t = .06;\ se = 4.04)}$
Self-reported general health	$-.15_{(t = .06;\ se = -2.91)}$	$.18_{(t = .06;\ se = 3.53)}$
Self-reported number of functional health constraints	$-.14_{(t = -.06;\ se = -2.52)}$	$.22_{(t = .06;\ se = 3.97)}$
Other-reported number of functional constraints	$-.14_{(t = .06;\ se = -2.46)}$	$.26_{(t = .06;\ se = 4.45)}$
Activities[1]		
Engagement in health-related issues	$-.20_{(t = .06;\ se = -3.82)}$	$.22_{(t = .06;\ se = 4.25)}$
Engagement in leisure- and work-related activities	$-.08_{(t = .06;\ se = -1.48)}$	$.27_{(t = .06;\ se = 4.79)}$
Self-evaluation[1]	$-.13_{(t = .06;\ se = -2.45)}$	$.13_{(t = .06;\ se = 2.56)}$
Worries	$-.13_{(t = .06;\ se = -3.29)}$	$.15_{(t = .06;\ se = 3.79)}$
Feelings of worthlessness	$-.14_{(t = .06;\ se = -2.47)}$	$.16_{(t = .06;\ se = 2.82)}$
Coping styles[1]	$-.15_{(t = .06;\ se = -2.98)}$	$.24_{(t = .06;\ se = 4.52)}$
Assimilative style	$-.16_{(t = .06;\ se = -3.11)}$	$.23_{(t = .06;\ se = 4.35)}$
Accommodative style	$-.17_{(t = .06;\ se = -3.28)}$	$.25_{(t = .06;\ se = 4.64)}$
Satisfaction with social relations	$-.18_{(t = .06;\ se = -3.52)}$	$.24_{(t = .06;\ se = 4.50)}$

[1] To test for the joint effects of characteristics belonging to a specific domain, a model was specified that tested their effects simultaneously. For example, to test the multivariate effects of sociodemographic variables, a model included the three covariates education, gender, and living alone.

Table J4
Fourteen Covariates: Their Bivariate Correlations With Three Dimensions of Perceived Control

Covariates	*Perceived personal control over desirable outcomes*	*Perceived personal responsibility for undesirable outcomes*	*Perceived others' control*
Sociodemographic variables			
Education	$-.13_{(t = .05;\ se = -2.66)}$	$.01_{(t = .05;\ se = .18)}$	$-.18_{(t = .05;\ se = -3.75)}$
Gender	$-.08_{(t = .05;\ se = -1.55)}$	$-.07_{(t = .05;\ se = -1.33)}$	$.13_{(t = .05;\ se = 2.62)}$
Living alone	$.05_{(t = .05;\ se = .91)}$	$-.04_{(t = .05;\ se = -.75)}$	$-.06_{(t = .05;\ se = -1.27)}$
Self- and other-reported health			
Self-reported competence	$.15_{(t = .05;\ se = 3.00)}$	$.10_{(t = .05;\ se = 1.77)}$	$-.10_{(t = .05;\ se = -2.14)}$
Self-reported general health	$.08_{(t = .05;\ se = 1.55)}$	$.05_{(t = .05;\ se = .89)}$	$-.17_{(t = .05;\ se = -3.46)}$
Self-reported number of functional health constraints	$.05_{(t = .04;\ se = .89)}$	$.02_{(t = .05;\ se = .31)}$	$-.29_{(t = .05;\ se = -6.29)}$
Other-reported number of functional constraints	$.06_{(t = .03;\ se = 1.17)}$	$.02_{(t = .05;\ se = .33)}$	$-.39_{(t = .04;\ se = -9.22)}$
Activities			
Engagement in health-related issues	$.18_{(t = .05;\ se = 3.51)}$	$.04_{(t = .05;\ se = .66)}$	$.10_{(t = .05;\ se = 1.96)}$
Engagement in leisure- and work-related activities	$-.06_{(t = .03;\ se = -1.27)}$	$.00_{(t = .05;\ se = -.02)}$	$-.31_{(t = .04;\ se = -6.97)}$
Self-evaluation			
Worries	$-.01_{(t = .05;\ se = -.29)}$	$.00_{(t = .05;\ se = -.05)}$	$-.14_{(t = .05;\ se = -1.40)}$
Feelings of worthlessness	$-.12_{(t = .05;\ se = -2.34)}$	$.10_{(t = .05;\ se = 1.81)}$	$.27_{(t = .05;\ se = 5.88)}$
Coping styles			
Assimilative style	$.22_{(t = .05;\ se = 4.59)}$	$.11_{(t = .05;\ se = 2.01)}$	$-.08_{(t = .05;\ se = -1.71)}$
Accommodative style	$.19_{(t = .05;\ se = 3.72)}$	$.21_{(t = .05;\ se = 3.92)}$	$.13_{(t = .05;\ se = 2.62)}$
Satisfaction with social relations	$.10_{(t = .05;\ se = 2.04)}$	$.10_{(t = .05;\ se = 1.78)}$	$.02_{(t = .05;\ se = .44)}$

Appendix K

Cross-Validation Analysis of the Model Testing the Relationship Between Perceived Control and Emotional Well-Being: Comparison of the Parent and Continuer Sample

Table K1 presents the overall model fit indices of the invariance models. Table K2 contains the $\Delta \chi^2$ tests testing for invariance across the parent and continuer samples on the measurement and structural level. As seen in Table K1, when invariance of the loadings and intercepts were enforced, the overall model fit was still acceptable. Based on a modeling rationale, the measurement model is, therefore, considered to be invariant across groups. In addition, when invariance of the loadings and intercepts was enforced, the differences in fit were statistically nonsignificant (see Table K2).

With one exception—the factor means—all the components of the structural model were invariant across the parent and continuer samples. As seen in Table K2, the factor means of perceived others' control and positive affect differed significantly across the samples. Perceived others' control was higher in the parent sample ($M = 2.62$) than in the continuer sample ($M = 2.31$). In contrast, positive affect was higher in the continuer sample ($M = 2.32$) than in the

Table K1
Global Fit Indices of the Invariance Models Perceived Control and Emotional Well-Being Across the Parent and Continuer Samples

Invariance models	χ^2	*df*	χ^2:*df*	*RMSEA*	ρ	*IFI*	*NFI*	*NNFI*	*CFI*
Measurement level									
Configural	233.99	136	1.72	.03	.96	.97	.93	.96	.91
Loadings	241.05	144	1.67	.03	.96	.97	.93	.96	.91
Intercepts	252.62	153	1.65	.03	.96	.97	.93	.96	.91
Structural level									
Factor variances	260.28	158	1.65	.03	.96	.97	.92	.96	.91
Covariance dimension of perceived control	264.44	161	1.63	.03	.96	.97	.92	.96	.91
Covariance positive/ negative affect	269.05	162	1.63	.03	.96	.97	.92	.96	.91
Causal effects	269.84	168	1.61	.03	.97	.97	.92	.97	.91
Factor means	294.10	173	1.70	.03	.96	.96	.91	.96	.91
Perceived personal control over desirable outcomes	270.76	169	1.60	.03	.97	.97	.92	.97	.91
Perceived personal responsibility for undesirable outcomes	271.05	170	1.59	.03	.97	.97	.92	.97	.91
Perceived others' control	285.96	171	1.67	.03	.96	.96	.92	.96	.91
Positive affect	279.44	171	1.63	.03	.96	.97	.92	.96	.91
Negative affect	271.87	171	1.59	.03	.97	.97	.92	.97	.91

Table K2
Testing Invariance Across the Parent and the Continuer Samples

Invariance models	$\Delta \chi^2$	*df*	*p*
Measurement level			
Loadings	7.06	8	.53
Intercepts	11.57	9	.24
Structural level			
Factor variances	7.66	5	.18
Covariance perceived control dimensions	2.81	3	.42
Covariance positive/negative affect	1.35	1	.25
Causal effects of perceived control	5.40	6	.49
Factor means	24.26	5	.00
Perceived personal control over desirable outcomes	.92	1	.34
Perceived personal responsibility for undesirable outcomes	.29	1	.59
Perceived others' control	14.91	1	.00
Positive affect	8.39	1	.00
Negative affect	.82	1	.37

parent sample ($M = 2.20$). The means of all the constructs are presented separately for the parent and continuer samples in Table K3.

Figure K1 presents the effects of the three perceived control dimensions on positive and negative affect when constrained to be equal across the parent and the continuer sample. The magnitude of the effects of perceived control on emotional well-being mirror the respective effects that were found when investigating the parent sample as a whole (see Results Chapter, Figure 11).

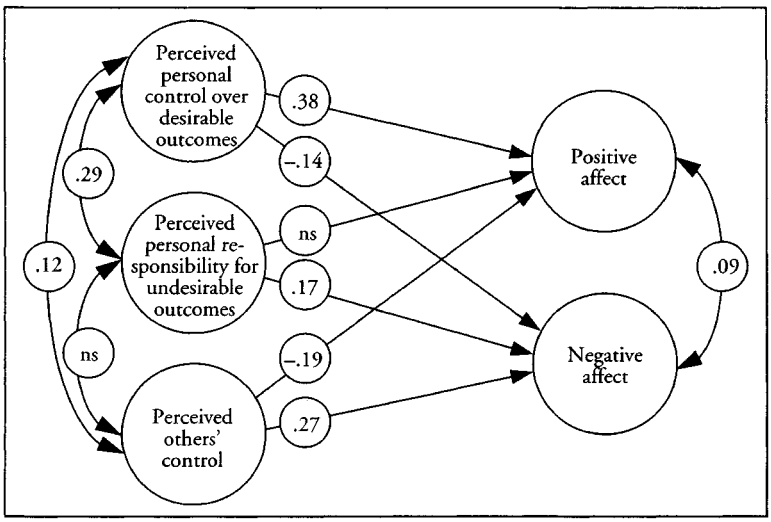
Table K3
Mean Values of Three Dimensions of Perceived Control in the Parent and Continuer Samples

	Perceived personal control over desirable outcomes	*Perceived personal responsibility for undesirable outcomes*	*Perceived others' control*
Parent			
Mean	3.68	3.46	2.62
STD	.71	.71	.97
Continuer			
Mean	3.64	3.48	2.31
STD	.69	.67	.89
$\Delta \chi^2$ Test[1]			
$\Delta \chi^2_{(1)}$	.92	.29	14.91
p	.34	.59	.00

[1] The means and standard deviations refer to the raw data level. In contrast, the $\Delta \chi^2$ values are based on the latent mean estimates. A $\Delta \chi^2$ value indicates whether a mean estimate can be constrained to be equal across the samples without losing model fit. A significant value suggests that a mean of a latent factor has to be freely estimated (i.e., the mean significantly differed across the samples).

In contrast, the covariance pattern of the three dimensions of perceived control differed somewhat from the pattern that would have been expected given the results based on the parent sample (cf., Results Chapter, Figure 11). When comparing the parent and continuer samples, personal control over desirable outcomes and perceived others' control were positively interrelated ($r_{(se = .05;\ t = 2.62)} = .12$). In the previous analyses, this covariation was nonsignificant ($r_{(se = .06;\ t = 1.57)} = .09$).

Figure K1
The Effects of Perceived Control on Emotional Well-Being in the Parent and Continuer Samples



Note. Presented are the effects of perceived control dimensions on positive and negative affect in the parent and continuer samples. All the causal effects could be forced to be equal across the two samples.

Appendix L

Cross-Validation Analysis of the Model Testing the Relationship Between Perceived Control and Emotional Well-Being: Comparison of the Continuer and Noncontinuer Sample

Table L1 presents the overall model fit indices of the invariance models. Table L2 contains the $\Delta \chi^2$ tests testing for invariance across the parent and continuer samples on the measurement and structural level. As seen in Table L1, when invariance of the loadings and intercepts were enforced, the overall model fit was still acceptable. Based on a modeling rationale, the measurement model is, therefore, considered to be invariant across groups.

Note, however, that the loading of the third indicator of personal control over desirable outcomes was not invariant across the two samples (see Table L2). Moreover, the intercept of the second indicator of personal responsibility for undesirable outcomes could not be constrained to be equal across the samples without losing model fit (the mean values of the three indicators of personal responsibility for undesirable outcomes are presented in Table L3).

As seen in Table L2, the factor variance of positive affect differed across the samples. The continuer sample was more homogenous regarding this component of emotional well-being than the noncontinuers. While the covariance between positive affect and negative affect was invariant across the parent and continuer samples, the proposed covariance between the dimensions of perceived control differed across the two samples. Follow-up analysis indicated that the covariation between personal control over desirable outcomes and perceived others' control differed across the samples, being higher in the noncontinuer sample ($r_{(se = .07;\ t = -.34)} = -.02$) as compared to the continuer sample ($r_{(se = .09;\ t = 2.60)} = .23$).

The causal effects of the three dimensions of perceived control on positive and negative affect were invariant across the continuer and noncontinuer samples. Figure L1 presents the effects of perceived control in the continuer and noncontinuer samples, when constrained to be equal. As seen, the direction and the magnitude of the effects of perceived control on emotional well-being mirror the respective effects that were found when investigating the parent sample as a whole.

Finally, the factor means of perceived others' control and positive affect differed across the continuer and noncontinuer samples. The means of all constructs are presented separately for the continuer and noncontinuer samples in Table L3.

Table L1

Global Fit Indices of the Invariance Models Perceived Control and Emotional Well-Being Across the Continuer and Noncontinuer Samples

Invariance models	χ^2	*df*	χ^2:*df*	*RMSEA*	ρ	*IFI*	*NFI*	*NNFI*	*CFI*
Measurement level									
Configural	192.86	136	1.42	.03	.97	.98	.92	.97	.90
Loadings	209.23	144	1.45	.03	.96	.97	.92	.96	.89
Loadings partial[1]	196.83	144	1.37	.03	.97	.98	.92	.97	.90
Intercepts	221.38	153	1.45	.03	.97	.97	.91	.97	.89
Intercept-partial[2]	206.58	143	1.35	.03	.97	.98	.92	.97	.90
Structural level									
Factor variances	216.92	157	1.38	.03	.97	.97	.91	.97	.90
Covariances: perceived control[3]	212.23	156	1.36	.03	.97	.98	.92	.97	.90
Others' c.–pers. respons.	220.61	159	1.39	.03	.97	.97	.91	.97	.90
Personal c.–pers. respons.	212.53	157	1.35	.03	.97	.98	.92	.97	.90
Personal c.–others' c.	215.68	158	1.37	.03	.97	.98	.91	.97	.90
Covariance positive/negative affect	217.49	159	1.37	.03	.97	.98	.91	.97	.90
Causal effects	227.47	165	1.38	.03	.97	.97	.91	.97	.90
Factor means[4]	284.08	169	1.68	.03	.95	.95	.89	.95	.88
Perceived personal control over desirable outcomes	230.20	166	1.39	.03	.97	.97	.91	.97	.90
Perceived others' control	263.95	167	1.58	.03	.95	.96	.89	.95	.89
Positive affect	249.99	167	1.50	.03	.96	.96	.90	.96	.89
Negative affect	232.48	167	1.39	.03	.97	.97	.91	.97	.90

[1] Partial invariance excluded the invariance of one of the indicators of personal control over desirable outcomes.

[2] Partial invariance excluded the invariance of one of the indicators of responsibility for undesirable outcomes.

[3] Others' c. = perceived others' control; pers. respons. = perceived personal responsibility for undesirable outcomes; personal c. = perceived personal control over desirable outcomes.

[4] Because the intercepts of personal responsibility for undesirable outcomes could not be constrained to be equal across the two samples, the invariance of the factor mean was not tested.

Table L2
Testing Invariance Across the Continuer and Noncontinuer Samples

Invariance models	$\Delta \chi^2$	*df*	*p*
Measurement level			
Loadings	16.37	8	.04
Partial invariance: without third indicator of personal control over desirable outcomes	3.97	8	.86
Intercepts	24.55	9	.00
Partial invariance: without second indicator of personal responsibility for undesirable outcomes	9.75	9	.37
Structural level			
Factor variances	10.34	4	.04
Except positive affect	5.65	3	.13
Covariance perceived control dimensions[1]	8.38	3	.04
Others' control–responsibility	.30	1	.58
Personal control desirable–responsibility	3.15	1	.08
Personal control desirable–others' control	4.93	1	.03
Covariance positive/negative affect	1.81	1	.18
Causal effects of perceived control	9.98	6	.13
Factor means[2]	56.61	4	.00
Perceived personal control over desirable outcomes	2.73	1	.10
Perceived others' control	33.75	1	.00
Positive affect	19.79	1	.00
Negative affect	2.28	1	.13

[1] Others' control = perceived others' control; responsibility = perceived personal responsibility for undesirable outcomes; personal control desirable = perceived personal control over desirable outcomes.

[2] Because the intercepts of personal responsibility for undesirable outcomes could not be constrained to be equal across the two samples, the invariance of the factor mean was not tested.

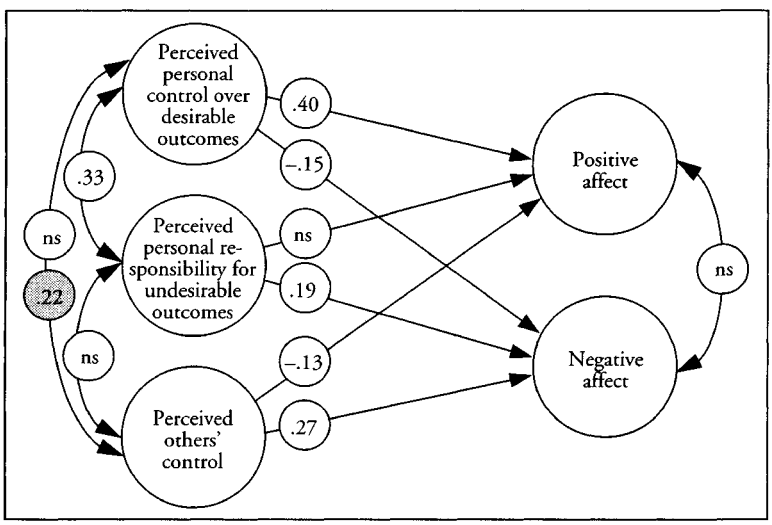
Table L3
Mean Values of Three Dimensions of Perceived Control in the Continuer and Noncontinuer Samples

	Perceived personal responsibility for undesirable outcomes[1]			*Perceived personal control over desirable outcomes*	*Perceived others' control*
	First indicator	*Second indicator*	*Third indicator*		
Continuer					
Mean	3.35	3.79	3.30	3.64	2.31
STD	1.01	.80	.92	.69	.89
Noncontinuer					
Mean	3.36	3.56	3.40	3.70	2.82
STD	1.01	.91	.99	.72	.96
$\Delta \chi^2$ Test					
$\Delta \chi^2_{(1)}$	.05	8.18	1.63	73.84	1.37
p	.82	.00	.20	.00	.24

Note. The means and standard deviations refer to the raw data level. In contrast, the $\Delta \chi^2$ values are based on the latent mean estimates. A $\Delta \chi^2$ value indicates whether a mean estimate can be constrained to be equal across the samples without losing model fit. A significant value suggests that a mean of a latent factor has to be freely estimated (i.e., the mean significantly differed across the samples).

[1] Because the intercepts of personal responsibility for undesirable outcomes could not be constrained to be equal across the two samples, the invariance of the intercepts are presented.

Figure L1
The Effects of Perceived Control on Emotional Well-Being in the Continuer and Noncontinuer Samples



Note. Presented are the effects of three dimensions of perceived control on positive and negative affect in the continuer and noncontinuer samples. As can be seen, the covariation between personal control over desirable outcomes and perceived others' control differed across the samples. The estimate in the continuer sample is presented in the dark circle, the estimate in the noncontinuer sample is shown in the white circle.

Appendix M

Cross-Validation Analysis of the Model Testing the Relationship Between Perceived Control and Emotional Well-Being: Comparison of the First and Second Wave

Table M1 presents the overall model fit indices of the invariance models. Table M2 contains the $\Delta \chi^2$ tests testing for invariance across the parent and continuer samples on the measurement and structural level. As seen in Table M1, when invariance of the loadings and intercepts were enforced, the overall model fit was still acceptable. Based on a modeling rationale, the measurement model is, therefore, considered to be invariant across groups. In addition, when invariance of the loadings and intercepts was enforced, the differences in fit were statistically nonsignificant (see Table M2).

As seen in Table M2, with the exception of the factor means, all the components of the structural model were invariant over time. The only mean that differed across time was that of

Table M1
Global Fit Indices of the Invariance Models Perceived Control and Emotional Well-Being Across the First and Second Wave of BASE

Invariance models	χ^2	*df*	χ^2:*df*	*RMSEA*	ρ	*IFI*	*NFI*	*NNFI*	*CFI*
Measurement level									
Configural	240.28	136	1.77	.04	.93	.95	.89	.93	.85
Loadings	247.01	144	1.72	.04	.93	.95	.88	.93	.85
Intercepts	260.68	153	1.70	.04	.93	.94	.88	.93	.85
Structural level									
Factor variances	257.79	158	1.70	.04	.93	.94	.87	.93	.85
Covariance dimensions of perceived control	275.36	161	1.71	.04	.93	.94	.87	.93	.85
Covariance positive/ negative affect	275.37	162	1.70	.04	.93	.94	.87	.93	.85
Causal effects	284.89	168	1.67	.04	.94	.94	.86	.94	.85
Factor means	296.60	173	1.68	.03	.93	.94	.86	.93	.85
Perceived personal control over desirable outcomes	285.15	169	1.71	.03	.93	.94	.96	.93	.85
Perceived personal responsibility for undesirable outcomes	288.19	170	1.69	.03	.93	.94	.86	.93	.85
Perceived others' control	294.60	171	1.72	.03	.93	.94	.86	.93	.85
Positive affect	288.70	171	1.69	.03	.93	.94	.86	.93	.85
Negative affect	289.20	172	1.68	.03	.94	.94	.86	.94	.85

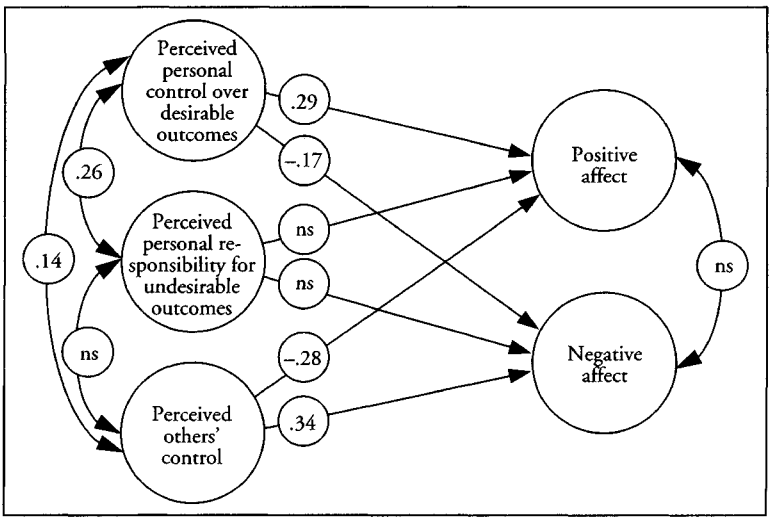
Table M2
Testing Invariance Across Time

Invariance models	$\Delta \chi^2$	*df*	*p*
Measurement level			
Loadings	6.73	8	.57
Intercepts	13.67	9	.14
Structural level			
Factor variances	7.11	5	.21
Covariance perceived control dimensions	7.57	3	.06
Covariance positive/negative affect	.01	1	.92
Causal effects of perceived control	9.52	6	.15
Factor means	11.71	5	.04
Perceived personal control over desirable outcomes	.26	1	.61
Perceived personal responsibility for undesirable outcomes	3.04	1	.08
Perceived others' control	6.41	1	.01
Positive affect	.51	1	.47
Negative affect	.50	1	.48

perceived others' control, which was higher at the second wave of data collection (the means of the three dimensions of perceived control are presented in the Results Chapter, Table 31).

Figure M1 presents the effects of the perceived control dimensions, when constrained to be equal across the two waves of BASE. The effects of two dimensions of perceived control (i.e., personal control over desirable outcomes and perceived others' control) mirrored the respective effects that were found when investigating the parent sample. However, in the continuer sample, the effect of personal control over desirable outcomes on positive affect did not significantly differ from its effect on negative affect ($\beta_{(1)} = .29$; $\beta_{(2)} = -.17$; $\Delta z = 1.71$). Moreover, contrary to previous analyses, personal responsibility for undesirable outcomes was neither related to positive nor to negative affect. The effect of personal responsibility for undesirable outcomes on negative affect was nonsignificant in both waves ($\beta_{(se = .07;\, t = 1.68)} = .11$). Its effect on positive affect tended to be significantly positive ($\beta_{(se = .10;\, t = 1.73)} = .16$) at the second wave, while it tended to be negative at the first wave ($\beta_{(se = .11;\, t = -1.55)} = -.15$). However, neither of the effects reached conventional levels of significance.

Figure M1
The Effects of Perceived Control on Emotional Well-Being at the First and Second Wave of Data Collection

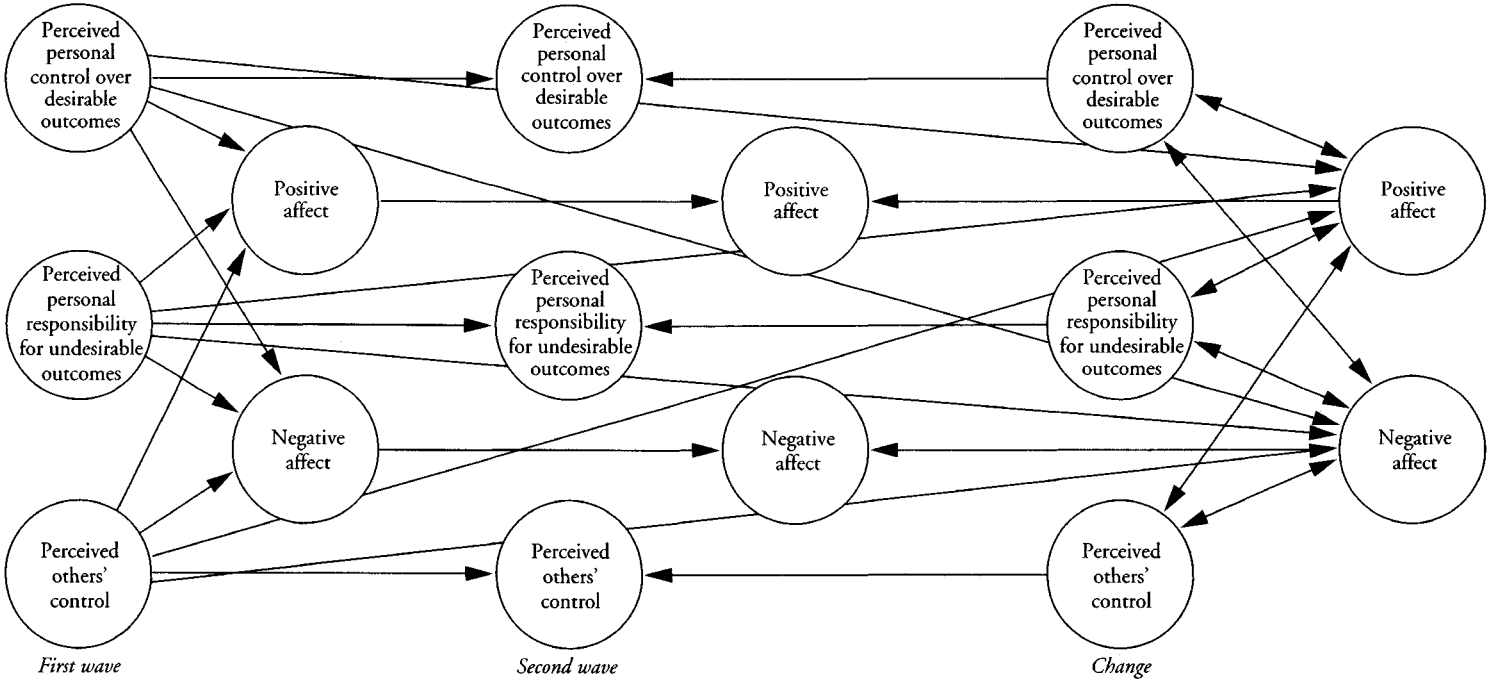


Note. Presented are the effects of three dimensions of perceived control on positive and negative affect in the continuer sample at the first and second wave.

Appendix N

Figure N1

Initial Levels and Differential Changes in Perceived Control as Predictors of Differential Changes in Emotional Well-Being



Note. As seen, three dimensions of perceived control and the two components of emotional well-being are specified at each wave. In addition, five phantom factors are specified. Each phantom factor represents the change variance in one of the five latent constructs (i.e., the variance not explained by the respective first-wave construct). To take test-retest effects into account, each corresponding indicator's residual variance was allowed to correlate across time (for more information about how the constructs were defined on the measurement level, see Method Chapter). To test the first longitudinal hypothesis (i.e., initial levels in perceived control should predict differential changes in emotional well-being), the relations between change in perceived control and change in the two components of emotional well-being were specified as correlations, while the relations between first-wave perceived control and the change factors of positive and negative affect were specified as causal paths. To test the second longitudinal hypothesis (i.e., differential changes in perceived control should predict differential changes in emotional well-being), the reverse pattern was specified: The relations between change in perceived control and change in the two components of emotional well-being were specified as causal paths, while the relations between first-wave perceived control and the change factors of positive and negative affect were specified as correlations.

Appendix O

The Robustness of the Longitudinal Relationship Between Perceived Control and Emotional Well-Being

Table O1
The Effects of Change in Perceived Control on Change in Positive and Negative Affect When Controlled for Self- and Other-Reported Functional Health

Change in perceived control	*Change in positive affect*	*Change in negative affect*
... when controlled for other-reported number of functional health constraints		
Perceived personal control over desirable outcomes	.01 (t = .16; se = .09)	−.32 (t = .16; se = −2.00)
Perceived personal responsibility for undesirable outcomes	.43 (t = .20; se = 2.47)	.16 (t = .18; se = .88)
Perceived others' control	−.29 (t = .14; se = −2.36)	−.27 (t = .13; se = −2.22)
... when controlled for self-reported number of functional health constraints		
Perceived personal control over desirable outcomes	.02 (t = .16; se = .31)	−.29 (t = .16; se = −1.95)
Perceived personal responsibility for undesirable outcomes	.42 (t = .20; se = 2.44)	.15 (t = .18; se = .94)
Perceived others' control	−.28 (t = −.14; se = 2.24)	.24 (t = .13; se = 1.99)

Self- and Other-Reported Functional Health and Their Association With *Intra*individual Changes in Emotional Well-Being

Table O2
Bivariate Correlations With *Intra*individual Changes in Two Dimensions of Emotional Well-Being

	Change in emotional well-being	
Covariates	*Positive affect*	*Negative affect*
Self-reported number of functional health constraints	.29 (t = .10; se = 3.19)	−.05 (t = .09; se = −.57)
Other-reported number of functional health constaints	.27 (t = .10; se = −2.96)	−.05 (t = .09; se = −.55)

Self- and Other-Reported Functional Health and Their Association With *Intra*individual Changes in Perceived Control

Table O3
Bivariate Correlations With *Intra*individual Changes in Three Dimensions of Perceived Control

	Change in perceived control		
Covariates	*Perceived personal control over desirable outcomes*	*Perceived personal responsibility for undesirable outcomes*	*Perceived others' control*
Self-reported number of functional health constraints	$.11_{(t = .09;\ se = 1.23)}$	$.03_{(t = .10;\ se = .36)}$	$-.21_{(t = .09;\ se = -2.41)}$
Other-reported number of functional health constraints	$-.16_{(t = .09;\ se = -1.77)}$	$-.01_{(t = .10;\ se = -.12)}$	$.16_{(t = .09;\ se = 1.81)}$

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843 S. Reinbek: Rowohlt, 1994 (4., vollständig überarbeitete und erweiterte Neuausgabe).

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1404 S. Stuttgart: Klett-Cotta, 1980.

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Gestalt und Funktion nichtstaatlicher Schulen im Rahmen öffentlicher Bildungssysteme.
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Ausgangspunkt der Arbeit ist ein Befund, der in der gerontologischen Forschung als paradox bezeichnet wurde: Emotionales Wohlbefinden bleibt - trotz einer Zunahme von Verlusten - bis ins hohe Alter hinein stabil. Ziel war es zu zeigen, daß das Bild einer durchschnittlichen Stabilität emotionalen Wohlbefindens durch ein Bild über Unterschiede zwischen Wohlbefindensbereichen und zwischen Personen ergänzt werden muss. Der empirische Teil der Arbeit basiert auf den ersten beiden Erhebungswellen der Berliner Altersstudie. Objektive Einschränkungen in der Mobilität einerseits und subjektive Kontrollüberzeugungen andererseits wurden als Prädiktoren positiven und negativen emotionalen Wohlbefindens untersucht. Querschnittliche und längsschnittliche Strukturgleichungsanalysen ergaben zwei zentrale Ergebnisse: Erstens zeigen nicht alle Dimensionen emotionalen Wohlbefindens altersbezogene Stabilität; positive Emotionen werden im hohen Alter und im Angesicht von alterstypischen Gesundheitseinschränkungen seltener erlebt. Zweitens verfügen nicht alle alten Personen über ein stabiles Wohlbefinden; sowohl im gesundheitlichen Bereich als auch im Bereich der subjektiven Kontrollüberzeugungen lassen sich Risikofaktoren für das emotionale Wohlbefinden alter Menschen identifizieren. Diese Ergebnisse widersprechen einem überoptimistisch positiven Altersbild und verweisen auf Handlungsbedarf zur Steigerung emotionalen Wohlbefindens auch - und vielleicht gerade - im hohen Alter.

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