Received: 29 April 2021 | Revised: 8 October 2021 | Accepted: 19 November 2021

DOI: 10.1111/jopy.12692

ORIGINAL ARTICLE

WILEY

The nonlinear association between grandiose and vulnerable narcissism: An individual data meta-analysis

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Funding information
Austrian Science Fund (FWF); German Research Foundation (DFG)

Abstract

Objective: Narcissism can manifest in grandiose and vulnerable patterns of experience and behavior. While largely unrelated in the general population, individuals with clinically relevant narcissism are thought to display both. Our previous studies showed that trait measures of grandiosity and vulnerability were unrelated at low-to-moderate levels of grandiose narcissism, but related at high levels.

Method: We replicate and extend these findings in a preregistered individual data meta-analysis ("mega-analysis") using data from the Narcissistic Personality Inventory (NPI)/Hypersensitive Narcissism Scale (HSNS; $N = 10{,}519$, $k = 28$) and the Five-Factor Narcissism Inventory (FFNI; $N = 7{,}738$, $k = 17$).

Results: There was strong evidence for the hypothesis in the FFNI ($\beta_{\text{Grandiose} < 1SD} = .08$, $\beta_{\text{Grandiose} > 1SD} = .36$, $\beta_{\text{Grandiose} > 2SD} = .53$), and weaker evidence in the NPI/HSNS ($\beta_{\text{Grandiose} < 1SD} = .00$, $\beta_{\text{Grandiose} > 1SD} = .12$, $\beta_{\text{Grandiose} > 2SD} = .32$). Nonlinearity increased with age but was invariant across other moderators. Higher vulnerability was predicted by elevated antagonistic and low agentic narcissism at subfactor level.

Conclusion: Narcissistic vulnerability increases at high levels of grandiosity. Interpreted along Whole Trait Theory, the effects are thought to reflect state changes echoing in trait measures and can help to link personality and clinical models.

KEYWORDS

breakpoint, grandiose narcissism, grandiosity, nonlinearity, vulnerability, vulnerable narcissism

1 | INTRODUCTION

Research on narcissism delineated two prevailing expressions of narcissistic strivings, namely grandiosity and vulnerability (Cain et al., 2008). Grandiosity is indicative of feelings of superiority, admiration seeking, and entitlement, closely reflecting the conception of narcissism in everyday language (Buss & Chiodo, 1991). Vulnerability, in contrast, describes anxious, defensive, and avoidant, yet entitled experience and behavior (Hart et al., 2017;

Miller et al., 2012). In the *general population*, trait measures of grandiose and vulnerable narcissism are unrelated or only slightly related (Jauk & Kaufman, 2018; Jauk et al., 2017), though they share a common core of antagonistic self-importance and entitlement (Krizan & Herlache, 2018; Miller et al., 2016). Individuals displaying severe forms of *narcissistic pathology*, in contrast, are hypothesized to display both grandiose and vulnerable experience and behavior, although in an oscillating fashion (Pincus & Lukowitsky, 2010). While personality models conceive grandiose and vulnerable narcissism as largely independent traits, clinicians are more inclined to see the commonalities among both (Wright & Edershile, 2018).

In an attempt to bridge these perspectives, we hypothesized that the relation of grandiosity and vulnerability varies as a function of the level of grandiose narcissism. We assumed that self-reports of two expressions are unrelated at low-to-moderate levels, where both might reflect stable patterns of experience and behavior, but become more related at high levels of grandiose narcissism, where state variation might play a more important role. We found support for this hypothesis in two large samples using different self-report scales (Jauk & Kaufman, 2018; Jauk et al., 2017). Approaching this question, the first of these studies was exploratory regarding the question whether and where there might be a breakpoint in the grandiose narcissism distribution. Both studies relied on data from our own labs. What is needed now is a large-scale, confirmatory replication, which the present preregistered[1] individual data meta-analysis ("mega-analysis"; cf. Fleeson & Gallagher, 2009) aims to provide.

Before elaborating on the hypothesis, we provide an overview of personality and clinical perspectives on narcissism. While these are not mutually exclusive and go hand in hand in different aspects (cf. Cain et al., 2008; Wright & Edershile, 2018), they also go along with different psychological foci and methodologies to a certain extent. This is most evident in a focus on *inter*individual differences in the general population and use of nomothetic methods on the one hand, and a focus on *intra*individual differences in select populations and use of idiographic methods on the other (cf. Ackerman et al., 2019; Wright & Edershile, 2018). Though this distinction is only of prototypical nature, many researchers and clinicians do adopt both views in the study and treatment of narcissism, and models originating in population-based studies do extend to clinical populations, we think that understanding current perspectives in the light of their prevailing psychological paradigms might help to unveil gaps between both, which we aim to address in this study.

1.1 | Personality perspectives on narcissism

The concept of grandiose narcissism as a trait was devised from the diagnostic criteria for Narcissistic Personality Disorder (NPD) in the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 1980), and adapted for self-report assessment in the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979). Items of the NPI encompass statements such as "I think I am a special person" or "I have a natural talent for influencing people" (Raskin & Terry, 1988). It is a widely used measure of grandiose narcissism (Miller et al., 2014), but alternatives have been proposed (see below). Vulnerable narcissism was delineated as a separate construct when Wink (1991) noted that items of different narcissism scales sort into two largely orthogonal dimensions, which he termed "grandiosity-exhibitionism" and "vulnerability-sensitivity" (p. 590). Wink described these in terms of "extraversion, self-assurance, exhibitionism, and aggression," and "introversion, defensiveness, anxiety, and vulnerability to life's traumas" (1991, p. 590). Building on this work, Hendin and Cheek (1997) developed the Hypersensitive Narcissism Scale (HSNS), encompassing items such as "when I enter a room I often become selfconscious and feel that the eyes of others are upon me" (Hendin & Cheek, 1997, p. 592). It has become a widely used vulnerable narcissism measure (Miller et al., 2014), particularly in combination with the NPI.

Individuals high in grandiose narcissism tend to be extraverted, bold, and charming (Back et al., 2010; Dufner et al., 2013; Jauk et al., 2016), whereas those high in vulnerable narcissism tend to be introverted, anxious, and avoidant (Hart et al., 2017; Miller et al., 2012). Grandiose narcissism is largely associated with self-reports of adaptive adjustment, as evident in associations with self-esteem (Campbell, 2001), life satisfaction (Kaufman et al., 2020), or good mental health (though also with feelings of inauthenticity and externalizing symptoms; Kaufman et al., 2020; Miller et al., 2011). Conversely, vulnerable narcissism is negatively associated with self-esteem or life satisfaction (Brookes, 2015; Rose, 2002) and is related to an array of mainly internalizing symptoms (Euler et al., 2018; Kaufman et al., 2020; Miller et al., 2011, 2017). Despite these opposing patterns, Wink (1991) already noted that both share "common narcissistic characteristics of conceit, self-indulgence, and disregard for the needs of others" (1991, p. 596), hereby already anticipating contemporary personality models of narcissism.

In their *Narcissism Spectrum Model* (NSM), Krizan and Herlache (2018) posit that entitled self-importance, as a central characteristic of narcissism, stands at the core of both expressions. Narcissistic strivings can vary not just in

extremity, but also in the way they are expressed. As the authors put it: "narcissism can be conceptualized as a spectrum of personality characteristics that reflects variation in self-importance and entitlement as a shared phenotype, with narcissism exhibiting different forms of expression spanning distinct dimensions of temperament and functioning" (Krizan & Herlache, 2018, p. 8). These are seen primarily in approach—versus avoidance-orientation, which shape narcissistic strivings in bold or reactive interpersonal styles (Krizan & Herlache, 2018; Spencer et al., 2018).

Similarly, in their *Trifurcated Model of Narcissism* (TMN), Miller and colleagues suggest that grandiose and vulnerable narcissism can be conceptualized from a Five-Factor-Model (FFM) perspective as combinations of either agentic extraversion and antagonism or neuroticism and antagonism (Miller et al., 2016, 2017; Weiss et al., 2019). The model builds on the idea that specific personality configurations can be described as combinations of FFM trait variants. The NSM and TMN are consistent in that they place entitled self-importance/antagonism at the common core, and differentiate grandiose and vulnerable narcissism along boldness/agency or reactivity/neuroticism (cf. Wright & Edershile, 2018). The measure related to the TMN is the Five-Factor Narcissism Inventory (FFNI; Glover et al., 2012), which assesses the three factors using 15 subscales, making it a comprehensive inventory for use in the general population. To sum up, *personality perspectives* have delineated grandiose and vulnerable narcissism, which can be described along three factors (see also Crowe et al., 2019). We refer to these as agentic, antagonistic, and neurotic narcissism in the following.

1.2 | Clinical perspectives on narcissism

While personality researchers have delineated interindividual differences in grandiosity and vulnerability, *clinical theorists* are inclined to see the common aspects among them (Wright & Edershile, 2018). For instance, Pincus and Lukowitsky (2010) assert that "many contemporary clinical experts on narcissistic personality disorder now recognize that grandiose self-states oscillate or co-occur with vulnerable self-states and affective dysregulation" (2010, p. 428). Similarly, Ronningstam (2009) notes that "the narcissistic individual may fluctuate between assertive grandiosity and vulnerability" (p. 113).

The different emphases made by personality and clinical researchers might be at least partially due to their different methodologies and observational bases: while personality research strives for the identification of stable *inter*individual differences, clinicians working with narcissistic patients might be more focused on *intra*individual differences in terms of states or situational contingencies (see also Ackerman et al., 2017). This is consistent with recent empirical research: Gore and Widiger (2016) asked clinicians to provide ratings on patients who fit either a habitually grandiose or vulnerable narcissistic personality. Those who were seen as habitually grandiose were rated to display episodes of vulnerability, but not to the other way around. A similar finding was obtained with lay raters[2] (Hyatt et al., 2018).

A unifying characteristic of clinical perspectives on narcissism seems to be that the coexistence of grandiose and vulnerable aspects is considered key to understanding and treating narcissistic pathology. This view emerged primarily from psychodynamic theory and is known as the mask model in psychology (cf. Kuchynka & Bosson, 2018). Grandiose strivings are seen as a defense against an underlying vulnerable self. This is, for instance, evident in Kernberg's (1975) writings who sees the development of a grandiose self as a child's reaction to indifferent or hostile parents. Recent quantitative psychodynamic accounts conceptualize narcissistic pathology as a conflict in the self-esteem system, which can manifest in active (grandiose) or passive (vulnerable) modes, or a blend of those (OPD Task Force, 2008).

While the notion of opposing tendencies is commonly associated with psychodynamic theory, also therapeutic accounts which are situated more in the cognitive-behavioral tradition acknowledge the coexistence of grandiosity and vulnerability in narcissism. Schema therapy, for instance, posits that patients with narcissistic pathology attempt to cope with problematic early experiences in different modes, including an over-aggrandizing (grandiose) and a vulnerable mode (Behary & Dieckmann, 2012). Relatedly, the dual-action regulation model of narcissism (e.g., Sachse & Sachse, 2019) postulates the existence of negative (vulnerable) and compensatory (grandiose) schemas, which can be selectively triggered and mutually inhibit each other, consistent with the notion of fluctuating states.

To sum up, an assumption that can be derived from *clinical perspectives* on narcissism across different traditions is that both grandiose and vulnerable aspects are represented in individuals with severe levels of narcissism, and are assumed to be selectively expressed in particular situations (which is supported by recent research; see next section). Importantly, the causal-developmental relations of grandiose and vulnerable aspects need not necessarily be part of a cross-sectional perspective on their coexistence (Jauk & Kaufman, 2018).

1.3 | The nonlinearity hypothesis

Personality and clinical perspectives on narcissism leave a gap regarding the relation between grandiose and

vulnerable aspects: while personality research points to largely independent traits, clinicians assume both aspects to be represented within the same individuals. Following this latter perspective, one might expect to find a positive association between self-report measures, but this is not commonly the case (Jauk & Kaufman, 2018; Jauk et al., 2017; Krizan & Herlache, 2018; Miller et al., 2011; Wink, 1991). In an attempt to bridge this gap, we suggested that the correlation between grandiose and vulnerable narcissism measures might be moderated by the level of grandiose narcissism itself: the two aspects might be unrelated at low-to-moderate levels, as commonly studied in personality research, but might become related at higher levels of grandiosity, as seen by clinicians working with narcissistic patients (Jauk et al., 2017). The assumptions underlying this hypothesis can be explained within the framework of Whole Trait Theory:

Whole Trait Theory (WTT) posits that traits can be understood as *density distributions of states* (Fleeson & Jayawickreme, 2015; Jayawickreme et al., 2019). The level of a trait assessed by a questionnaire, extraversion for instance, is thought to reflect the *corresponding central tendency of a cumulative distribution of extraverted states over time*. Similar assumptions can be made for narcissism (Ackerman et al., 2019), and empirical evidence shows that trait measures of grandiose and vulnerable narcissism do correspond substantially with state assessments (Crowe et al., 2016, 2018; Edershile et al., 2019).

If individuals with high levels of grandiose narcissism (i.e., a high likelihood to experience grandiose states) are also more likely to experience vulnerable states, this should manifest in *elevations in trait measures of vulnerable narcissism*, and accordingly a *correlation between trait scales of grandiose and vulnerable narcissism*. Importantly, we do not expect this correlation to be particularly strong (Jauk et al., 2017), as these individuals might still be in a habitually grandiose mode (cf. Back, 2018), which is only intermittently disrupted by vulnerable states or episodes. Still, an increase in correlation, and thereby also an increase in mean levels in the continuous distribution at a between-subjects level would, in terms of WTT, suggest *higher central tendencies of the individual distributions of vulnerable states*. It is important that trait measures, unlike state measures, are not thought to reflect snapshots of personality at the time of assessment, but "density distributions of those personality states over time" in WTT (Jayawickreme et al., 2019, p. 2). Since grandiose and vulnerable states do occur largely independent of each other (Edershile et al., 2019), increases of vulnerability along grandiose states could suggest vacillations between both (though with a higher central tendency for grandiose states in terms of a predominant mode; see above). While our meta-analysis may provide indirect evidence for such vacillations in large-scale data, we note there is not much direct systematic evidence to date. One recent work, however, shows that grandiose narcissism is associated with higher variability in grandiosity *and* vulnerability over time (Edershile & Wright, 2020). Importantly, increases in trait correlations could also be due to other factors, such as extremity of ratings. Thus, as a discriminant validity test, we hypothesized that individuals with high trait vulnerability should not display increased trait grandiosity when the analysis is inverted (Jauk & Kaufman, 2018).

To test this nonlinearity hypothesis, we previously used segmented regression analysis—an iterative statistical procedure that allows for the empirical detection of a significant change in slope (breakpoint) in a bivariate distribution (Muggeo, 2003)—in a large sample ($N = 1{,}006$). Using the NPI and HSNS as measures of grandiose and vulnerable narcissism, we found a significant breakpoint at 90% cumulative frequency of the NPI grandiose narcissism distribution, with correlations between grandiose and vulnerable narcissism being $r = -.09$ and $r = .20$ below and above this breakpoint (Jauk et al., 2017). In a second study ($N = 891$), we replicated and extended this finding using the FFNI-SF (Glover et al., 2012; short form by Sherman et al., 2015) as a more comprehensive measure of grandiose and vulnerable narcissism. Again, we found a significant breakpoint in the bivariate distribution at a cumulative frequency of 75% in the FFNI-SF grandiose narcissism distribution. Correlations below and above this breakpoint were $r = .02$ and $r = .45$. Note that higher correlations also imply higher mean levels of vulnerable narcissism, since the regression function is continuous (i.e., the regression lines meet at the breakpoint). Results were specific for grandiose narcissism as, when we inverted the analysis, high vulnerability was independent of grandiosity. Within the three-factor model, we found that grandiose narcissism is more saturated with agentic aspects in the lower range, but more with antagonistic aspects in the higher range. Validity measures further pointed to differential relations of grandiose narcissism with indicators of psychological functioning and mental health in terms of higher correlations with and mean levels of negative affect, depression, or fear of losing control (Jauk & Kaufman, 2018).

1.4 | The present meta-analysis

Our previous studies were limited in that they were partially exploratory in nature and relied on data from our own labs. Here, we attempt to replicate and extend these studies using a meta-analytical account. Following a preregistered study protocol,[3] we surveyed the literature for studies from the past eight years using either the NPI/HSNS or the

FFNI to assess grandiose and vulnerable narcissism[4] in sufficiently large samples. Our primary hypotheses concerned nonlinearity in the relationship between grandiose and vulnerable narcissism, as assessed by the NPI/HSNS and the FFNI, which we tested in three ways:

1. As a precursor to confirmatory tests, we assessed the extent of nonlinearity in the data by using a quadratic over a linear regression term. We expected quadratic terms to explain significant incremental variance in vulnerable narcissism.
2. As the main confirmatory test based on estimates obtained in our previous studies, we tested differences in slopes below and above +1 *SD* of the grandiose narcissism distribution[5] using multilevel modeling (MLM). The correlation below +1 *SD* should be close to zero, whereas there should be a significant positive association above +1 *SD*, and a significant difference between both. On an exploratory basis, we repeated these analyses using +2 *SD* as a more extreme sample-split parameter. As a test of discriminant validity, we inversed the analyses, splitting the sample for vulnerability.
   As moderator variables, we tested the effects of participant sex, age, geographical region, questionnaire version (long- vs. short-form), and publication status.[6]
   In addition to these main confirmatory analyses, we further explored the nature of the nonlinear effects within the three-factor model using two different approaches:
   a. First, we investigated the saturation of grandiose and vulnerable narcissism by their constituent three-factor model dimensions (as in Jauk & Kaufman, 2018).
   b. Second, we directly explored multivariate nonlinear relations among the three factors using response surface analyses. These depict configurations of agentic and antagonistic aspects at which vulnerable/neurotic aspects are highest.
3. Finally, to obtain more precise estimates of possible breakpoints based on the pooled datasets, we used segmented regression analyses, as previously, for an empirical detection of changes in slope.

2 | METHODS

2.1 | Search strategy and study selection

We preregistered the study protocol on the Open Science Framework (OSF) on the 1st of April 2020: https://osf.io/d3u7g. Our aim was to gather data from previously published and unpublished studies encompassing either the NPI/HSNS or the FFNI, also including short versions of those inventories. We originally planned to include studies with $n \geq 100$, but, upon screening of available data, made one exception to this rule for a smaller sample[7] (see Supporting Information Table S1).

We searched the academic databases Scopus, PsychInfo, and PubMed for narciss*, grand*, and vulnerab* in the abstracts of articles published between 2012 and mid-2020.[8] For the NPI/HSNS, we identified 58 studies meeting the above-mentioned criteria, reporting on data of ~30,000 individuals. For the FFNI, we identified 23 studies reporting on data from ~20,000 individuals. To obtain unpublished data, we asked researchers who publish regularly on narcissism (identified by our literature search) for unpublished datasets, also including those from our own labs. As described in the preregistration, we assumed that up to 50% of researchers might be able to share their data, and the sample would further be complemented by unpublished data, why we aimed for final samples of $N \sim 15{,}000$ for the NPI/HSNS and $N \sim 10{,}000$ for the FFNI. We set a stopping rule for sampling, which was either when this desired sample size or the extended deadline for data sharing (see preregistration) was met.

2.2 | Measures

We included studies assessing grandiose and vulnerable narcissism using either the *Narcissistic Personality Inventory* (NPI; Raskin & Hall, 1979) and the *Hypersensitive Narcissism Scale* (HSNS; Hendin & Cheek, 1997) or the *Five-Factor Narcissism Inventory* (FFNI; Glover et al., 2012). The NPI is a widely used 40-item forced-choice measure of grandiose narcissism. It can be scored at a general or a subfactor level. Ackerman and colleagues (2011) introduced a three-factor solution encompassing *leadership/authority* ("I have a natural talent for influencing people"), *grandiose exhibitionism* ("I like to be the center of attention" and *entitlement/exploitativeness* ("I will never be satisfied until I get all that I deserve"; p. 69). The first two of these map onto more agentic/approach-oriented narcissism, the latter on antagonistic narcissism/entitlement (Krizan & Herlache, 2018; Miller et al., 2016). The studies included here (see Supporting Information Table S1) used either the English original or the German version (Schütz et al., 2004). The NPI is available in different short forms. The included studies mostly used the original 40-item version, some (see Table S1) also used the 16-item version (Ames et al., 2006) or the 13-item version (Gentile et al., 2013). For these, we estimated NPI-40 scores using multiple regression to have comparable scores across studies (see Supporting Information). For this reason, we cannot report internal consistencies here. The HSNS is a widely used 10-item measure of

vulnerable narcissism. Sample items are "I can become entirely absorbed in thinking about my personal affairs, my health, my cares or my relations to others" or "when I enter a room I often become selfconscious and feel that the eyes of others are upon me." The included studies administered the HSNS in either English or German and used all items.

The FFNI measures different aspects of narcissism based on the FFM, following the rationale that complex personality configurations can be described using FFM variants as "building blocks". The FFNI can be scored either for grandiose and vulnerable narcissism, the TMN consisting of agentic, antagonistic, and neurotic narcissism (Miller et al., 2016; Weiss et al., 2019), or at facet-level (15 facets; Glover et al., 2012). Example items are "I often fantasize about having lots of success and power" (grandiose/agentic narcissism/grandiose fantasies), "It may seem unfair, but I deserve extra (i.e., attention, privileges, rewards)" (grandiose/antagonistic narcissism/entitlement), or "I feel ashamed when people judge me" (vulnerable/neurotic narcissism/shame). The FFNI is available in different versions, the included studies (see Table S1) used the original 148-item long form (FFNI-LF; Glover et al., 2012) or the 60-item short form (FFNI-SF; Sherman et al., 2015). To have comparable scores across studies, we used regression-based estimation of FFNI-LF scores for studies using the FFNI-SF (see Supporting Information), which is why we cannot report internal consistencies here. Studies used either the original English version, a German version (manuscript in prep., for material, see Jauk et al., 2021), or a Polish version (Rogoza et al., 2021).

2.3 | Analysis plan

We tested our hypotheses using three preregistered approaches, complemented by exploratory analyses:

1. As a precursor, to assess the extent to which a quadratic term of grandiose narcissism would improve the prediction of vulnerable narcissism, we used MLMs with random intercepts (without random slopes, as described in the preregistration) and linear (step 1) as well as quadratic terms (step 2) of grandiose narcissism.
2. As main confirmatory hypothesis tests in the MLM framework, we assessed whether an interaction of *grandiose narcissism* and *level of grandiose narcissism* (below/above +1 *SD*) would indicate a significant difference in slope on *vulnerable narcissism*. We standardized continuous variables and used weighted effect coding for binary variables (moderators), so that the interaction coefficient directly denotes the standardized change in slope (te Grotenhuis et al., 2017). The models included a random intercept (no random slope, as described in the preregistration).

In addition to preregistered tests at +1 *SD*, we repeated the analyses for a higher split criterion of +2 *SD*. The rationale to do so was that +1 *SD*, or top 15.9% of the sample, indicates high, but not necessarily extreme expressions of grandiose narcissism. A split at +2 *SD*, or top 2.6% of the sample indicates extreme expressions of grandiose narcissism and lies within population prevalence estimates of NPD[9] (American Psychiatric Association, 2013; Ronningstam, 2009). Note that +2 *SD* also aligns with the empirically obtained breakpoint estimates (method described in the next point).

To test the consistency of interaction effects, we first evaluated random effects of the interaction term (i.e., allowing the interaction to vary across samples), and then tested three-way interactions with moderator variables (sex, age, country, questionnaire version, and publication status). Prior to the hypothesis tests, we report intraclass correlations of grandiose and vulnerable narcissism in the nested design,[10] and random effects of the bivariate associations (i.e., variation in correlation between both) across samples.

In addition to these confirmatory analyses, to better understand the role of different aspects of narcissism, we explored nonlinear effects within the three-factor structure using two different approaches:

a. First, we investigated the differential saturation of grandiose and vulnerable narcissism by their constituent three-factor model dimensions along the grandiose narcissism distribution (as previously; Jauk & Kaufman, 2018). These analyses could show whether certain aspects become more relevant at higher levels.
b. Second, we directly explored nonlinear relations among the three-factor model dimensions, transferring the main analysis strategy from the two- to the three-factor model. As bivariate analyses techniques were not adequate for this, we used response surface analyses (for an introduction, see Humberg et al., 2019) to depict multivariate nonlinearity in the pooled datasets (non-multilevel, since the effects of interest were not dependent upon level-2-variables; see below). We used the response surface methods (rsm) R package (Lenth, 2009) to estimate a full second-order polynomial model predicting Y by the main effects of X_1, X_2, the interaction $X_1{*}X_2$, and the squared terms X_1^2, X_2^2. Results can be plotted to visualize the bivariate ranges of X_1, X_2 which display the

area for the strongest response in Y on the response surface.

3. Finally, to obtain empirical breakpoint estimates, we used segmented regression analyses, as in our previous studies. These can detect a breakpoint (change in slope) in a continuous bivariate distribution using iterative computation (R package segmented; Muggeo, 2003, 2008). Segmented hereby means that a regression function $Y = f(X)$ has different parameters in different segments of X, with the breakpoint ψ being the point at which these are most likely to differ. Significance of the breakpoint is assessed using the Davies test (Davies, 1987). Segmented regression has to be supplied with an initial guess parameter ψ_0 for the breakpoint, and a number of K evaluation points in the distribution of X. Based on our prior findings, we set the initial guess parameter to $\psi_0 = +1$ *SD* (see above). We set the K parameter to 7, as in our previous studies (Jauk & Kaufman, 2018; Jauk et al., 2017).

To test the robustness of findings, we repeated the main confirmatory analyses with samples in which datapoints could be considered bivariate extreme values, according to Mahalanobis distance ($\chi^2_{(2)} = 13.82$; $p < .001$), were excluded. While we previously excluded those individuals prior to analyses (Jauk & Kaufman, 2018; Jauk et al., 2017), here, the pooled samples are much larger, which is why extreme values are not expected to influence the bivariate distributions considerably and were not excluded in the first round of analyses. Indeed, results were highly similar with and without these values (see below).

3 | RESULTS

3.1 | Obtained data and descriptive statistics

3.1.1 | Narcissistic Personality Inventory/ Hypersensitive Narcissism Scale

For the NPI/HSNS, we obtained data from 15 studies. One study ($N = 400$) used a 7-point rating scale (as opposed to the original 5-point scale) for the HSNS. We rescaled the raw scores to the original metric, but the rescaled scores were still markedly lower than those of the other studies,[11] which is why we excluded this study. The remaining data stemmed from 14 studies encompassing 28 samples. After exclusion of individuals who had more than 20% missing data at item level, the final pooled sample consisted of $N = 10{,}519$ individuals (6,714 female, 3,829 male, 3 diverse, 73 missing) with an average age of 25.53 years ($SD = 10.26$, range = 14–81). Table S1 displays detailed characteristics at sample level. Intraclass correlation coefficients (ICCs) indicated that 6.71% of NPI variance and 1.94% of HSNS variance were attributable to differences between samples. The overall correlation of the NPI and HSNS in the pooled sample was $r = .03$ ($CI_{95\%} = .03$–$.05$, $p = .01$). When the nested data structure was taken into account (see Table 1, including *CI*s), the association between NPI and HSNS was estimated at $\beta = .02$ ($p = .01$). When adding a random effect of NPI to the model (analysis for descriptive purposes, not in Table 1), this association was estimated at $\beta = .03$ ($p = .10$), and the random effect was significant ($p = .01$), indicating significant variation of the magnitude of this association between samples (see Supporting Information Figure S1 for distribution).

3.1.2 | Five-Factor Narcissism Inventory

For the FFNI, we obtained data from eight studies encompassing 17 samples. After exclusion of individuals who had more than 20% missing data at item level, the final sample consisted of $N = 7{,}738$ individuals (5,096 female, 2,608 male, 25 diverse, and 9 missing) with a mean age of 27.42 years ($SD = 11.38$, range = 15–82). Table S1 displays detailed characteristics at sample level. ICCs showed that 13.52% of variance in grandiose and 2.74% of variance in vulnerable narcissism were attributable to differences between samples. The correlation between grandiose and vulnerable narcissism was $r = .13$ ($CI_{95\%} = .11$–$.15$, $p < .001$). As Table 1 (including *CI*s) shows, this coefficient remained unchanged when estimated in a multilevel model $\beta = .13$ ($p < .001$). When adding a random effect of grandiose narcissism (for descriptive purposes, not in Table 1), the estimate remained unchanged ($\beta = .13$, $p < .001$), and the random effect was significant ($p = .02$), indicating variability of the association between samples (see Supporting Information Figure S1).

3.2 | Hypotheses tests

3.2.1 | Precursor: quadratic over linear regression

We first evaluated the extent of nonlinearity by adding a quadratic over a linear term in standard regression models (non-MLM, for comparability with our previous studies). For the NPI/HSNS, we observed a linear effect of $\beta = .02$ ($CI_{95} = .00$–$.04$, $p = .06$) and a quadratic effect of $\beta = .03$ ($CI_{95} = .01$–$.04$, $p = .01$) in a model containing both terms. The variance explained by a linear term was 0.08% and

TABLE 1 Coefficient estimates of multilevel models for testing the association between grandiose and vulnerable narcissism at different levels of grandiosity

	Base model		**+1 *SD***			**+2 *SD***		
Measure	**Intercept only**	**+ GN as predictor**	**+ GN as grouping**	**+ GN*Group**	**+ random effect GN*Group**	**+ GN as grouping**	**+ GN*Group**	**+ random effect GN*Group**
NPI/HSNS								
Fixed effects								
Intercept	.04 (−.02 to .10)	.04 (−.02 to .09)	.04 (−.02 to .09)	.00 (−.06 to .07)	.00 (−.06 to .07)	.04 (−.02 to .09)	.01 (−.05 to .07)	.01 (−.05 to .07)
	$p = .19$	$p = .20$	$p = .20$	$p = .90$	$p = .92$	$p = .20$	$p = .69$	$p = .75$
GN		**.02 (.01 to .03)**	.01 (−.02 to .04)	.02 (−.01 to .05)	.02 (−.01 to .05)	.01 (−.01 to .03)	*.02 (.00 to .04)*	*.02 (.00 to .04)*
		$p = .01$	$p = .45$	$p = .17$	$p = .21$	$p = .24$	$p = .07$	$p = .07$
Group			.05 (−.02 to .12)	−.12 (−.26 to .03)	−.10 (−.25 to .04)	**.14 (.03 to .26)**	*−.61 (−1.29 to .08)*	*−.63 (−1.32 to .085)*
			$p = .17$	$p = .12$	$p = .16$	$p = .02$	$p = .08$	$p = .07$
GN*Group				**.12 (.03 to .21)**	**.12 (.03 to .22)**		**.31 (.03 to .60)**	**.33 (.05 to .61)**
				$p = .01$	$p = .01$		$p = .03$	$p = .02$
Group = low				.00 (−.03 to .03)			.01 (−.01 to .03)	
				$p = .90$			$p = .33$	
Group = high				**.12 (.03 to .20)**			**.32 (.04 to .60)**	
				$p = .01$			$p = .02$	
Random effects								
Intercept	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .04)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .04)**
	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
GN*Group					.00 (.00 to .03)			–
					$p = .32$			
FFNI								
Fixed effects								
Intercept	−.02 (−.11 to .07)	−.02 (−.11 to .07)	−.02 (−.11 to .06)	**−.09 (−.18 to .00)**	−.07 (−.18 to .04)	−.02 (−.11 to .06)	−.07 (−.15 to .02)	−.05 (−.14 to .05)
	$p = .60$	$p = .58$	$p = .58$	$p = .04$	$p = .19$	$p = .56$	$p = .13$	$p = .30$
GN		**.13 (.10 to .15)**	**.11 (.08 to .14)**	**.13 (.09 to .16)**	**.11 (.08 to .14)**	**.10 (.07 to .13)**	**.11 (.08 to .14)**	**.10 (.08 to .13)**
		$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
Group			*.07 (−.01 to .16)*	**−.32 (−.50 to −.15)**	**−.18 (−.36 to .00)**	**.25 (.13 to .38)**	**−.74 (−1.26 to −.22)**	−.39 (−.93 to .14)
			$p = .09$	$p < .001$	$p = .05$	$p < .001$	$p < .001$	$p = .15$
GN*Group				**.28 (.17 to .38)**	**.16 (.01 to .31)**		**.43 (.21 to .65)**	*.22 (−.02 to .48)*
				$p < .001$	$p = .04$		$p < .001$	$p = .08$

TABLE 1 (Continued)

	Base model		+1 *SD*			+2 *SD*		
Measure	**Intercept only**	**+ GN as predictor**	**+ GN as grouping**	**+ GN*Group**	**+ random effect GN*Group**	**+ GN as grouping**	**+ GN*Group**	**+ random effect GN*Group**
Group = low				**.08 (.05 to .12)**			**.09 (.07 to .12)**	
				$p < .001$			$p < .001$	
Group = high				**.36 (.26 to .46)**			**.53 (.31 to .74)**	
				$p < .001$			$p < .001$	
Random effects								
Intercept	**.03 (.01 to .06)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.04 (.02 to .08)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.02 (.01 to .06)**
	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$
GN*Group					**.04 (.02 to .09)**			**.04 (.02 to .10)**
					$p = .02$			$p = .03$

Note: Coefficients in bold are significant at $p < .05$, coefficients in italic denote trends at $p < .10$. Brackets show $CI_{95\%}$. Group refers to sample split (low/high) at either +1 *SD* or +2 *SD*.

Abbreviations: FFNI, Five-Factor Narcissism Inventory; GN, grandiose narcissism; HSHS, Hypersensitive Narcissism Scale; NPI, Narcissistic Personality Inventory.

significantly increased ($p < .001$) to 0.16% with a quadratic term. For the FFNI, we observed a linear effect of $\beta = .12$ ($CI_{95} = .40–.14$, $p < .001$) and a quadratic effect of $\beta = .06$ ($CI_{95} = .02–.05$, $p < .001$) in a model containing both. The variance explained by linear term was 1.73% and significantly ($p < .001$) increased to 2.03% with a quadratic term.

3.2.2 | Confirmatory analysis: interaction terms in multilevel models

Narcissistic Personality Inventory/Hypersensitive Narcissism Scale

Table 1 presents a multilevel model including the main effects of *NPI* and *Group* (sample-split at +1 *SD*) as well as the interaction *NPI*Group* on *HSNS*. In this model, neither the effect of *NPI* ($p = .17$) nor that of *Group* ($p = .12$) was statistically significant, but the interaction was ($p = .01$). The interaction coefficient indicated a standardized difference of $\Delta\beta = .12$ between groups of lower and higher grandiose narcissism (Figure 1 displays a graphical representation). In the lower grandiose subsample, there was no association ($\beta = .00$, $p = .90$), whereas in the higher grandiose subsample, there was a small effect of $\beta = .12$ ($p = .01$). When adding a random effect of the interaction term to this model, the fixed interaction effect remained unchanged and significant ($p = .01$), but the interaction did not significantly vary across samples ($p = .32$), which shows that there is no evidence for heterogeneity of this effect across samples.

When we split the sample at +2 *SD*, again, we did not observe significant main effects of *NPI* ($p = .07$) or Group ($p = .08$), but there was a significant interaction between *NPI*Group*. The interaction coefficient indicated a standardized difference of $\Delta\beta = .32$ ($p = .02$) between groups below and above +2 *SD* of the NPI distribution. The coefficients within groups were $\beta = .01$ ($p = .33$) and $\beta = .32$ ($p = .02$), pointing to a moderate effect. The random effect of this interaction term could not be estimated, presumably due to the small samples above +2 *SD*.

In the next step, we evaluated the consistency of *NPI*Group* interactions in moderation models. Though we did not find random effects of the interaction of interest across samples, the interaction could still be moderated by level-1-variables, and we had a priori interest in tests of moderation. We observed significant main effects (see Table 2) of *sex* ($p < .001$) and *age* ($p < .001$) in the way that women and younger people generally displayed higher scores in vulnerable narcissism. No three-way interaction was statistically significant. While most two-way interactions remained unchanged in the moderation models, the interaction of *NPI*Group* was not significant anymore when taking up *age* and the interaction

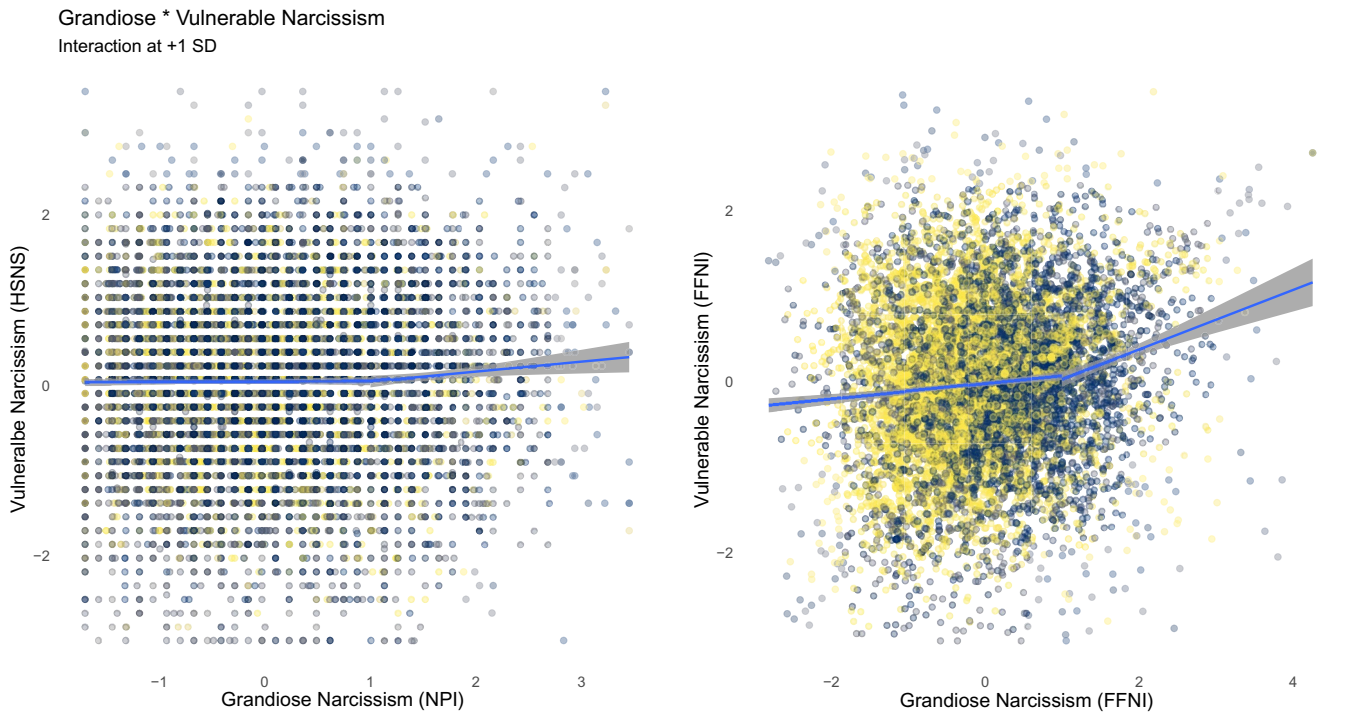

FIGURE 1 Bivariate distributions of grandiose and vulnerable narcissism in the NPI/HSNS (left) and FFNI (right). Separate regression lines for lower and higher grandiose segments, split at +1 *SD*, graphically represent the significant interaction effects (see Table 1). Different colors denote different samples

*NPI*Group*age*. The same was true for *publication status*.[12] The other moderators did not show significant main effects or interactions.

To be sure that the results are not affected by influential data points, we repeated the analyses after excluding bivariate extreme values according to Mahalanobis distance. As Supporting Information Tables S2 and S3 show, the results do not depend on whether extreme values are being removed. As an exception to this, taking up *sex* as a moderator pushed the significance of *NPI*Group* to the trend level, but estimates stayed nearly unchanged.

Five-Factor Narcissism Inventory

Table 1 presents a multilevel model including the main effects of *FFNI Grandiose* (*FFNI_G*) and *Group* (sample-split at +1 *SD*) as well as their interaction *FFNI_G*Group* on *FFNI Vulnerable* (*FFNI_V*). Both main effects and their interaction were significant. The main effect of *FFNI_G* matched the simple correlation reported above ($\beta = .13$, $p < .001$). The interaction effect indicated a difference of $\Delta\beta = .28$ ($p < .001$) between groups (see Figure 1 for graphical representation). The slope in the lower grandiose group was a small effect of $\beta = .08$ ($p < .001$), the slope in the higher grandiose group was a moderate effect of $\beta = .36$ ($p < .001$). When adding a random interaction term, the fixed interaction effect *FFNI_G*Group* was lower with $\Delta\beta = .16$ but still significant ($p = .04$). The random interaction effect was also significant ($p = .02$), indicating partial heterogeneity across samples (which will be tested for moderating effects in the following).

As with the NPI/HSNS, we repeated the analysis with a sample split of +2 *SD*. In the interaction model, we observed a similar main effect of *FFNI_G* ($\beta = .11$, $p < .001$) and a stronger interaction effect ($\Delta\beta = .43$, $p < .001$). Slopes within the groups were a small effect of $\beta = .09$ ($p < .001$) and a large effect of $\beta = .53$ ($p < .001$), respectively. When adding a random interaction term, the fixed interaction effect dropped to $\Delta\beta = .22$ and was not significant ($p = .08$), and there was variation between samples ($p = .03$), indicating heterogeneity of this effect (which will be tested for moderating effects next).

As we observed significant random effects for the interaction terms across samples at both split criteria, we next sought to explain this variation by probing three-way interactions with the level-1-variables *sex* and *age* (which varied considerably between studies; see Table S1) and the level-2-variables *country*, *FFNI version*, and *publication status*. We observed significant main effects (see Table 2) of *sex* ($p < .001$) and *age* ($p < .001$) in the way that women and younger people generally displayed higher scores in vulnerable narcissism. Among these, *age* displayed a three-way interaction effect with *FFNI_G* and *Group* ($p < .001$), which showed that the difference in slope between lower and higher grandiose individuals increases

with age (see Supporting Information Figure S2). For every one-year change in age, the difference in slope increases by $\Delta\beta = .01$ (more precisely $\Delta\beta = .006711$, for a sample split at +1 *SD*), which means that for a 20-year-old person, the model predicts a change in slope of $\Delta\beta = .13$, whereas this change would be $\Delta\beta = .34$ for a 50-year-old person. This pattern of results was evident for both split criteria (with varying parameter estimates). None of the other moderation tests were significant, and including the moderators in the models did not generally alter the pattern of results.

Again, we repeated the analyses after excluding cases that could be considered bivariate extreme values according to Mahalanobis distance. Supporting Information Tables S2 and S3 show that the pattern of results was not affected by excluding those cases; the results pattern stayed unchanged and the coefficients varied only slightly.

3.2.3 | Exploratory analysis: differential saturation with three-factor model dimensions

Narcissistic Personality Inventory/Hypersensitive Narcissism Scale

To investigate the role of the underlying three factors for the nonlinear relations among grandiose and vulnerable narcissism, we complemented the preregistered analyses with exploratory correlational analyses. We split the NPI into leadership/authority (LA), grandiose exhibitionism (GE), and entitlement/exploitativeness (EE; Ackerman et al., 2011). LA most closely resembles agentic narcissism, as does grandiose GE (though less prototypically), whereas EE most closely resembles antagonistic narcissism (Krizan & Herlache, 2018; Miller et al., 2016). As Table 3 and the corresponding continuous visualization in Figure 2 show, correlations of grandiose narcissism with its agentic aspects decreased substantially along the distribution, whereas correlations with its antagonistic aspects remain relatively unchanged and show increases at very high levels (however, estimates are less stable toward the end of the distribution; see Figure 2). Similar effects were not evident in the correlation of vulnerable narcissism with these factors along the grandiose narcissism distribution, though slight increases toward the upper end were evident as well.

Five-Factor Narcissism Inventory

Similar to the NPI/HSNS, the pattern of correlations (see Table 3 and Figure 2) for grandiose narcissism shows that grandiosity becomes considerably less saturated with agentic but similarly saturated with antagonistic narcissism at higher levels, and the correlation with neurotic narcissism increases from negative to zero. This pattern is also evident at facet level, with agentic aspects such as grandiose fantasies decreasing substantially in relevance[13] and antagonistic aspects showing either mild de- or increases. Regarding neurotic aspects, shame increases considerably in relevance. Regarding correlations with vulnerable narcissism, there is generally little variation, but vulnerability seems to become more saturated with antagonistic aspects at higher levels of grandiosity (though also with larger *CI*s; see Figure 2).

3.2.4 | Exploratory analysis: nonlinear associations among three-factor model dimensions

Narcissistic Personality Inventory/Hypersensitive Narcissism Scale

We conducted exploratory response surface analyses to directly investigate nonlinear associations within the three-factor model. We estimated separate models for the prediction of the *HSNS* by *LA* and *EE*/HSNS by *GE* and *EE* to study the interplay of agentic and antagonistic on vulnerable aspects of narcissism. As Table 4 shows, both models showed significant linear main effects of both dimensions, trends for interactions among them, and significant quadratic effects of the variables representing agentic aspects. Figure 3 shows that in both models, antagonistic aspects of narcissism linearly increase narcissistic vulnerability, whereas agentic aspects decrease vulnerability, though this effect levels off nonlinearly at higher scores. This nonlinearity comes into play earlier for GE than for LA.

Five-Factor Narcissism Inventory

A response surface model (see Table 4) showed that agentic and antagonistic narcissism have significant linear and quadratic effects, and significantly interact in predicting neurotic narcissism. In contrast to the NPI factors, the FFNI factors yielded a strongly intertwined response surface (see Figure 3): high scores on one of the predictors with simultaneously low scores on the other go along with low narcissistic neuroticism. However, a combination of low agentic and elevated (but not too high) antagonistic narcissism[14] goes along with elevated scores on neurotic narcissism. Low scores on both are also accompanied by low neurotic narcissism.

3.2.5 | Empirical test of change in slope

Narcissistic Personality Inventory/Hypersensitive Narcissism Scale

We conducted segmented regression analyses within the two-factor model to obtain empirical estimates of

TABLE 2 Moderation tests for variables at level 2 (sample) and level 1 (person)

	+1 *SD*					+2 *SD*				
Measure	**Sex as moderator**	**Age as moderator**	**Country as moderator**	**Version as moderator**	**Publication as moderator**	**Sex as moderator**	**Age as moderator**	**Country as moderator**	**Version as moderator**	**Publication as moderator**
NPI/HSNS										
Fixed effects										
Intercept	.04 (−.03 to .10)	**.34 (.25 to .43)**	−.02 (−.10 to .05)	.00 (−.07 to .06)	−.02 (−.15 to .11)	.04 (−.02 to .10)	**.34 (.25 to .43)**	−.01 (−.08 to .07)	.00 (−.07 to .07)	−.03 (−.16 to .10)
	$p = .28$	$p < .001$	$p = .51$	$p = .94$	$p = .72$	$p = .20$	$p < .001$	$p = .88$	$p = .93$	$p = .61$
GN	*.03 (.00 to .06)*	.00 (−.02 to .03)	.02 (−.01 to .04)	.02 (−.01 to .05)	.02 (−.01 to .05)	**.03 (.01 to .05)**	.01 (−.02 to .03)	.01 (−.01 to .03)	**.02 (.00 to .04)**	*.02 (.00 to .04)*
	$p = .07$	$p = .75$	$p = .29$	$p = .17$	$p = .22$	$p = .01$	$p = .57$	$p = .28$	$p = .05$	$p = .07$
Group	−.11 (−.25 to .04)	*−.13 (−.27 to .01)*	*−.14 (−.29 to .01)*	−.12 (−.26 to .02)	−.10 (−.25 to .04)	*−.59 (−1.28 to .10)*	−.53 (−1.21 to .16)	−.58 (−1.28 to .12)	*−.68 (−1.38 to .02)*	*−.60 (−1.29 to .09)*
	$p = .15$	$p = .09$	$p = .06$	$p = .12$	$p = .16$	$p = .09$	$p = .13$	$p = .11$	$p = .06$	$p = .09$
Moderator	**−.08 (−.13 to −.04)**	**−.01 (−.02 to −.01)**	.04 (−.08 to .16)	.03 (−.11 to .17)	.04 (−.11 to .18)	**−.08 (−.12 to −.04)**	**−.01 (−.02 to −.01)**	.02 (−.10 to .14)	.03 (−.11 to .17)	.06 (−.09 to .20)
	$p < .001$	$p < .001$	$p = .53$	$p = .70$	$p = .60$	$\mathbf{p < .001}$	$\mathbf{p < .001}$	$p = .71$	$p = .68$	$p = .42$
GN*Group	**.11 (.01 to .21)**	.07 (−.07 to .20)	**.15 (.06 to .25)**	**.12 (.03 to .22)**	.04 (−.09 to .18)	**.30 (.01 to .59)**	.21 (−.10 to .53)	**.31 (.01 to .59)**	**.36 (.06 to .65)**	*.30 (−.03 to .64)*
	$p = .04$	$p = .35$	$p < .001$	$p = .01$	$p = .54$	$p = .04$	$p = .19$	$p = .04$	$p = .02$	$p = .08$
GN*Group* Moderator	.01 (−.06 to .08)	.00 (.00 to .01)	−.06 (−.14 to .02)	−.01 (−.09 to .07)	.08 (−.03 to .19)	.00 (−.08 to .09)	.00 (.00 to .01)	.02 (−.09 to .12)	−.04 (−.14 to .05)	.01 (−.15 to .16)
	$p = .74$	$p = .18$	$p = .18$	$p = .80$	$p = .14$	$p = .95$	$p = .29$	$p = .74$	$p = .34$	$p = .91$
Random effects										
Intercept	**.02 (.01 to .03)**	**.02 (.01 to .04)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .04)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**	**.02 (.01 to .03)**
	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
FFNI										
Fixed effects										
Intercept	.02 (−.07 to .11)	**.37 (.24 to .50)**	**−.14 (−.26 to −.01)**	−.13 (−.33 to .07)	−.03 (−.15 to .09)	.04 (−.05 to .12)	**.39 (.25 to .52)**	*−.11 (−.23 to .01)*	−.10 (−.30 to .10)	.00 (−.12 to .12)
	$p = .68$	$p < .001$	$p = .03$	$p = .20$	$p = .60$	$p = .39$	$p < .001$	$p = .08$	$p = .31$	$p = .99$
GN	**.15 (.12 to .19)**	**.10 (.07 to .14)**	**.12 (.09 to .16)**	**.13 (.09 to .16)**	**.13 (.09 to .16)**	**.14 (.11 to .17)**	**.09 (.06 to .12)**	**.11 (.08 to .14)**	**.11 (.08 to .14)**	**.11 (.09 to .14)**
	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
Group	**−.28 (−.46 to −.10)**	**−.33 (−.50 to −.16)**	**−.32 (−.49 to −.14)**	**−.32 (−.50 to −.14)**	**−.32 (−.50 to −.15)**	**−.68 (−1.20 to −.17)**	**−.72 (−1.24 to −.21)**	**−.72 (−1.24 to −.19)**	**−.70 (−1.22 to −.18)**	**−.71 (−1.23 to −.19)**
	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$
Moderator	**−.26 (−.31 to −.20)**	**−.02 (−.02 to −.01)**	.08 (−.08 to .25)	.04 (−.18 to .27)	−.11 (−.27 to .05)	**−.25 (−.30 to −.20)**	**−.02 (−.02 to −.01)**	.08 (−.08 to .25)	.04 (−.18 to .27)	−.12 (−.28 to .04)
	$p < .001$	$p < .001$	$p = .31$	$p = .68$	$p = .16$	$p < .001$	$p < .001$	$p = .31$	$p = .69$	$p = .14$
GN*Group	**.22 (.10 to .34)**	.11 (−.04 to .27)	**.28 (.17 to .39)**	**.26 (.10 to .42)**	**.28 (.15 to .41)**	**.38 (.15 to .60)**	.18 (−.07 to .44)	**.44 (.22 to .66)**	**.30 (.02 to .58)**	**.38 (.14 to .62)**
	$p < .001$	$p = .17$	$p < .001$	$p < .001$	$p < .001$	$p = .01$	$p = .16$	$p < .001$	$p = .04$	$p < .01$

TABLE 2 (Continued)

Measure	+1 *SD* Sex as moderator	Age as moderator	Country as moderator	Version as moderator	Publication as moderator	+2 *SD* Sex as moderator	Age as moderator	Country as moderator	Version as moderator	Publication as moderator
GN*Group*Moderator	.04 (−.04 to .13)	**.01 (.00 to .01)**	−.01 (−.10 to .08)	.01 (−.11 to .14)	−.01 (−.10 to .09)	.04 (−.06 to .13)	**.01 (0.00 to 0.01)**	−.05 (−.15 to .05)	.13 (−.04 to .30)	.06 (−.05 to .16)
	$p = .30$	$p < .001$	$p = .78$	$p = .83$	$p = .90$	$p = .46$	$p < .001$	$p = .38$	$p = .13$	$p = .31$
Random effects										
Intercept	**.02 (.01 to .05)**	**.04 (.02 to .09)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.04 (.02 to .09)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**	**.02 (.01 to .05)**
	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$	$p = .01$

Note: Coefficients in bold are significant at $p < .05$, coefficients in italic denote trends at $p < .10$. Brackets show $CI_{95\%}$. Group refers to sample split (low/high) at either +1 *SD* or +2 *SD*. Country was dummy coded for North America (0) and Europe (1). Version was dummy coded for long (0) and short forms (1). Sex was dummy coded for female (0) and male (1). See methods for details. Age reflects the age in years, unstandardized.

Abbreviations: FFNI, Five-Factor Narcissism Inventory; GN, grandiose narcissism; HSHS, Hypersensitive Narcissism Scale; NPI, Narcissistic Personality Inventory.

breakpoints. We observed a significant breakpoint at +1.98 *SD* of the NPI distribution ($p = .01$; see Supporting Information Figure S4). The slopes below and above this breakpoint were $\beta = .01$ ($CI_{95} = -.01$–$.04$, $p = .18$) and $\beta = .12$ ($CI_{95} = .03$–$.64$, $p = .03$). Note that while the result pattern is similar to the one reported for the MLM interaction test, the standardized difference in slope is smaller, likely because the analysis does not consider the nested data structure. To test the specificity of the nonlinear relationship, we reversed the analysis, using the HSNS as a predictor and the NPI as a criterion. Contrary to our expectation, this analysis also indicated a significant breakpoint at +0.88 *SD* of the HSNS distribution. The slopes below and above the breakpoint were $\beta = -.01$ ($CI_{95} = -.04$–$.02$, $p = .40$) and $\beta = .09$ ($CI_{95} = .10$–$.31$, $p < .001$).

Five-Factor Narcissism Inventory

Segmented regression analysis revealed a significant change in slope between *FFNI_G* and *FFNI_V* at +1.35 *SD* of the grandiose narcissism distribution ($p < .001$; see Supporting Information Figure S4). The slopes below and above these breakpoints were $\beta = .08$ ($CI_{95} = .06$–$.12$, $p < .001$) and $\beta = .21$ ($CI_{95} = .26$–$.54$, $p < .001$), respectively. While the effect points in the same direction as the MLM interaction test reported above, the difference in slopes is smaller, likely because the analysis does not consider the nested data structure. Again, we reversed the analysis to test for specificity. When using *FFNI_V* as a predictor and *FFNI_G* as a criterion, segmented regression analysis yielded a significant breakpoint at +0.29 *SD* of the vulnerable narcissism distribution ($p = .02$). However, this effect indicated a *de*crease in slope between the lower ($\beta = .14$, $CI_{95} = .15$–$.23$, $p < .001$) and upper segment ($\beta = .04$, $CI_{95} = .01$–$.15$, $p = .03$) of the vulnerable narcissism distribution. This indicates that, while high grandiosity is accompanied by increased vulnerability, high vulnerability is largely independent of grandiosity.

4 | DISCUSSION

This study tested the nonlinearity hypothesis on the relation of narcissistic grandiosity and vulnerability using a preregistered individual data meta-analysis (mega-analysis). We observed clear evidence (moderate to large effects) for the hypothesis in the FFNI and weaker evidence (small to moderate effects) in the NPI/HSNS. Specifically, findings for the FFNI showed that there is a sizeable difference in slope ($\Delta\beta = .28$) between grandiosity and vulnerability at lower versus higher levels (+1 *SD*) of grandiosity, and this difference becomes stronger

TABLE 3 Intercorrelations of FFNI factors and facets for different split criteria

	Grandiose narcissism			Vulnerable narcissism		
	< +1 *SD*	> +1 *SD*	> +2 *SD*	< +1 *SD*	> +1 *SD*	> +2 *SD*
NPI/HSNS						
NPI	–	–	–	.00	**.06**	**.11**
Agentic narcissism						
Leadership/Authority	**.74**	**.53**	**.38**	**−.05**	.03	−.02
Grandiose exhibitionism	**.60**	**.47**	**.44**	−.01	.01	.08
Antagonistic narcissism						
Entitlement/Exploitativeness	**.40**	**.32**	**.36**	**.27**	**.27**	**.29**
HSNS	.00	**.06**	**.11**	–	–	–
FFNI						
Agentic narcissism	**.79**	**.41**	**.39**	**.06**	**−.06**	**−.16**
Acclaim seeking	**.55**	**.25**	**.28**	**.07**	**−.09**	**−.23**
Authoritativeness	**.62**	**.33**	**.36**	**−.12**	**−.14**	**−.15**
Grandiose fantasies	**.57**	**.22**	**.15**	**.21**	**.08**	−.08
Exhibitionism	**.55**	**.28**	**.23**	**.08**	.03	.02
Antagonistic narcissism	**.72**	**.69**	**.66**	**.53**	**.64**	**.69**
Manipulativeness	**.60**	**.50**	**.47**	**.12**	**.09**	.01
Exploitativeness	**.55**	**.50**	**.47**	**.24**	**.34**	**.33**
Entitlement	**.50**	**.47**	**.44**	**.25**	**.36**	**.40**
Lack of empathy	**.40**	**.44**	**.45**	**.12**	**.24**	**.34**
Arrogance	**.61**	**.51**	**.47**	**.20**	**.29**	**.31**
Reactive anger	**.29**	**.21**	**.21**	**.72**	**.80**	**.84**
Distrust	**.11**	**.23**	**.22**	**.64**	**.56**	**.53**
Thrill seeking	**.49**	**.35**	**.35**	**.10**	**.12**	**.16**
Neurotic narcissism	**−.21**	**−.09**	.00	**.81**	**.79**	**.81**
Shame	**−.14**	*.07*	**.18**	**.79**	**.78**	**.79**
Indifference (rev.)	**−.36**	**−.37**	**−.40**	**.44**	**.30**	*.14*
Need for admiration	**−.09**	.02	.08	**.77**	**.73**	**.78**

Note: Coefficients in bold are significant at $p < .01$, coefficients in italic are significant at $p < .05$. *N*s for < +1 *SD*, > +1 *SD*, and > +2 *SD* are 6,542, 1,196, and 324, respectively. The indifference facet is reversed in the trifurcated model (Miller et al., 2016), indicating *low* indifference to perceived slights, criticism, failure, or rebuke/*high* self-consciousness (Glover et al., 2012).

Abbreviations: FFNI, Five-Factor Narcissism Inventory; HSNS, Hypersensitive Narcissism Scale; NPI, Narcissistic Personality Inventory.

as grandiosity further increases ($\Delta\beta$ = .43 at +2 *SD*). Complementary empirical breakpoint detection yielded an estimate in between those two criteria (+1.35 *SD*). The effect was not dependent upon moderators such as country of assessment, questionnaire version, or participants' sex but was moderated by participants' age, which we elaborate on in the following. For the NPI/HSNS, we observed a small effect ($\Delta\beta$ = .12) for the hypothesized relation when comparing segments below and above +1 *SD*, and a moderate effect when applying a stricter criterion ($\Delta\beta$ = .31 at +2 *SD*). The empirical breakpoint estimate at +1.98 *SD* aligned with this latter criterion. There was no indication of heterogeneity across samples or a moderation effect, though the interaction seemed to depend on age (as for the FFNI).[15] Taken together, these results show that there is evidence for an increase of narcissistic vulnerability at high levels of grandiosity as assessed by trait self-report scales. The differences are subtle, and their detection requires a nuanced and reliable assessment.

4.1 | Personality and clinical perspectives on narcissism—paradox lost?

Given the near-orthogonality of grandiose and vulnerable narcissism measures in the general population (Jauk & Kaufman, 2018; Jauk et al., 2017; Krizan & Herlache, 2018;

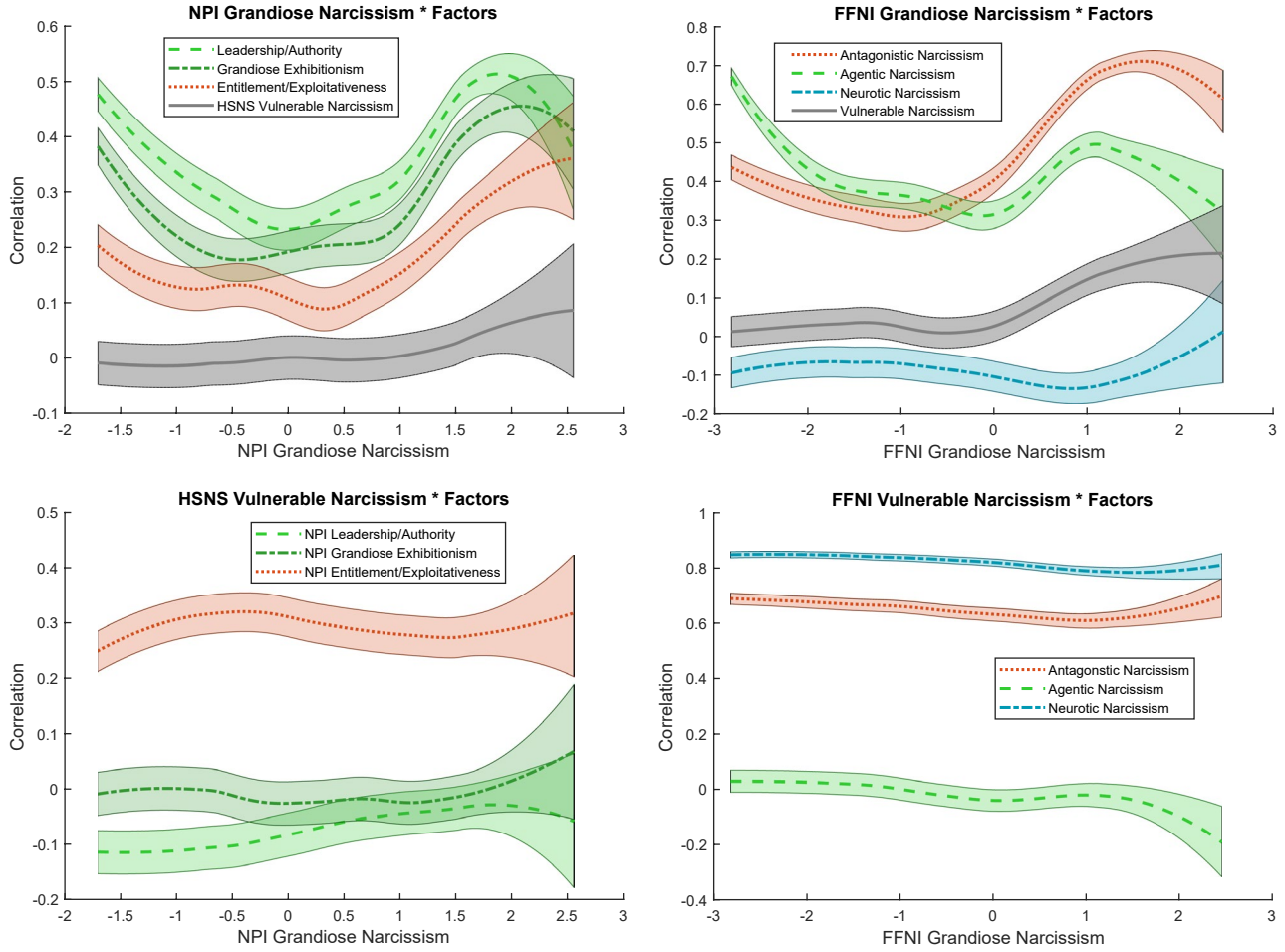

FIGURE 2 Visualization of the correlation of grandiose (top) and vulnerable narcissism (bottom) with the three-factor factor model dimensions as a function of grandiose narcissism (left: NPI/HSNS, right: FFNI). Plots display the correlation (including $CI_{95\%}$ band) in windows of $n = 2{,}500$ data points, iteratively computed for every X-value (starting from the lowest) and smoothed using a loess filter. The upper tail uses a minimum of $n = 100$ data points as ceiling

Miller et al., 2011; Wink, 1991), personality models tend to view these two expressions of narcissism as mostly distinct traits. Conversely, clinical perspectives are more inclined to see a common ground for both (cf. Wright & Edershile, 2018), and emphasize that individuals with pathological narcissism can fluctuate between grandiose and vulnerable states (Pincus & Lukowitsky, 2010; Ronningstam, 2009). Higher state variability has also been confirmed in systematic research using different methods (Edershile & Wright, 2020; Gore & Widiger, 2016; Kanske et al., 2017; Oltmanns & Widiger, 2018). Our findings show that personality and clinical perspectives hold true for different subpopulations. While grandiose and vulnerable narcissism reflect largely orthogonal traits at low-to-moderate levels of grandiosity, they become more intertwined at higher levels (+1 *SD,* or top 15.9%), and substantially related at very high levels (+2 *SD*, or top 2.6%). This latter criterion lies within the prevalence estimates of NPD (American Psychiatric Association, 2013; Ronningstam, 2009), a personality disorder characterized by extreme grandiosity (Miller et al., 2014).

What mechanisms might drive the increasing correlation of trait measures of grandiosity and vulnerability at high levels of grandiose narcissism? Based on accumulating evidence for variation in grandiose and vulnerable states, particularly at high levels of grandiose narcissism (Edershile & Wright, 2020; Gore & Widiger, 2016; Oltmanns & Widiger, 2018), we assume that increases in trait questionnaires of vulnerability likely reflect increases of such vulnerable states or episodes in those with high levels of grandiosity. That is, to some extent, the experience of vulnerable states likely echoes in trait measures. We base this interpretation on WTT, which assumes that traits can be understood as density distributions of states (Fleeson & Jayawickreme, 2015; Jayawickreme et al., 2019), and trait scales, therefore, indicate the central tendency of intraindividual variation in experience and behavior.

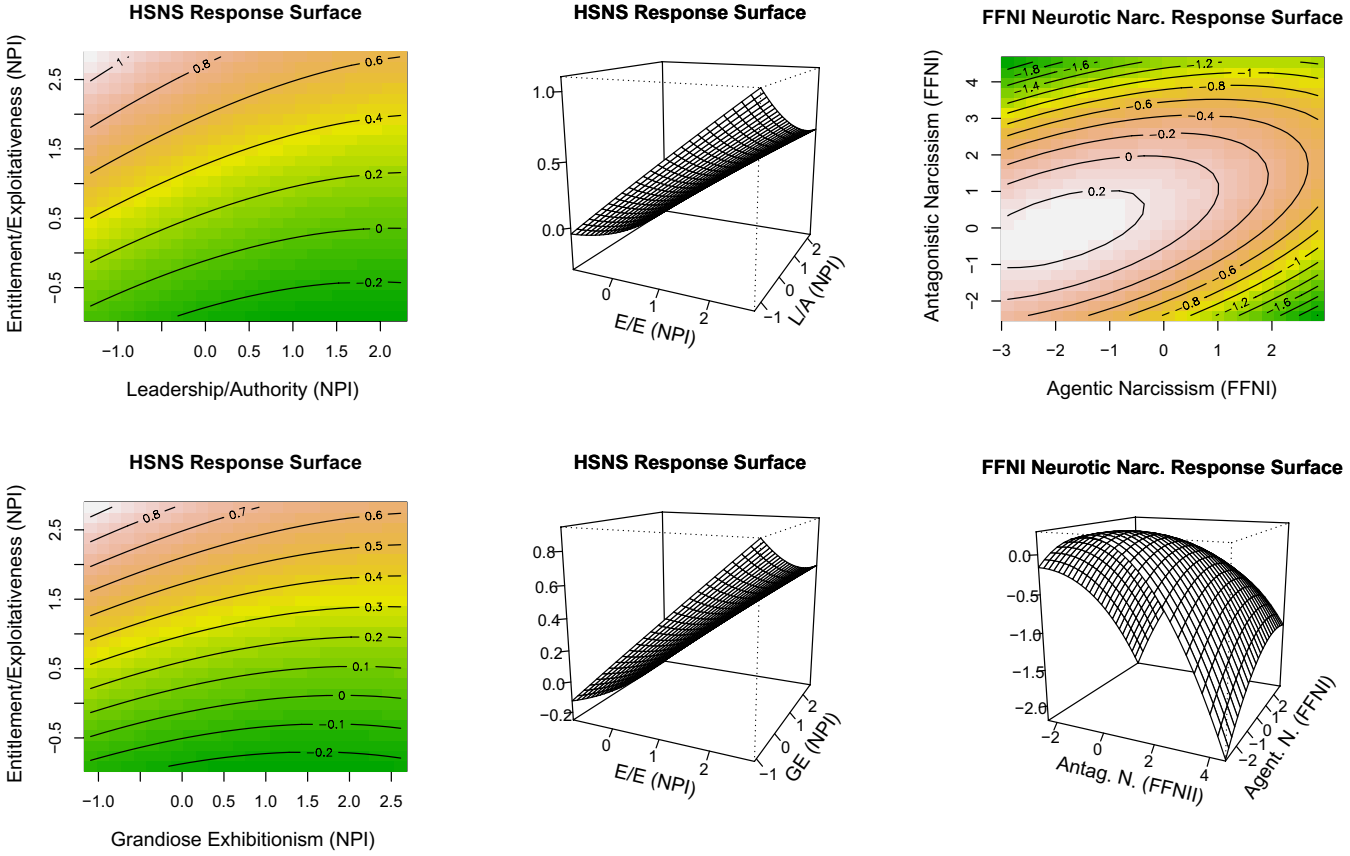

FIGURE 3 Two- and three-dimensional visualizations of response surfaces (second-order polynomial models) for prediction of HSNS vulnerable narcissism (left) and FFNI neurotic narcissism (right) by three-factor model scores of grandiose narcissism. Scales are standardized. Left: The NPI factors (*X*, *Y*) display slight nonlinearity and interaction (see Table 4) in predicting the HSNS (colormap, *Z*). The highest HSNS scores can be expected for low agentic and high antagonistic narcissism. Right: The FFNI factors (*X*, *Y*) display strong nonlinearity and interaction (see Table 4) in predicting neurotic narcissism (colormap, *Z*). High neurotic narcissism scores can be expected for low agentic, and medium-to-elevated antagonistic narcissism. Low scores on neurotic narcissism can be expected for high agentic and low antagonistic narcissism/low agentic and high antagonistic narcissism. Note, however, that this latter combination is unlikely to occur given that agentic and antagonistic narcissism are highly correlated and display a triangular bivariate distribution (see Supporting Information Figure S3)

The highly grandiose individual might thus experience more frequent and/or more pronounced vulnerable states, which, to some extent, manifests in global self-ratings.

The nonlinear effect is specific for grandiosity and cannot be inversed (see FFNI segmented regression models). Highly vulnerable persons do not show increased grandiosity, which is in line with our previous study (Jauk & Kaufman, 2018) and research demonstrating with other methods that highly grandiose individuals show episodes of vulnerability, but not the other way around (Edershile & Wright, 2020; Gore & Widiger, 2016). However, unexpectedly, the results pattern for the NPI/HSNS deviated, in this regard, from that of the FFNI, as a positive change in slope was also observed along the HSNS distribution. While we have no clear interpretation for this result at this point, tentatively speaking, it might be that the HSNS, which has formerly also been considered a measure of "covert" narcissism (Wink, 1991), draws to some extent on hidden grandiose aspects ("I am secretly 'put out' or annoyed when other people come to me with their troubles, asking me for my time and sympathy"; Hendin & Cheek, 1997, p. 592). Higher scale scores might thus be accompanied by higher breakthroughs of grandiosity, so to speak. However, this speculation must remain subject to future studies, and as a whole, the results observed for the FFNI are in greater accordance with studies using different methods (Edershile & Wright, 2020; Gore & Widiger, 2016).

4.2 | The nonlinear relationship through the lens of the three-factor model

Factor- and facet-level analyses for the NPI and FFNI showed that with increasing grandiose narcissism,

TABLE 4 Results of response surface models (second-order polynomial regression models) for the prediction of vulnerable/neurotic aspects of narcissism by agentic and antagonistic aspects

	Linear effect on…	Squared effect on…	Model summary
NPI/HSNS			
Model 1	…HSNS	…HSNS	
Leadership/Authority	**−.12 (.01)**	**.03 (.01)**	
Entitlement/Exploitativeness	**.29 (.01)**	.00 (.01)	
Interaction	*−.02 (.01)*	–	
Model 2	…HSNS	…HSNS	
Grandiose exhibitionism	**−.07 (.01)**	**.02 (.01)**	
Entitlement/Exploitativenss	**.27 (.01)**	−.01 (.01)	
Interaction	*−.02 (.01)*	–	$F_{(5,10513)} = 179.60$, $p < .001$
			$R^2_{adj} = .08$
FFNI	…Neurotic narcissism	…Neurotic narcissism	
Agentic narcissism	**−.18 (.01)**	**−.05 (.01)**	
Antagonistic narcissism	**.14 (.01)**	**−.10 (.01)**	
Interaction	**.08 (.02)**	–	$F_{(5,7732)} = 66.23$, $p < .001$
			$R^2_{adj} = .04$

Note: Coefficients are standardized, brackets denote standard errors. Bold type represents $p < .05$, italic type represents $p < .10$.

Abbreviations: FFNI, Five-Factor Narcissism Inventory; HSHS, Hypersensitive Narcissism Scale; NPI, Narcissistic Personality Inventory.

grandiosity becomes less saturated with agentic aspects, and vulnerability becomes more saturated with antagonistic aspects. This is largely in accordance with our previous results (Jauk & Kaufman, 2018) and shows that, on the one hand, adaptive aspects of grandiosity, which could potentially counteract negative consequences (e.g., Kaufman et al., 2020), become less relevant as grandiosity increases. On the other, it shows that vulnerability is tied more strongly to antagonistic aspects, making the common core of grandiose and vulnerable aspects stronger at high levels of grandiosity (though a higher saturation of grandiosity with antagonism, as in our previous study [Jauk & Kaufman, 2018], was not evident).

To further study the interplay of different narcissism aspects directly at the three-factor level, we conducted exploratory response surface analyses, which allow to investigate nonlinear and interactive effects of agentic and antagonistic aspects. For both the NPI and the FFNI, these showed that it is neither agentic nor antagonistic aspects alone that increase vulnerable/neurotic aspects, but a combination of those. Specifically, agentic aspects—at least up to a certain point—seem to buffer antagonistic aspects when it comes to vulnerable/neurotic narcissism. This pattern was more clearly evident in the NPI/HSNS, where, at low levels of agentic narcissism, even mild increases in antagonistic narcissism are accompanied by increases in neurotic narcissism, whereas at high levels of agentic narcissism, it takes longer for antagonistic narcissism to increase neurotic narcissism. Agentic narcissism, however, continues to have this "protective" effect only up to an above-average level, where the relationship levels off. The FFNI results pointed in a similar direction, in that a combination of low agentic and elevated antagonistic narcissism is accompanied by higher neurotic narcissism. Here, however, we observed stronger quadratic effects, which indicate that high scores on either dimension *de*crease neurotic narcissism again.

Considering the evidence from factor correlation and response surface analyses together, we conclude that antagonistic narcissism does play a key role in explaining vulnerable/neurotic narcissism, but the *absence of agentic aspects* might be at least as important. Particularly those individuals who have an antagonistic interpersonal style, yet little "positive" and potentially stabilizing (even if self-aggrandizing) experiences linked to agentic narcissism, might display vulnerable/neurotic aspects of narcissism such as shame (which displayed the strongest increase in correlation with overall grandiose narcissism). Similar findings were obtained, for instance, for the absence of positive affect in the development of depression (Wood & Joseph, 2010). More generally, recent research suggested that personality disorders can be understood as emergent interpersonal syndromes (i.e., unlikely and socially problematic trait configurations; Lilienfeld et al., 2019), and the results observed here might be seen as supporting such an account to narcissism.

4.3 | Normal and pathological narcissism

The results could further be seen as supporting to some degree the distinction between adaptive and maladaptive or normal and pathological expressions[16] of narcissism. Research has long strived to delineate self-report scales of narcissism with respect to the extent to which they assess adaptive or maladaptive aspects (e.g., Ackerman et al., 2011; Pincus et al., 2009). These efforts commonly center around the identification of nomological networks as evident in validity measures, assuming linear effects of the respective scales. While these linear effects do certainly capture the most relevant general trends, it might well be the case that increasing narcissism levels are accompanied by qualitative shifts in the nomological networks. For instance, a person who behaves arrogant in some situations, but not in others, might be quite successful in the social realm, not display signs of psychological maladjustment, and might be considered an example of adaptive/normal narcissism. In contrast, a person who behaves arrogant in almost every situation—including those where others will certainly not tolerate it—will almost inevitably face social problems, which might unveil narcissistic vulnerability. Crucially, both of these persons can be placed on the *same* narcissism *dimension* (here: antagonistic narcissism), but in *different segments* of it. It is thus not necessary to assume qualitative shifts in the narcissism dimension (antagonism) itself, but different (potentially socially mediated) effects of it might manifest in differential relations with other variables, particularly narcissistic vulnerability. These might further be amplified by simultaneous changes in other aspects, most notably the absence of agentic aspects.

It is interesting to note that our findings align well with those from a large-scale study of nonlinear effects of narcissism in the workplace: Grijalava and colleagues (2015) investigated leadership qualities related to narcissism and found narcissism to be positively associated with (supervisor-rated) leadership effectiveness at moderate levels, but negatively related at high levels. As the authors stated, "increasing narcissism in the low range of the trait will lead to more adaptive manifestations of narcissism" whereas "increasing narcissism in the high range of the trait will produce maladaptive manifestations" (p. 26). The effects were not attributable to agentic aspects, but presumably more related to antagonistic aspects (though these were not directly studied), which is in line with the effects observed here.

We thus argue that the adaptiveness or maladaptiveness of inventories such as the NPI or FFNI might not only depend upon their coverage of different construct aspects, but also on the investigated range within the respective dimensions, and potentially interactions with other dimensions. Which form of narcissism might be considered normal or pathological might, from an empirical point of view, well depend upon the *level* of narcissism, and changes in the nomological network associated with it. We note that the correlation between grandiosity and vulnerability observed here for high levels of FFNI grandiose narcissism is well in line with the intrinsic correlation of grandiose and vulnerable subscales in the PNI—a scale designed to assess maladaptive forms of narcissism, in which the co-occurrence of grandiose and vulnerable aspects is considered vital (Pincus et al., 2009; Wright et al., 2010).

While the idea of qualitative shifts within the same dimension might conflict to some extent with our understanding of desirable psychometric characteristics and necessitate more complex analysis techniques, we believe considering this complexity may better depict the reality of individual differences. Though not very popular in personality psychology, dose–response relationships are common phenomena in science (for instance pharmacology; Tallarida & Jacob, 1979) and also everyday life (considering just the many instances where we say that we "overdid" something). They can be understood as systemic changes within self-organizing systems (e.g., Hayes et al., 2007), which seems a fruitful perspective for the study of personality (Richardson et al., 2013), and specifically personality pathology (Hopwood et al., 2015). Though we used discrete breakpoints here, we do not understand these as isomorphic representations of the empirical relations, but as probabilistic guesses of distribution points around which qualitative shifts are most likely to occur. The results are thus not meant to reflect cutoffs for maladaptive/pathological narcissism, yet, they may provide best guesses for distribution ranges where systemic changes are likely to take place.

4.4 | Implications for research and practice

We wish to address three aspects that might be of relevance to narcissism research: first, the difference in slope for the FFNI depended on age to a sizeable degree, as the interaction was stronger for older individuals (though vulnerability was, on average, lower in older individuals). This might be the case because narcissistic vulnerability—even if seeded early in life (Huxley et al., 2021; Kernberg, 1975)—takes time to unfold, or to be unveiled. Someone in their early twenties—on the peak of intellectual and physical capacities, yet in many aspects still protected from the pitfalls of adult life—might, on average, not have experienced a significant amount or intensity of adverse events such as job loss or divorce, or ego-threatening developmental

changes such as declines in physical performance or attractiveness. Research has confirmed that such factors do shape our personality (e.g., Specht, 2017), and they might serve as triggers of narcissistic vulnerability particularly after midlife (e.g., Goldstein, 1995). This seems even more important given that grandiose narcissism itself has been found to show longitudinal selection effects in the way that those high in grandiosity have a higher likelihood to experience adversity (Orth & Luciano, 2015). However, cohort effects might also be at play, and future longitudinal studies will be needed to unveil the complex associations. In any case, this result underlines the necessity of studying samples that vary substantially in demographic characteristics such as age, as vulnerable aspects accompanying high grandiosity might otherwise be underestimated.

Second, the results show that considering the absolute level of grandiosity might be important when designing and interpreting studies, particularly those using select populations or extreme groups. Qualitative shifts between lower and higher grandiosity samples could at least partially explain experimentally unveiled signs of vulnerability in highly grandiose individuals, as evident for instance in neuroscience research (Jauk & Kanske, 2021). This can be effectively addressed by, on the one hand, considering the level of narcissistic grandiosity, and, on the other, by complementing designs with measures of narcissistic vulnerability (ibid). For research that aims to test threshold effects, we recommend using the empirically obtained breakpoint estimates as a priori parameters in large and diverse samples.

Third, future studies could assess mediating variables which might explain increases in vulnerability at higher levels of grandiose narcissism. From a clinical perspective, *personality functioning*, in terms of general self- and other-related emotional competencies, might be a prime candidate, as personality disorders in general (American Psychiatric Association, 2013), and narcissistic pathology specifically (Kernberg, 1975), are conceptualized as constellations where extreme trait expressions meet reduced functioning. Of note, self-regulatory functions (including stabilization of self-esteem) are regarded as central elements of personality functioning (American Psychiatric Association, 2013; OPD Task Force, 2008), and these might be directly relevant for explaining transitions between grandiose and vulnerable states. While personality functioning is not frequently assessed in nonclinical personality research, *emotional intelligence* might be used as a proxy for it (Jauk & Ehrenthal, 2021). Also, the *general factor of psychopathology*—closely linked to personality pathology (Oltmanns et al., 2018)—might be studied as a moderator.

For psychological practice, the findings reported here imply that clinicians working with patients who present as highly grandiose should be particularly attentive to signs of narcissistic vulnerability. While the DSM acknowledges that vulnerability can accompany grandiosity (American Psychiatric Association, 2013), the present meta-analysis of large samples from the general population provides quantitative evidence that they are indeed more likely to accompany high grandiosity. Correctly identifying narcissistic vulnerability as such is important as it is associated with a wide range of negative consequences, including suicidal ideation and behavior (e.g., Jaksic et al., 2017). However, since highly grandiose individuals tend to hide or deny vulnerable aspects (cf. Pincus et al., 2014), and, beyond that, also evoke negative reactions in their therapists (Tanzilli et al., 2015), it can be challenging. Seeing vulnerability in those who present as highly grandiose might be even more difficult for those without professional training, as laypeople attribute grandiose behavior to similarly grandiose motives (Koepernik et al., 2021). For an integrated understanding of narcissism, it thus seems important to raise awareness for the interplay of grandiose and vulnerable aspects in highly grandiose individuals, which we hope this study can contribute to.

5 | LIMITATIONS AND CONCLUSION

This research is limited by several aspects: first and foremost, the data are limited to narcissism inventories and demographic variables but do not include external validity measures which would be needed to corroborate the notion of qualitative shifts in the nomological networks along the grandiosity distribution. However, one of our previous studies did include such measures, and found higher correlations and mean levels of symptoms in highly grandiose individuals (Jauk & Kaufman, 2018). A related point concerns the validation of the nomological network with other narcissism measures, particularly the PNI. It can be hypothesized that the correlation between grandiose narcissism measures and those assessing pathological narcissism would be higher at higher levels of grandiosity.

Second, we interpreted the effects as likely reflecting state changes in those who are highly grandiose, but other research methods, particularly Ecological Momentary Assessment, provide more direct tests of such notions (Edershile & Wright, 2020). However, the approach taken here allows to re-analyze large amounts of existing data from different sampling sites and scrutinize them for potentially moderating factors, thereby providing well-powered hypothesis tests in a large-scale investigation. The trait-level results obtained here, together with studies zooming in on these relationships using longitudinal

designs, might contribute to a comprehensive understanding of the relationship between grandiosity and vulnerability.

Finally, it could be argued that the effects observed here are due to range restriction of the assessed variables. We acknowledge that such range restriction might play a role in effects for which we observed decreases here, particularly the intercorrelation of grandiosity and agentic narcissism facets at high levels. These facets did indeed display ceiling effects, and it might be that their associations would not level off if the scale ranges were higher. However, this was not the case at the factor level. Maybe even more importantly, range restriction is unlikely to produce increases in associations (see also Jauk & Kaufman, 2018), which is why it does not concern the central hypothesis tested here.

This study investigated the nonlinearity hypothesis of grandiose and vulnerable narcissism in a preregistered individual data meta-analysis. We found strong support for the assumption that vulnerability increases at high levels of grandiosity in the FFNI, and weaker support in the NPI. The nonlinear effect in the FFNI was stronger for older individuals, and potentially protective agentic aspects become less important as grandiose narcissism increases. The findings might help to bridge the gap between personality and clinical models of narcissism and have implications for research and practice.

ACKNOWLEDGMENTS

We would like to express our sincere gratitude and appreciation for all of our colleagues who shared their data, thereby making this research possible. The contributors are listed in Supporting Information Table S1. We would-further like to thank Viktoria Kanzler for her valuable support. This research was supported by a grant from the Austrian Science Fund (FWF): J 4344 (EJ) and by a grant from the German Research Foundation (DFG): CRC940/C07 (PK, EJ). Open access funding enabled and organized by ProjektDEAL.

ETHICS STATEMENT

This study reanalyzed existing and anonymized data, an IRB approval was not required.

AUTHOR CONTRIBUTIONS

EJ developed the study concept, based on earlier works of EJ and SBK, and preregistered the study. PJ conducted literature search, LU and PJ performed data collection. EJ and LU analyzed the data with the statistical guidance of MH. EJ drafted the manuscript. SBK, MH, and PK provided revisions and extensions. All authors approved the final version of the manuscript.

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ENDNOTES

[1] The preregistration can be accessed at https://osf.io/d3u7g.

[2] We note that this study, different from other works reviewed here, did not directly investigate either patients or clinicians, but it replicates findings obtained from expert raters in lay raters.

[3] The study protocol is in accordance with the applicable points of the PRISMA IPD checklist (Stewart et al., 2015).

[4] Though the *Pathological Narcissism Inventory* (PNI; Pincus et al., 2009) is another frequently used narcissism inventory that encompasses separate scales of grandiose and vulnerable narcissism, the conception of this inventory differs from the others as grandiose and vulnerable aspects are highly related (Wright et al., 2010) and also grandiose scales are closer to the vulnerability side of the spectrum, as compared to other narcissism measures (Krizan & Herlache, 2018).

[5] "We suggest that a sample split at +1 *SD* above the mean (which is in the confidence interval of both studies) might be a reasonable approximation for a simple test of the nonlinearity hypothesis" (Jauk & Kaufman, 2018, p. 12).

[6] We included publication status (published vs. unpublished) as an additional, not preregistered moderator following reviewer feedback. Though the analyzed studies generally pursued different research questions, thereby not targeting the correlation between grandiose and vulnerable narcissism by design, it might be that study characteristics associated with publication status impact the effects of interest. While we originally also planned to test for data acquisition method (online vs. offline), this variable did not have sufficient variation (almost all of the studies were conducted online, see Supporting Information Table S1) and was not tested as a moderator.

[7] This concerns a forensic sample of young criminal offenders gathered at our own lab. The rationale for inclusion was to maximize variance in the higher grandiose narcissism range. Note that while grandiose narcissism was high in this sample ($M = 2.78$, $SD = .58$) compared to the pooled estimate ($M = 2.49$, $SD = .55$), vulnerable narcissism ($M = 2.86$, $SD = .45$) was comparable to the pooled sample ($M = 2.85$, $SD = .61$). Inclusion did thus not bias the analysis but helped to maximize power in the higher grandiosity range.

[8] We chose this period for both, the NPI/HSNS and the FFNI, because the FFNI was first published in 2012 (Glover et al., 2012).

[9] Though the NPI or the FFNI grandiose narcissism scale cannot be used for the clinical assessment of narcissistic personality disorder, they might still provide valid approximations in the research context, as previous investigations showed that narcissistic personality disorder is a dimensional rather than a categorical phenomenon (Aslinger et al., 2018) and that both scales converge with expert ratings of clinical criteria for narcissistic personality disorder (Miller et al., 2014).

[10] While we originally planned to use *study* as nesting variable, upon data screening, we noticed that several studies used multiple samples, partially with different level 2 characteristics (such as sampling site). We thus deemed it more appropriate to use *sample* as a nesting variable. This also increased the number of level 2 units, resulting in higher sensitivity for tests of random effects and moderation tests.

[11] The HSNS means ranged from 2.88 to 3.03 across studies (pooled $M = 2.89$, pooled $SD = .61$), with the exception of this study, which had a mean of 2.06 ($SD = .48$) and was thus 1.36 *SD* lower than grand average of the remaining studies.

[12] To further investigate why this was the case, we estimated separate models for published ($N = 8{,}509$, $k = 22$) and unpublished ($N = 2{,}010$, $k = 6$) studies. When splitting the sample at +1 *SD*, among the published studies, the complemental analyses showed an interaction effect of *NPI*Group* which is comparable to that of the full sample ($\Delta\beta = .09$ [−.10−.19]), though at trend-level ($p = .08$). Within the unpublished studies, the analyses showed a stronger effect with a large *CI* ($\Delta\beta = .22$ [−.05–.49]) which was not significant ($p = .12$), likely reflecting an instable estimate due to the small sample size ($n = 256$). When splitting the sample at +2 *SD*, the interaction of *NPI*Group* remained largely unchanged in magnitude and significant among the published studies ($\Delta\beta = .32$ [.02–.62], $p = .03$), but had a very large CI and was insignificant among the unpublished studies ($\Delta\beta = .15$ [−1.06–1.36], $p = .81$). Of note, only 33 individuals exceeded the split-criterion of +2 *SD* among the unpublished studies. We conclude that the effect of interest is present in published and unpublished studies, and variance associated with publication status is likely unsystematic, why the overall sample might provide the best estimate of the actual magnitude.

[13] We note that some subscales assessing agentic aspects display ceiling effects, which might partially account for the decreases in correlations (see also limitations). However, such ceiling effects are not evident in the composite agentic narcissism score.

[14] Though the response surface plot displays estimates for high antagonistic and low agentic narcissism, we note that such a combination is—among the many individuals in the pooled sample—unlikely to occur, as these are highly correlated and display a triangular distribution (see Supporting Information Figure S2). The model predictions for this trait constellation, though of theoretical relevance, should thus not be mistaken as a depiction of the empirical data.

[15] We note that including publication status as a moderator also affected the significance level, but publications status did not show systematic effects (see Section 3).

[16] We use these terms as they are frequently being used in the literature. Note that we do not want to imply the existence of fundamentally different types of narcissism or the like; please see below.

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How to cite this article: Jauk, E., Ulbrich, L., Jorschick, P., Höfler, M., Kaufman, S. B., & Kanske, P. (2021). The nonlinear association between grandiose and vulnerable narcissism: An individual data meta-analysis. *Journal of Personality*, 00, 1–24. https://doi.org/10.1111/jopy.12692