

Supplementary Material

to

**Neuroticism, emotional stress reactivity and recovery in daily life: Examining extraversion and
open-mindedness as moderators**

Power Considerations

To determine the statistical power for the tests performed in this manuscript, we conducted simulations using the package *simr* in RStudio. The simulations were based on suggestions from Arend & Schäfer (2019) for power analyses in two-level models. The code used to perform the analyses can be found on the OSF (https://osf.io/bc543/?view_only=67de1a6b6a1d451db6a623fceb55ffbd).

We specified a two-level model with:

- a within-person effect with a random slope on Level 1 (emotional stressor reactivity; L1),
- two between-person effects on Level 2 (personality traits, L2_1 and L2_2),
- a two-way interaction between those Level 2 variables (trait interaction, L2_IA),
- their respective cross-level interactions with the Level 1 variable (association of each trait variable with emotional reactivity, CLI1 and CLI2),
- and a three-way cross-level interaction between the Level 2 variables and the Level 1 variable (our main effect of interest: trait interactions in predicting emotional reactivity, CLI3)

We based the power analyses on the smaller late adulthood sample with fewer beeps ($n_{\text{Level 2}} = 170$, $n_{\text{Level 1}} = 42$) following the reasoning that power should be higher in the larger lifespan sample with more beeps per person ($n_{\text{Level 2}} = 364$, $n_{\text{Level 1}} = 54$).

We specified a medium ICC (0.40), a small within-person effect ($L1 = 0.10$) with relatively small random variance (0.09), and a small correlation between the Level 2 variables (0.10). These specifications were kept constant across simulations. We then varied the standardized effect sizes for the effects of interest and calculated the statistical power for these effects based on $n = 1000$ simulated datasets each using the Kenward Roger test.

The effect size specifications and power for the respective effects are reported in Table S1. To summarize, the statistical power is sufficient to detect medium sized (0.30) two- and three-way cross-level interactions, but nothing much smaller.

Table S1

Summary of Results from Simulations for Power Analyses.

Parameter Specifications						Power Estimation		
L2_1	L2_2	L2_IA	CLI1	CLI2	CLI3	Power L2_1/L2_2	Power CLI1/2	Power CLI3
0.30	0.30	0.30	0.30	0.30	0.30	98.7%	94.5%	91.7%
0.30	0.30	0.20	0.20	0.20	0.20	98.6%	66.1%	56.8%
0.20	0.20	0.20	0.20	0.20	0.20	74.0%	66.1%	56.8%
0.30	0.30	0.20	0.20	0.20	0.10	98.6%	65.5%	17.8%

Note. Parameter Specifications refer to standardized effect sizes. Each power estimate is based on $n = 1000$ simulations.

Reference

Arend, M. G., & Schäfer, T. (2019). Statistical power in two-level models: A tutorial based on Monte Carlo simulation. *Psychological Methods*, 24(1), 1–19. <https://doi.org/10.1037/met0000195>

Table S2
Model Equations.

<p>Within Person – Level 1</p> $NA_{ij} = \beta_{0j} + \beta_{1j} \text{CurrentStressor}_{ij} + \beta_{2j} \text{LaggedStressor}_{ij} + \varepsilon_{ij}$
<p>Between Person – Level 2</p> $\beta_{0j} = \gamma_{00} + \gamma_{01} \text{Neuroticism}_j + \gamma_{02} \text{Extraversion}_j + \gamma_{03} \text{Openness}_j + \gamma_{04} \text{Neuroticism}_j \times \text{Extraversion}_j + \gamma_{05} \text{Neuroticism}_j \times \text{Openness}_j + \gamma_{06} \text{Age} (+ \gamma_{07} \text{Age}^2) + u_{0j}$ $\beta_{1j} = \gamma_{10} + \gamma_{11} \text{Neuroticism}_j + \gamma_{12} \text{Extraversion}_j + \gamma_{13} \text{Openness}_j + \gamma_{14} \text{Neuroticism}_j \times \text{Extraversion}_j + \gamma_{15} \text{Neuroticism}_j \times \text{Openness}_j + u_{1j}$ $\beta_{2j} = \gamma_{20} + \gamma_{21} \text{Neuroticism}_j + \gamma_{22} \text{Extraversion}_j + \gamma_{23} \text{Openness}_j + \gamma_{24} \text{Neuroticism}_j \times \text{Extraversion}_j + \gamma_{25} \text{Neuroticism}_j \times \text{Openness}_j + u_{2j}$
<p>Mixed Model Equation</p> $NA_{ij} = \gamma_{00} + \gamma_{01} \text{Neuroticism}_j + \gamma_{02} \text{Extraversion}_j + \gamma_{03} \text{Openness}_j + \gamma_{04} \text{Neuroticism}_j \times \text{Extraversion}_j + \gamma_{05} \text{Neuroticism}_j \times \text{Openness}_j + \gamma_{06} \text{Age} (+ \gamma_{07} \text{Age}^2) + \gamma_{10} \text{CurrentStressor}_{ij} + \gamma_{11} \text{Neuroticism}_j \text{CurrentStressor}_{ij} + \gamma_{12} \text{Extraversion}_j \text{CurrentStressor}_{ij} + \gamma_{13} \text{Openness}_j \text{CurrentStressor}_{ij} + \gamma_{14} \text{Neuroticism}_j \times \text{Extraversion}_j \text{CurrentStressor}_{ij} + \gamma_{15} \text{Neuroticism}_j \times \text{Openness}_j \text{CurrentStressor}_{ij} + \gamma_{20} \text{LaggedStressor}_{ij} + \gamma_{21} \text{Neuroticism}_j \text{LaggedStressor}_{ij} + \gamma_{22} \text{Extraversion}_j \text{LaggedStressor}_{ij} + \gamma_{23} \text{Openness}_j \text{LaggedStressor}_{ij} + \gamma_{24} \text{Neuroticism}_j \times \text{Extraversion}_j \text{LaggedStressor}_{ij} + \gamma_{25} \text{Neuroticism}_j \times \text{Openness}_j \text{LaggedStressor}_{ij} + u_{1j} \text{CurrentStressor}_{ij} + u_{2j} \text{LaggedStressor}_{ij} + u_{0j} + \varepsilon_{ij}$

Note. LaggedStressor is the presence vs. absence of a stressor at the previous time point, i.e. CurrentStressor_(i-1). For clarity, we label it as “Lagged Stressor” in the equations, tables, and text. Age² was only included in the lifespan sample.

Table S3

Lifespan Sample: Descriptive Statistics and Correlations for High and Low Arousal Negative Affect, Stress and Personality Traits. Pooled within person correlations are displayed below and weighted between person correlations above the central diagonal.

Variable	Mean (SD)	Average within- person SD	ICC	Correlations						
				High arousal NA	Low arousal NA	Stress	Neuroticism	Extraversion	Openness	Age
High arousal NA ^a	1.13 (1.29)	0.92	0.40	-	0.86	0.33	0.27	-0.08	-0.05	-0.16
Low arousal NA ^a	0.90 (1.316)	0.91	0.41	0.64	-	0.29	0.25	-0.08	-0.06	-0.21
Stress ^b	0.08 (0.28)	0.24	0.09	0.33	0.34	-	0.14	-0.05	0.05	-0.04
Neuroticism	3.55 (1.24)	-	-	-	-	-	-	-0.17	-0.06	0.06
Extraversion	5.00 (1.17)	-	-	-	-	-	-	-	0.32	-0.14
Openness	4.98 (1.11)	-	-	-	-	-	-	-	-	0.10
Age	43.22 (20.29)	-	-	-	-	-	-	-	-	-

Note. Estimates with $p < .05$ are displayed in bold.

Table S4

Late Adulthood Sample: Descriptive Statistics and Correlations for High and Low Arousal Negative Affect, Stress, and Personality Traits. Pooled within person correlations are displayed below and weighted between person correlations above the central diagonal.

Variable	Mean (SD)	Average within- person SD	ICC	Correlations						
				High arousal NA	Low arousal NA	Stress	Neuroticism	Extraversion	Openness	Age
High arousal NA ^a	9.59 (14.71)	8.07	0.57	-	0.90	0.47	0.45	-0.15	0.09	0.37
Low arousal NA ^a	9.07 (16.23)	9.25	0.50	0.70	-	0.40	0.47	-0.21	0.14	0.30
Stress ^b	0.19 (0.39)	0.34	0.16	0.32	0.24	-	0.15	0.07	-0.02	0.31
Neuroticism	2.36 (0.55)	-	-	-	-	-	-	-0.29	-0.01	0.23
Extraversion	3.27 (0.41)	-	-	-	-	-	-	-	0.01	-0.01
Openness	3.08 (0.28)	-	-	-	-	-	-	-	-	-0.07
Age	72.25 (8.59)	-	-	-	-	-	-	-	-	-

Note. Estimates with $p < .05$ are displayed in bold.

Table S5*Sensitivity analyses: Age differing associations of N and stressors with NA.*

	Lifespan Sample			
	NA high		NA low	
	Estimate	95% CI	Estimate	95% CI
Intercept NA	0.82	[0.70, 0.94]	0.53	[0.40, 0.65]
Current stressor	1.21	[1.10, 1.32]	1.22	[1.11, 1.33]
N	0.17	[0.11, 0.24]	0.17	[0.10, 0.23]
E	-0.04	[-0.11, 0.03]	-0.05	[-0.12, 0.02]
O	0.00	[-0.07, 0.07]	-0.01	[-0.09, 0.07]
Age	-0.01	[-0.01, -0.00]	-0.01	[-0.01, -0.00]
N × Current stressor	0.01	[-0.08, 0.10]	0.10	[0.01, 0.19]
E × Current stressor	0.00	[-0.10, 0.10]	-0.03	[-0.13, 0.07]
O × Current stressor	0.05	[-0.04, 0.15]	0.10	[-0.00, 0.20]
N × E	-0.03	[-0.09, 0.02]	-0.03	[-0.09, 0.02]
N × O	0.01	[-0.05, 0.07]	0.02	[-0.04, 0.08]
N × E × Current stressor	0.01	[-0.06, 0.08]	-0.03	[-0.11, 0.04]
N × O × Current stressor	-0.04	[-0.11, 0.04]	-0.02	[-0.10, 0.06]
Lagged stressor	0.26	[0.19, 0.33]	0.32	[0.25, 0.40]
N × Lagged stressor	0.02	[-0.04, 0.08]	0.02	[-0.05, 0.08]
E × Lagged stressor	-0.00	[-0.07, 0.06]	0.01	[-0.06, 0.08]
O × Lagged stressor	0.03	[-0.03, 0.10]	0.03	[-0.04, 0.10]
N × E × Lagged stressor	0.03	[-0.02, 0.08]	0.02	[-0.03, 0.07]
N × O × Lagged stressor	0.00	[-0.05, 0.05]	-0.02	[-0.08, 0.03]
N × age break point adolescence ^a	-0.40	[-0.67, -0.13]	-0.38	[-0.57, -0.19]
Current stressor × age break point adolescence ^a	-0.10	[-0.52, 0.32]	0.10	[-0.24, 0.45]
N × Current stressor × age break point adolescence ^a	-0.20	[-0.61, 0.20]	-0.33	[-0.65, -0.00]
Age × age break point adolescence ^a	-0.00	[-0.01, 0.00]	0.00	[-0.00, 0.01]
Random Effects				
Residual Variance NA	0.84		0.83	
Intercept Variance	0.53		0.56	
Current Stressor Variance	0.58		0.67	
Lagged Stressor Variance	0.14		0.20	
Marginal R ² / Conditional R ²	0.125 / 0.485		0.141 / 0.508	

Note. Negative Affect (NA) was assessed on a scale from 0-6. Personality traits were assessed using the BFI-S (Gerlitz & Schupp, 2005) on a scale from 1-7.

Estimates with $p < .05$ are displayed in bold.

^a dummy coded variables <17 years for the model including NA high and <18 years for the model including NA low. We tested break points between 15 – 25 years and used model comparisons (lowest AIC and BIC) to identify the optimal break points.

Table S6*Analyses including all Big Five Traits.*

	Lifespan Sample				Late Adulthood Sample			
	NA high		NA low		NA high		NA low	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Intercept NA	0.85	[0.72, 0.97]	0.57	[0.45, 0.70]	5.51	[3.80, 7.22]	5.32	[3.52, 7.13]
Current stressor	1.20	[1.10, 1.31]	1.23	[1.12, 1.34]	8.83	[7.44, 10.22]	7.22	[5.59, 8.85]
N	0.15	[0.08, 0.21]	0.14	[0.07, 0.20]	6.74	[3.82, 9.66]	7.29	[4.21, 10.37]
E	-0.03	[-0.10, 0.05]	-0.03	[-0.10, 0.04]	-0.6	[-4.22, 3.02]	-2.31	[-6.13, 1.51]
O	0.01	[-0.07, 0.09]	0.00	[-0.08, 0.08]	3.29	[-1.79, 8.36]	5.44	[0.09, 10.79]
A	-0.04	[-0.12, 0.04]	0.00	[-0.08, 0.09]	2.49	[-1.82, 6.80]	2.34	[-2.21, 6.89]
C	-0.03	[-0.11, 0.05]	-0.07	[-0.15, 0.01]	-2.41	[-6.26, 1.44]	-1.48	[-5.54, 2.58]
Age	0.00	[-0.01, 0.01]	-0.00	[-0.01, 0.01]	0.35	[0.19, 0.52]	0.33	[0.16, 0.50]
Age ²	0.00	[-0.00, 0.00]	0.00	[-0.00, 0.00]				
N × Current stressor	0.01	[-0.08, 0.09]	0.08	[-0.01, 0.17]	3.41	[0.84, 5.97]	4.76	[1.76, 7.76]
E × Current stressor	0.01	[-0.09, 0.10]	-0.02	[-0.12, 0.08]	-0.15	[-3.40, 3.11]	1.3	[-2.51, 5.11]
O × Current stressor	0.03	[-0.08, 0.13]	0.10	[-0.01, 0.21]	-1.28	[-5.95, 3.39]	0.1	[-5.36, 5.57]
A × Current stressor	0.05	[-0.05, 0.16]	0.02	[-0.09, 0.13]	1.59	[-2.28, 5.46]	2.57	[-1.97, 7.10]
C × Current stressor	0.05	[-0.05, 0.16]	-0.04	[-0.15, 0.06]	-2.43	[-5.85, 0.98]	0.82	[-3.18, 4.82]
N × E	-0.04	[-0.10, 0.01]	-0.04	[-0.09, 0.02]	-2.74	[-8.79, 3.30]	-5.59	[-11.97, 0.79]
N × O	0.02	[-0.04, 0.09]	0.05	[-0.02, 0.11]	5.9	[-2.81, 14.61]	12.19	[3.00, 21.38]
N × A	0.03	[-0.03, 0.09]	-0.01	[-0.07, 0.05]	-1.44	[-10.44, 7.56]	-2.81	[-12.34, 6.71]
N × C	0.01	[-0.05, 0.06]	-0.04	[-0.09, 0.01]	-5.34	[-11.72, 1.04]	-2.01	[-8.76, 4.73]
N × E × Current stressor	0.01	[-0.06, 0.08]	-0.04	[-0.11, 0.04]	-1.54	[-7.07, 3.98]	0.94	[-5.53, 7.40]
N × O × Current stressor	-0.03	[-0.11, 0.05]	-0.01	[-0.09, 0.07]	3.12	[-4.82, 11.05]	2.09	[-7.21, 11.40]
N × A × Current stressor	-0.01	[-0.08, 0.07]	0.02	[-0.07, 0.10]	7.25	[-0.72, 15.22]	-0.26	[-9.54, 9.02]
N × C × Current stressor	0.00	[-0.07, 0.07]	0.04	[-0.04, 0.11]	0.35	[-5.26, 5.96]	-1.75	[-8.31, 4.81]
Lagged stressor	0.26	[0.19, 0.33]	0.32	[0.24, 0.40]	1.91	[0.80, 3.02]	1.87	[0.49, 3.25]
N × Lagged stressor	0.02	[-0.04, 0.08]	0.02	[-0.04, 0.08]	1.28	[-0.77, 3.32]	0.45	[-2.09, 2.99]

	Lifespan Sample				Late Adulthood Sample			
	NA high		NA low		NA high		NA low	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
E × Lagged stressor	-0.01	[-0.07, 0.06]	0.01	[-0.06, 0.08]	-2.52	[-5.12, 0.08]	-2.74	[-5.97, 0.49]
O × Lagged stressor	0.03	[-0.05, 0.10]	0.05	[-0.03, 0.13]	-2.04	[-5.75, 1.67]	-4.64	[-9.25, -0.04]
A × Lagged stressor	-0.00	[-0.08, 0.07]	0.00	[-0.08, 0.08]	0.3	[-2.77, 3.37]	-1.80	[-5.62, 2.02]
C × Lagged stressor	0.02	[-0.05, 0.10]	-0.04	[-0.12, 0.03]	-1.00	[-3.72, 1.73]	0.99	[-2.40, 4.37]
N × E × Lagged stressor	0.03	[-0.02, 0.08]	0.02	[-0.03, 0.07]	0.17	[-4.27, 4.61]	-2.52	[-8.03, 2.99]
N × O × Lagged stressor	0.00	[-0.05, 0.06]	-0.03	[-0.09, 0.03]	-4.22	[-10.59, 2.15]	-8.62	[-16.53, -0.71]
N × A × Lagged stressor	-0.01	[-0.06, 0.04]	-0.01	[-0.07, 0.04]	-2.02	[-8.29, 4.26]	-3.83	[-11.62, 3.96]
N × C × Lagged stressor	0.01	[-0.04, 0.06]	0.03	[-0.02, 0.08]	-1.17	[-5.62, 3.27]	-1.14	[-6.66, 4.38]
Random Effects								
Residual Variance NA	0.84		0.83		73.57		110.79	
Intercept Variance	0.54		0.57		75.58		82.98	
Random Slope Variance Current Stressor	0.58		0.68		41.35		54.79	
Random Slope Variance Lagged Stressor	0.15		0.20		19.74		31.21	
Marginal R ² / Conditional R ²	0.121 / 0.483		0.140 / 0.508		0.272 / 0.673		0.241 / 0.610	

Note. The model estimates are not directly comparable across the two samples due to different answering scales and/or measures used. Negative Affect (NA) was assessed on a scale from 0-6 in the lifespan sample and on a scale from 0-100 in the late adulthood sample. Personality traits were assessed using the BFI-S (Gerlitz & Schupp, 2005) on a scale from 1-7 in the lifespan sample and using the NEO-FFI (Borkenau & Ostendorf, 1993) on a scale from 1-5 in the late adulthood sample.

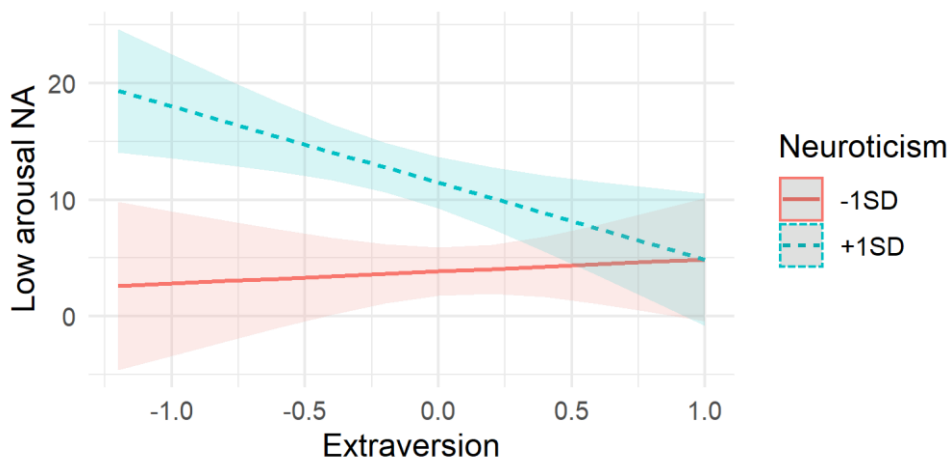
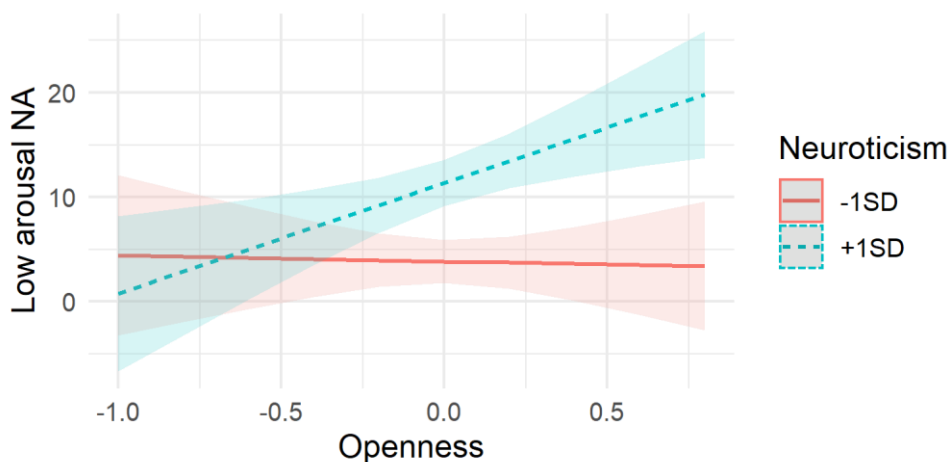
Table S7*Results from Models Including Time Since Stressor Occurrence as Predictor on Level 1.*

	Lifespan Sample				Late Adulthood Sample			
	NA high		NA low		NA high		NA low	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Intercept NA	0.87	[0.74, 0.99]	0.59	[0.46, 0.71]	6.25	[4.57, 7.93]	6.05	[4.34, 7.76]
Time since Stressor	-0.30	[-0.33, -0.28]	-0.31	[-0.33, -0.28]	-2.66	[-3.06, -2.26]	-2.48	[-2.95, -2.02]
N	0.16	[0.10, 0.23]	0.15	[0.08, 0.21]	6.85	[4.11, 9.58]	7.08	[4.30, 9.87]
E	-0.03	[-0.10, 0.04]	-0.03	[-0.11, 0.04]	-0.89	[-4.56, 2.77]	-2.36	[-6.10, 1.37]
O	-0.00	[-0.08, 0.07]	-0.01	[-0.09, 0.07]	3.85	[-1.27, 8.97]	5.08	[-0.13, 10.29]
Age	0.00	[-0.01, 0.01]	-0.00	[-0.01, 0.01]	0.38	[0.22, 0.54]	0.32	[0.15, 0.49]
Age ²	0.00	[-0.00, 0.00]	0.00	[-0.00, 0.00]	-	-	-	-
N × Time since Stressor	-0.01	[-0.03, 0.01]	-0.03	[-0.05, -0.01]	-1.07	[-1.79, -0.34]	-1.14	[-1.99, -0.30]
E × Time since Stressor	-0.01	[-0.03, 0.02]	-0.01	[-0.03, 0.02]	-0.37	[-1.35, 0.61]	-0.77	[-1.91, 0.37]
O × Time since Stressor	-0.00	[-0.03, 0.02]	-0.01	[-0.03, 0.02]	0.27	[-1.19, 1.73]	0.06	[-1.64, 1.77]
N × E	-0.04	[-0.09, 0.01]	-0.04	[-0.10, 0.02]	-3.83	[-9.69, 2.03]	-6.61	[-12.58, -0.64]
N × O	0.03	[-0.03, 0.09]	0.04	[-0.02, 0.10]	5.08	[-3.62, 13.78]	9.73	[0.87, 18.60]
N × E × Time since Stressor	-0.01	[-0.03, 0.01]	0.00	[-0.02, 0.02]	-0.16	[-1.70, 1.37]	-0.36	[-2.15, 1.43]
N × O × Time since Stressor	0.02	[0.00, 0.04]	0.02	[-0.00, 0.04]	-0.92	[-3.47, 1.63]	-0.35	[-3.33, 2.63]
Random Effects								
Residual Variance NA	0.86		0.86		71.10		108.70	
Intercept Variance	0.55		0.57		80.41		82.29	
Time since Stressor Variance	0.03		0.04		3.88		5.08	
Marginal R ² / Conditional R ²	0.121 / 0.477		0.131 / 0.493		0.276 / 0.683		0.243 / 0.600	

Note. The model estimates are not directly comparable across the two samples due to different answering scales and/or measures used. Negative Affect (NA) was assessed on a scale from 0-6 in the lifespan sample and on a scale from 0-100 in the late adulthood sample. Personality traits were assessed using the BFI-S (Gerlitz & Schupp, 2005) on a scale from 1-7 in the lifespan sample and using the NEO-FFI (Borkenau & Ostendorf, 1993) on a scale from 1-5 in the late adulthood sample. Time since stressor occurrence was coded as follows: Still ongoing = -6, < 5 min = -5, 5-10min = -4, 10-30min = -3, 30-60min = -2, > 60min = -1; no stressor = 0. Estimates with $p < .05$ are displayed in bold.

Figure S1

Plots Showing Interactions Between Neuroticism and Extraversion (A) and Openness (B) in Predicting Low Arousal NA (Late Adulthood Sample).

A**B**

Note. The panels of the figure show average low-arousal NA in situations without stressors for people low or high in neuroticism (+/- 1SD) at different levels of extraversion (a) and openness (b), respectively. NA was originally assessed on a scale from 0-100. Extraversion and openness were assessed on a scale from 1-5; the x-axis in the figures refers to deviations from the sample mean (= 0). It can be obtained that at high levels of neuroticism, extraversion and openness matter for daily negative affect. High levels of neuroticism coupled with either low levels of extraversion or high levels of openness are associated with reporting particularly high low-arousal negative affect.

Figure S2

Plots illustrating the interaction between neuroticism and time since stressor occurrence for high and low arousal NA in the lifespan sample (A + B) and in the late adulthood sample (C + D).

