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Increases of negative affect following daily hassles are not moderated by neuroticism: An ecological momentary assessment study

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Abstract
The occurrence of daily hassles is associated with increased subsequent levels of negative affect. Neuroticism has been found to exacerbate this effect. So far, most research used single-item measures for the assessment of daily hassles or relied on daily diary studies. This study aimed to examine the interrelations of daily hassles, negative affect reactivity, and neuroticism in daily life employing an extensive inventory of daily hassles. Seventy participants (18–30 years; *M* = 23.9 years, 59% female) completed a 4-week smartphone-based ecological momentary assessment study reporting the occurrence and perceived strain of daily hassles as well as negative affect at five semi-random signals between 9 a.m. and 8 p.m. Multilevel analyses revealed significant associations between elevated levels of negative affect and higher cumulative daily hassle strain ratings per signal in concurrent and time-lagged analyses. Contrary to our expectations, there was no moderation by neuroticism on these associations. The results suggest that daily hassles can accumulate in their impact on mood in daily life and exert a prolonged effect on negative affect. The absence of a significant moderation by neuroticism may be interpreted in the light of methodological specifics of this study.

KEYWORDS
daily hassles, ecological momentary assessment, negative affect, neuroticism, stress reactivity

1 | BACKGROUND

Daily hassles are an inevitable part of life. Previous studies found that individuals averagely experience around 20 inconvenient, unpleasant, and possibly stressful daily events per week (Kanner, Coyne, Schaefer, & Lazarus, 1981), such as interpersonal conflicts, time pressure, physical pain or noise. Frequent exposure to daily hassles may significantly contribute to the deterioration of short-term and, ultimately, long-term affective well-being and health (Peralta-Ramirez, Jimenez-Alonso, Godoy-Garcia, & Perez-Garcia, 2004; Tessner, Mittal, & Walker, 2011). In this regard, daily hassles even exceeded the

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relevance of major life events, such as death of a loved one, job loss or environmental disasters (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982; Fernandez & Sheffield, 1996; Peralta-Ramirez et al., 2004). Prior research found that the negative impact of daily hassles on health may be more attributable to an individual's stressor reactivity, that is, how a person reacts physically and emotionally to a stressful event (Bolger & Zuckerman, 1995), than to objective characteristics of stressor exposure such as daily hassle number and frequency. For instance, it was found that a larger negative affect (NA) stress reactivity was associated with long-term risk for chronic physical or mental health conditions, while mere stressor exposure was not (Charles, Piazza, Mogle, Sliwinski, & Almeida, 2013; Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013). Furthermore, larger NA responses to stress were related to self-reported depressive symptoms (van Winkel et al., 2015), higher cortisol reactions to stress (Jacobs et al., 2007) and mortality (Chiang, Turiano, Mroczek, & Miller, 2018).

A large body of research demonstrated changes in NA following exposure to daily hassles. Generally, individuals indicated increased levels of NA after having encountered a stressful event (van Eck, Nicolson, & Berkhof, 1998; Husky, Mazure, Maciejewski, & Swendsen, 2007; Röcke, Li, & Smith, 2009; Wrzus, Muller, Wagner, Lindenberger, & Riediger, 2013). Higher numbers of daily hassles or higher strain ratings of daily hassles were associated with higher levels of NA compared to lower numbers or lower strain ratings (Baker, 2006; Rush & Hofer, 2014; Sliwinski, Almeida, Smyth, & Stawski, 2009; Zautra, Affleck, Tennen, Reich, & Davis, 2005). Regarding the duration of this impact it was shown that daily hassles could influence NA for up to 9 hr (van Eck et al., 1998; Johnson et al., 2008).

An individual's personality may play an important role in the stress process and partially determines how a person reacts towards a stressful event. The personality dimension of neuroticism may be particularly relevant as it predisposes to experiencing NA in general (Costa & McCrae, 1980), increases the likelihood to experience stressors (Affleck, Tennen, Urrows, & Higgins, 1994; Bolger & Schilling, 1991; Bolger & Zuckerman, 1995; David, Green, Martin, & Suls, 1997; Suls & Martin, 2005) and to perceive them as severe and harmful (Marco & Suls, 1993; Sliwinski et al., 2009). Furthermore, neuroticism is associated with dysfunctional coping strategies such as hostile reactions or self-blame (Gunthert, Cohen, & Armeli, 1999; McCrae & Costa, 1986) and more negative appraisal styles (Tong, 2010). When exposed to a stressor, individuals with high neuroticism exhibit a hyperreactivity meaning that they tend to react in a stronger manner compared to individuals with low neuroticism (Suls, 2001; Suls & Martin, 2005). Accordingly, the majority of past research found subjects high in neuroticism to report higher levels of NA after encountering daily hassles compared to subjects low in neuroticism (Bolger & Schilling, 1991; Komulainen et al., 2014; Marco & Suls, 1993; Mroczek & Almeida, 2004; Sliwinski et al., 2009; Suls, Green, & Hillis, 1998; Zautra et al., 2005).

While the evidence regarding the influence of neuroticism on NA reactivity to daily hassles appears to be strong, the majority of studies conducted so far relied on retrospective data. Daily hassles were usually assessed at the end of the day and participants were asked to recall and average number and strain of daily hassles. This, however, entails some difficulties when interpreting results. First, human recall is subject to a range of retrospective biases (Shiffman, Stone, & Hufford, 2008). For instance, retrieval of memorized information is affected by the mental state, mood or context at time of the inquiry (Ebner-Priemer & Trull, 2009; Shiffman et al., 2008). Thus, at the end of the day, individuals may overestimate the number and strain of daily hassles encountered during the day if, for example, they had recently had an argument with their partner. Furthermore, recall is more accurate for emotionally salient events (Shiffman et al., 2008), implying a potentially less correct estimation of repeated and commonplace phenomena such as daily hassles. Another difficulty of retrospectively assessed NA is that levels of NA are prone to fluctuating over the course of a day, which may not be captured by single end-of-day assessments and obscure associations with daily hassles.

Ecological momentary assessment (EMA)[1] is better suited to capture the association between daily hassles and NA reactivity than retrospective reports, as it involves multiple measurements over the course of a day in the participants' natural environment. Thereby, EMA reduces the aforementioned retrospective biases, increases external validity and is sensitive to fluctuations over the day (Shiffman et al., 2008).

A small number of EMA studies investigated the influence of neuroticism on NA reactivity to daily hassles. They found stronger NA reactivity to daily hassles in high compared to low neuroticism individuals (Komulainen et al., 2014; Marco & Suls, 1993; Suls et al., 1998). However, these studies (and other EMA studies on daily hassles) assessed only one daily hassle per interval: Usually, participants were asked whether a daily hassle had occurred within a given time frame (e.g., within the last 30 min). In case they indicated that a hassle had occurred, they were usually prompted to report the perceived strain of the daily hassle (e.g., Husky et al., 2007; Komulainen et al., 2014), write down the daily hassle (e.g., Husky et al., 2007) or indicate the nature of the daily hassle (e.g., whether it was related to their health, time pressure, financial strain, family, etc., e.g., Husky et al., 2007; Wrzus et al., 2013).

However, as previous studies have shown, the number of daily hassles seems to be relevant for the extent of NA reactivity, (e.g., Baker, 2006; Goldschmidt et al., 2014; Rush & Hofer, 2014). Thus, studies focusing only on a single daily hassle instead of a broader number of daily hassles within a given time frame might risk neglecting potentially cumulative effects of daily hassles on subsequent NA reactivity. Inventories consisting of a larger number of potential daily hassles may therefore be better suited to capture a wider range of occurred daily hassles and to analyze their cumulative effects on NA reactivity. While many end-of-day studies applied differentiated, objective daily hassles inventories (e.g., Affleck et al., 1994; David et al., 1997; Kanner et al., 1981; Zautra et al., 2005), only a small number of EMA studies has assessed daily hassles with an extensive inventory (Goldschmidt et al., 2014; Smyth et al., 2009). However, these studies assessed a limited sample of only female participants with bulimia nervosa and did not examine the influence of neuroticism.

The aim of the present study was to examine how daily hassles may cumulatively influence NA reactivity by applying an elaborate daily hassle inventory via EMA in a broad sample of young adults. We focused our study on younger adults as they, compared to older adults, have been found to carry a higher burden in terms of stressor exposure (Mroczek & Almeida, 2004; Stawski, Sliwinski, Almeida, & Smyth, 2008) and stress-related consequences such as a higher prevalence of mental disorders (Jacobi et al., 2014). Besides, the present study served as a feasibility study for a future project, which was planned to be implemented within two large longitudinal studies of our research institution focusing on younger adults due the aforementioned reasons. Therefore, we included only younger adults in this study to create similar conditions wherever possible. Furthermore, we examined whether neuroticism moderated NA reactivity to daily hassles. In the analysis, both current and previous daily hassles were taken into account. More specifically, we hypothesized that a higher cumulative strain of daily hassles reported at the previous or the current EMA measurement point predicted larger NA in the current measurement point. Furthermore, we hypothesized that neuroticism moderated this association in the sense that higher neuroticism scores would lead to larger NA reactivity following daily hassles of the current or the previous EMA measurement point compared to lower neuroticism scores.

2 | METHODS

This study was part of a larger project on the ambulatory monitoring of stress experiences, which has received approval from the ethics committee of the State Chamber of Physicians of Rhineland-Palatinate (reference number 837.183.16–10,502) and followed the principles of the Declaration of Helsinki. Data collection took place between 09/2016 and 03/2017.

2.1 | Participants

Participants were recruited via mailing lists of the University and the University Medical Center in Mainz as well as via flyers posted on campus. To be included in the study, participants had to meet the following inclusion criteria: (1) 18–30 years of age, (2) sufficient command of German to follow the instructions and to complete questionnaires, (3) previous experience in using smartphones, (4) no planned deviation from the usual daily routine during the study period (e.g., no traveling for more than 4 days), (5) no self-reported mental disorders, (6) no consumption of illegal drugs or large quantities of alcohol (more than 15 standard glasses of alcohol per week).

2.2 | Procedure

2.2.1 | Screening interview

A 10-min phone interview was conducted with individuals interested in study participation to provide detailed information about the study procedure and to inform about the inclusion criteria.

2.2.2 | Baseline session

Individuals were subsequently invited to a baseline session of approximately 2 hr in the laboratory. After participants provided their written consent to the study participation and were given the opportunity to ask questions, the inclusion and exclusion criteria were checked. Additionally, the participants completed baseline measures (see below) and were equipped with study smartphones. They received a short training on how to answer the EMA signals to ensure that they correctly understood the EMA protocol and the items.

2.2.3 | Ecological momentary assessment protocol

The EMA phase started on the Monday following the baseline session. For 28 consecutive days, participants received five signals per day at semi-random time points between 9 a.m. and 8 p.m. via the study smartphone (in total 140 signals in 28 days). At each signal, participants indicated the occurred daily hassles since the previous signal, the perceived strain of each occurred daily hassle as well as their current level of NA (see below for a description of the applied measures). Each signal had to be answered within 90 min with two reminders every 30 min and took approximately 2 min to complete. The minimum default time interval between two regular signals was 1 hr. The EMA software and App movisensXS, version 1.0.1, library version 4,419 (movisens GmbH, Karlsruhe, Germany) was used to implement the protocol onto the study smartphones (model Motorola Moto E; Chicago, IL).

2.2.4 | Final session

In the week following the 28-day EMA phase, a 30-min final session was conducted in the laboratory. Participants returned the study smartphones and provided feedback in a semi-structured interview on the intrusiveness of the EMA methodology.

2.2.5 | Compensation

Participants received a staggered financial compensation for their participation in the larger project, consisting of a basic amount (up to 100 EUR) and several possible bonuses (e.g., 5 EUR if almost all EMA signals were answered within 1 week). The individual compensation depended on the participant's compliance, with a maximum possible amount of 176 EUR. Daily e-mail reminders were sent out to inform participants of their current signal compliance and the expected compensation.

2.3 | Measures

2.3.1 | Measures assessed during the baseline session

In addition to providing basic characteristics (e.g., age, gender, level of education, nationality), participants completed the following measures:

Mental health

The German version of the General Health Questionnaire 28 (GHQ-28; Goldberg et al., 1997) was applied to assess overall mental health. The GHQ-28 is a self-report screening questionnaire measuring the intensity of symptoms encountered in internalizing mental disorders (somatic symptoms, anxiety and insomnia, social dysfunction and depression) within the past days and weeks. It comprises four subscales with seven items each (28 items in total), that can be scored on a four-point Likert scale from 0 (“no, not at all”) to 3 (“much more than usual”). Based on previous studies (Goldberg et al., 1997), we included subjects with a GHQ-28 score of ≤23 to ensure a low level of mental dysfunction at baseline. Subjects yielding a score of >23 were contacted by trained medical staff for psychiatric clarification. If no impaired mental health was detected, these subjects were subsequently permitted to participate in the study. Internal consistency of the GHQ amounted to a Cronbach's α of .78 in this study.

Neuroticism

Trait neuroticism was measured using the respective two-item subscale of the Big-Five-Inventory-10 (BFI-10; Rammstedt, Kemper, Klein, Beierlein, & Kovaleva, 2012). The items were “I see myself as someone who…” (1) “…is relaxed, handles stress well” (reversed) and (2) “…gets nervous easily”. Participants responded on a five-point Likert-scale from 1 (“disagree strongly”) to 5 (“agree strongly”). The mean value of both items indicated the individual trait neuroticism. The BFI-10 is built on 10 items that have been drawn from the longer 44-item BFI (John, Donahue, & Kentle, 1991), based on consensual expert judgments and empirical item analyses (Rammstedt & John, 2007). Its psychometric properties were satisfactory in several samples: The two-items subscales demonstrated substantial correlations with the full scales of the BFI-44 (mean correlation of .86 for the neuroticism subscale), good test–retest stability (mean correlation of .74 for the neuroticism subscale) as well as significant convergent and discriminant validity with other Big-Five questionnaires (Rammstedt & John, 2007). Additionally, a high predictive ability of the BFI-10 regarding non-self-report variables, such as conduct violations or punctuality, has been reported. For some criteria, the BFI-10 even yielded better predictive results than the BFI-44 (Thalmayer, Saucier, & Eigenhuis, 2011). The BFI-10 has been widely used before (e.g., Müller et al., 2018; Park et al., 2016) and we opted to use the BFI-10 in particular given the time-restraints at our baseline session. A Cronbach's α of .51 was recorded in this study.

2.3.2 | Measures assessed during the EMA protocol

Daily hassles

At each signal, an EMA version of the Mainz Inventory of Microstressors (MIMIS; Chmitorz et al., 2020) was administered. The MIMIS comprised 58 potential daily hassles covering relevant aspects of daily life (e.g., work, family, friends, monetary aspects as well as environmental and living conditions; see the Appendix for a complete display of the MIMIS). Participants were instructed to indicate each daily hassle that had occurred since the last signal. For each selected daily hassle, participants were subsequently asked to rate the perceived daily hassle strain on a five-point Likert scale from 0 (“not at all straining”) to 4 (“very straining”). In the case that no daily hassles had occurred, subjects could choose the option “none of the above events has occurred since the last signal”, which was displayed at the end of the MIMIS. The cumulative strain for each signal was computed as the sum of all strain ratings in one signal, thus considering the cumulative effects of all reported daily hassles. If no daily hassles had been reported, the cumulative strain was coded as 0. The EMA version of the MIMIS showed high correlations with end-of-day and end-of-week versions of the MIMIS regarding daily hassle number and mean strain, providing evidence for its reliability (Chmitorz et al., 2020).

Negative affect

After having reported the occurred daily hassles, participants rated their current level of NA on the two-item valence dimension of a short mood scale, which has been developed especially for the assessment of current affect in EMA studies (Wilhelm & Schoebi, 2007). Participants indicated their current valence of affect on a slider style visual analogue scale from 0 to 100 on the two bipolar items “At this moment I feel: (1) content (0)—discontent (100)” and (2) “…unwell (0)—well (100)” (inverted). Current NA was computed as the mean value of these two items. The two items yielded good internal consistency scores at the between-person-level (α = .96) as well at the within-person-level (α = .80). The mood scale demonstrated high sensitivity to change (Wilhelm & Schoebi, 2007), which is a basic prerequisite for a mood scale administered within an EMA protocol.

2.4 | Analytic approach

This study aimed to examine the association between the cumulative strain ratings of daily hassles reported at the previous ($t - 1$) and the current (t) signal and NA reactivity with regard to neuroticism.

Multilevel models with random intercepts and coefficients were estimated with Stata 15 (Stata Corporation, College Station, TX) to account for the hierarchical data structure of the daily EMA signals (level 1) nested within participants (level 2). The multilevel analyses were carried out in four steps: the first step examined concurrent main effects of the level 1 and 2 predictors (only for the current signal t) to have a base model of concurrent effects. The second step investigated the previous signal $t-1$ by additionally including the time-lagged main effects. The third and fourth steps analyzed the concurrent and time-lagged interactions between the cumulative strain of the previous and the current signal and neuroticism (each interaction term was successively added, analogous to the first and second steps). Prior to the multilevel analysis, an unconditional model without any predictors was fitted to calculate the intraclass correlation. The following equations were used to predict NA:

Level 1 (signals)

$$NA_{tj} = \beta_{0j} + \beta_{1j}\,(\text{cumulative strain}_t) + \beta_{2j}\,(\text{cumulative strain}_{t-1}) + \beta_{3j}\,(\text{signal number day}) + \beta_{4j}(\text{signal number study}) + r_{tj} \quad (1)$$

Level 2 (subjects)

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{neuroticism}) + \gamma_{02}(\text{cumulative strain person mean}) + u_{0j} \quad (2a)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{neuroticism}) + u_{1j} \quad (2b)$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{neuroticism}) + u_{2j} \quad (2c)$$

$$\beta_{3j} = \gamma_{30} \quad (2d)$$

$$\beta_{4j} = \gamma_{40} \quad (2e)$$

NA_{ti} is the negative affect at the current signal t for subject j. β_{0j} denotes the random intercept representing the mean NA for person j (across the t signals), assuming the cumulative strain at t and $t-1$ to be at the person-mean. β_{1j} and β_{2j} were modeled as random effects and represent the regression coefficients (slopes) for the cumulative strain at signal t and $t-1$, respectively. Entering predictors as random effects allowed for the slopes of the association between the predictors and the criterion to vary between the subjects (Nezlek & Allen, 2006). The cumulative strain of t and $t-1$ were person-mean centered, which means that between-person differences in event scores did not contribute to the estimate of the slopes. Since the first signal of the day would contain information from the last signal of the previous day for the cumulative strain at $t-1$, we replaced the cumulative strain at $t-1$ on the first signal of each day with a missing value to eliminate effects from the previous day. The signal number across the day and across the study were entered as fixed effects to control for time trends across the day or the whole study period (the slopes are represented by β_{3j} and β_{4j}). r_{ti} reflects the residual within-person variance in NA. On level 2, Neuroticism was added grand-mean centered as fixed effect for the intercept β_{0j} and the slopes β_{1j} and β_{2j}, with γ_{11} and γ_{21} representing the cross-level interaction between neuroticism and cumulative strain at t or $t-1$. γ_{00} reflects the average level of NA with all other predictors at the grand-mean. The grand-mean centered person-mean of the cumulative strain was entered as covariate to the random intercept to control for between-person differences in cumulative strain (Bolger & Laurenceau, 2013). u indicates the random variance at level 2 for the random effects.

3 | RESULTS

Eighty subjects were enrolled in the study. In total, 10 participants were excluded at different time points of the study: Five participants were excluded prior to the EMA protocol due to GHQ scores above 23, indicating mental dysfunctions, and one due to taking psychiatric medication. Two participants quit the study during the EMA part of the study: One participant mentioned a lack of time as the reason for quitting, one lost the study smartphone after 12 days. During the feedback interview, two more participants were excluded as they reported having restructured their daily routines to decrease daily hassle frequency on account of the study, thus indicating measurement effects of the EMA methodology. The final sample consisted of 70 participants (59% female)

TABLE 1 Descriptive statistics

	M (SD)	Min	Max	Number of observations
Daily hassles (per signal)				
Mean number	1.68 (1.90)	0	19	9,125[a]
Mean strain	1.62 (.95)	0	4	6,163[b]
Cumulative strain	2.79 (3.78)	0	46	9,125[a]
Negative affect	30.93 (20.23)	0	100	9,125[a]
Neuroticism	2.76 (.89)	1	5	70

Abbreviations: *M*, mean; SD, standard deviation; Min, minimum; Max, maximum.
[a]All answered signals considered.
[b]All signals with at least one reported daily hassle considered.

TABLE 2 Within- and between-person correlations of number, mean strain and cumulative strain of daily hassles (per signal) as well as negative affect (per signal) and neuroticism

	Daily hassles			
	Number	Mean strain	Cumulative strain	Negative affect
Daily hassles				
Number	–	.06**	.86**	.19**
Mean strain	–.05	–	.45**	.37**
Cumulative strain	.82**	.39**	–	.30**
Negative affect	.23	.34*	.44**	–
Neuroticism	.10	.14	.20	.33*

Notes: Within-person correlation are displayed above the diagonal, between-person correlation below the diagonal, *$p < .05$, **$p < .01$, all p values are Bonferroni corrected.

TABLE 3 Negative affect hierarchically predicted by the cumulative strain of daily hassles at the current signal t (step 1), the previous signal $t-1$ (step 2), the interactions between the cumulative strain at signal $t \times$ neuroticism (step 3) and cumulative strain at signal $t-1 \times$ neuroticism (step 4)

Within-subjects fixed effects	b	SE_b	z	p	[95% CI]
Concurrent main effects (step 1)					
Cumulative strain$_t$[a]	2.18	0.18	12.15	<.001	[1.83; 2.53]
Neuroticism[b]	3.46	1.41	2.46	.01	[0.70; 6.21]
Cumulative strain (person mean)[b]	2.16	0.59	3.68	<.001	[1.01; 3.32]
Signal number across the day	0.08	0.12	0.69	.49	[−0.15; 0.30]
Signal number across the study	−0.01	0.003	−3.34	.001	[−0.02; −0.005]
Time-lagged main effects (step 2): Cumulative strain$_{t-1}$[a] added					
Cumulative strain$_t$[a]	2.29	0.19	11.90	<.001	[1.91; 2.67]
Cumulative strain$_{t-1}$[a]	0.41	0.06	6.53	<.001	[0.29; 0.53]
Neuroticism[b]	3.59	1.41	2.55	.01	[0.83; 6.36]
Cumulative strain (person mean)[b]	2.15	0.59	3.64	<.001	[0.99; 3.31]
Signal number across the day	−0.28	0.16	−1.68	.09	[−0.60; 0.05]
Signal number across the study	−0.01	0.004	−3.12	.002	[−0.02; −0.004]
Concurrent interaction (step 3): Cumulative strain$_t$[a] × neuroticism[b] added					
Cumulative strain$_t$[a] × neuroticism[b]	−0.08	0.22	−0.37	.71	[−0.50; 0.35]
Time-lagged interaction (step 4): Cumulative strain$_{t-1}$[a] × neuroticism[b] added					
Cumulative strain$_t$[a] × neuroticism[b]	−0.08	0.22	−0.38	.71	[−0.51; 0.34]
Cumulative strain$_{t-1}$[a] × neuroticism[b]	0.01	0.07	0.16	.88	[−0.12; 0.14]

Abbreviations: CI, confidence interval; SE, standard error; NA, negative affect; $N = 70$ individuals, 28 days, 9,125 observations (step 1), 6,982 observations (step 2–4); t, current signal; $t-1$, previous signal.
[a]Person-mean centered.
[b]Grand-mean centered.

with a mean age of 23.93 years (SD = 3.15). Almost all participants were of German nationality (94%), the majority (67%) were students. The educational level was high with 96% having completed at least high school. Overall, GHQ scores indicated a healthy sample ($M = 15.14$; SD = 5.50). On average, participants received a reimbursement of 162 EUR for their four-week participation in the larger study.

The overall EMA signal compliance was excellent with 94.51% completed signals over the course of all 28 days (SD = 5.25%), which corresponds to $M = 130.31$ (SD = 9.91) out of 140 completely answered signals. A multilevel model and subsequent χ^2-test were computed to test whether compliance rates declined over the course of the study, revealing significant differences between the 4 weeks ($\chi^2(3) = 17.25$; $p < .001$), with highest compliance in week

TABLE 4 Multilevel models to analyze the association between neuroticism and cumulative strain (model 1) and between neuroticism and daily hassle number (model 2)

Within-subjects fixed effects	*b*	SE_b	*z*	*p*	[95% CI]
Model 1: Cumulative strain as outcome					
Neuroticism[a]	0.47	0.28	1.69	.09	[−0.08; 1.02]
Model 2: Daily hassle number as outcome					
Neuroticism[a]	0.13	0.15	0.87	.39	[−0.17; 0.43]

Abbreviations: CI, confidence interval; SE, standard error; *N* = 70 individuals, 28 days, 9,125 observations.
[a]Grand-mean centered. Both models were controlled for signal number across the day and across the study.

TABLE 5 Negative affect predicted by the daily hassle number at the current signal *t* and the previous signal $t-1$, neuroticism as well as the interactions between daily hassle number at signal $t \times$ neuroticism and daily hassle number at signal $t-1 \times$ neuroticism

Within-subjects fixed effects	*b*	SE_b	*z*	*p*	[95% CI]
Daily hassle number$_t$[a]	3.02	0.35	8.55	<.001	[2.33; 3.71]
Daily hassle number$_{t-1}$[a]	0.68	0.13	5.28	<.001	[0.23; 0.92]
Neuroticism[b]	4.28	1.48	2.89	.004	[1.38; 7.18]
Daily hassle number (person mean)[b]	2.06	1.15	1.78	.07	[−0.20; 4.32]
Signal number across the day	−0.21	0.17	−1.22	.22	[−0.55; 0.13]
Signal number across the study	−0.02	0.004	−3.97	<.001	[−0.02; −.01]
Daily hassle number$_t$[a] × neuroticism[b]	0.23	0.40	0.59	.56	[−0.55; 1.01]
Daily hassle number$_{t-1}$[a] × neuroticism[b]	−0.13	0.14	−0.92	.36	[−0.41; 0.15]

Abbreviations: CI, confidence interval; SE, standard error; *N* = 70 individuals, 28 days, 6,982 observations; *t*, current signal; $t-1$, previous signal.
[a]Person-mean centered.
[b]Grand-mean centered.

1 (*M* = 95.32%; SD = 6.91%) and lowest compliance in week 4 (*M* = 92.39%; SD = 13.38%).

Table 1 displays descriptive results (*M*, SD) regarding the mean number and strain of occurred daily hassles per signal, mean NA levels and mean cumulative strain per signal as well as mean neuroticism scores of the participants. Within- and between-person correlations can be found in Table 2. In total, 9,125 signals were answered completely over all participants and days. The occurrence of daily hassles was reported in 6,163 of these observations.

The unconditional model revealed an intraclass correlation of .34, indicating that 66% of the total variance were attributable to within-person processes.

Results of the multilevel models are displayed in Table 3. All answered signals were considered for the multilevel models, regardless of whether daily hassles were reported or not. However, only 6,982 observations simultaneously contained exclusively non-missing values for all predictor and outcome variables at *t* and $t-1$ in the model and were therefore included in the final multilevel models. While signal number across the study yielded a significant negative parameter, signal number across the day did not, indicating that subjects reported lower levels of NA towards the end of the study but not towards the end of the day.

3.1 | Stress reactivity

The first and second step of the multilevel analysis revealed significant main effects of the cumulative strain at *t* and $t-1$, showing that a higher cumulative strain at the current (*t*) or the previous ($t-1$) signal were associated with higher levels of NA at the current signal *t*. Therefore, if participants reported higher cumulative strain resulting from a higher number or higher strain ratings of daily hassles reported at the current or the previous signal, they tended to experience higher current NA.

3.2 | Moderation of stress reactivity by neuroticism

The third and fourth step of the multilevel analysis did not show significant parameters for the interaction between cumulative strain at *t* or $t-1$ and neuroticism. Hence, neuroticism did not moderate the influence of cumulative strain at *t* or $t-1$ on current NA in the present study. Subjects with lower levels of neuroticism did not react with different levels of NA following daily hassles than subjects with higher levels of neuroticism. A power analysis revealed a limited power of 14% for the interaction.

As past studies have shown that subjects with high levels of neuroticism (compared to subjects with low levels of neuroticism) tend to perceive stressors as more severe and harmful (Marco & Suls, 1993; Sliwinski et al., 2009), one could argue that the cumulative strain itself is already strongly intertwined with neuroticism. Thus, the choice of cumulative strain as predictor may forestall a potential moderation of stress reactivity by neuroticism. In contrast, mere daily hassle number may be less affected by subjective perceptions and, thus, less confounded with neuroticism. Consequently, daily hassle number may be a better predictor when testing the moderation of the association between daily hassles and NA by neuroticism. To test the actual extent to which neuroticism may be confounded with cumulative strain *versus* daily hassle number, we post-hoc calculated two new multilevel models with neuroticism as predictor and cumulative strain versus mere daily hassle number as outcome (see Table 4). While neuroticism almost reached significance in predicting cumulative strain, neuroticism did not predict mere daily hassle number. These results imply that cumulative strain, in fact, may be more strongly intertwined with neuroticism than daily hassle number and mere daily hassle number may be better suited to check for a moderation of stress reactivity by neuroticism. We repeated step 2 of the multilevel models containing mere daily hassle number as predictor instead of cumulative strain revealing no significant parameters for the interaction between daily hassle number (t and $t-1$) and neuroticism (see Table 5). To conclude, we can rule out that the missing moderation of stress reactivity by neuroticism solely results from an entanglement between neuroticism and cumulative strain.

Additionally, we repeated our analyses by successively including multiple lagged effects (main and interaction effects) to shed light on the more nuanced relationship between neuroticism and NA reactivity following daily hassles at previous signals (up to signal $t-4$). The results can be found in the Supporting information.

4 | DISCUSSION

The present study assessed the impact of daily hassles on NA reactivity with regard to neuroticism, applying an elaborate daily hassle inventory within an EMA protocol instead of single-item or retrospective end-of-day assessments. While some end-of-day studies applied lists of a multiple daily hassles to determine daily stressor load, previous EMA studies did not use a comprehensive inventory to capture daily hassles. Instead, they mostly focused on the most severe daily hassle experienced (e.g., Husky et al., 2007; Marco & Suls, 1993; Wrzus et al., 2013), thereby neglecting potentially cumulative effects of multiple daily hassles occurring over a given time period.

Our EMA study demonstrated that a higher cumulative daily hassle strain was associated with a higher NA reactivity to these daily hassles. We could replicate findings from retrospective studies showing an increased NA reactivity when a larger number or cumulative strain of daily hassles were reported (e.g., Baker, 2006; Rush & Hofer, 2014; Sliwinski et al., 2009; Zautra et al., 2005). Furthermore, we could show that the impact of the cumulative strain on NA reactivity began shortly after the exposure to daily hassles (as we observed a higher NA reactivity at the same signal) and lasted for several hours (as a higher NA reactivity was still observable at the following signal, regardless of subsequent daily hassles reported at the current signal). This result is in line with the study by Johnson et al. (2008), which showed a prolonged influence of daily hassles on NA for up to 9 hr.

Considering the smaller coefficient of previous daily hassles compared to the coefficient of current daily hassles in this study, the impact of previous daily hassles seemed to attenuate over the hours, which may be attributed to an adequate use of coping strategies such as a successful reappraisal of the situation, problem solving or social support seeking (e.g., Lazarus, 1974; Smith, Saklofske, Keefer, & Tremblay, 2016). However, no complete recovery from daily hassles took place between two signals, as the effect of previous daily hassles on current NA was still observable, albeit smaller.

We did not find evidence for a significant moderation of NA reactivity to daily hassles by neuroticism. While this result is in line with Affleck et al. (1994), David et al. (1997) and Nezlek and Allen (2006), it contradicts the majority of studies revealing an impact of neuroticism on NA reactivity following daily hassles (e.g., Bolger & Schilling, 1991; Marco & Suls, 1993; Mroczek & Almeida, 2004; Sliwinski et al., 2009; Suls et al., 1998) and is also incongruent with the postulation of a hyperreactivity towards daily hassles of individuals with high levels of neuroticism (Suls, 2001). A possible explanation for the absence of a significant moderation may result from methodological specifics of our study, which deviates in some aspects from previous research in the field, as outlined below.

We used EMA instead of end-of-day reports, presumably reducing potential recall biases. Negative recall biases, however, are particularly found in participants with high levels of neuroticism (Chan, Goodwin, & Harmer, 2007; Martin, Ward, & Clark, 1983; Rijsdijk et al., 2009). Thus, an individual's level of neuroticism might have a stronger negative influence on affect ratings in end-of-day reports compared to EMA designs. Therefore, at the end of the day, individuals with high levels of neuroticism might recall a higher retrospective NA reactivity due to the aforementioned bias than low neuroticism individuals, whose ratings are subject to less bias. Furthermore, the negative recall bias may generally prompt individuals with high levels of neuroticism to report a larger number of daily hassles in the past day, compared to low neuroticism individuals, an effect that has been found in a broad number of studies (Affleck et al., 1994; Bolger & Schilling, 1991; Bolger & Zuckerman, 1995; David et al., 1997; Suls & Martin, 2005). By contrast, our inventory, presenting a detailed checklist of potential daily hassles to the subjects, might have reminded individuals with low levels of neuroticism of occurred events which they would have neglected otherwise, thus diminishing the difference between subjects with low and high levels of neuroticism regarding the number (and consequently the cumulative strain) of reported daily hassles. Our intensive daily hassle inventory implemented in EMA may therefore circumvent a possible overestimation of the effect of neuroticism on NA reactivity in end-of-day assessments.

Additionally, most previous research applied emotion-based affect measures to assess NA, such as the amount to which participants felt negative emotions like being angry, anxious or worried. Emotion-based NA measures and neuroticism measures often have a substantial overlap in item wording (such as feeling depressed, nervous or anxious), thereby facilitating possible co-variation between NA and neuroticism. In contrast, we employed a mood-based affect measure (NA as the result of negative mood states such as feeling discontent and unwell), whose items are distinct from items used for assessing neuroticism. By relying on distinct items, our mood-based affect measure potentially prevents from confounding effects of neuroticism and NA but may also impede significant results.

Finally, including only younger adults in our study might have prevented a significant moderation of neuroticism on NA reactivity following daily hassles, since there is evidence for a trend indicating that neuroticism might have a stronger influence on the stress- NA association in older compared to younger adults due to potential kindling effects (Mroczek & Almeida, 2004).

An important strength of the study is the application of an EMA protocol. As EMA employs a more intensive sampling frequency throughout the day compared to daily diary studies, EMA minimizes retrospective biases and allows capturing within-day variability in occurred daily hassles and NA reactivity. This is especially relevant regarding the type of stressor involved: As daily hassles are very common and frequently occurring phenomena of everyday life, that bear rather little emotional salience, their occurrence and subjective experience may be less accurately recalled in end-of-day assessments (for review, see LaBar & Cabeza, 2006). Furthermore, EMA methods increase external validity of collected data as the assessments take place within participants' daily life instead of the laboratory and thus reflect daily life processes more accurately. The results of our study are therefore highly generalizable to the daily lives of the high school educated German subpopulation.

The following limitations have to be taken into account when interpreting our findings. First, the reliability of the BFI-10 was below recommendations for research purposes (e.g., Groth-Marnat, 2003), resulting in a potential underestimation of neuroticism scores. However, low reliability scores do not necessarily translate into low validity scores. Despite its short length, the BFI-10 has shown excellent predictive validity (even better than the 44-item version of the BFI) in a student population regarding non-self-report variables such as life outcomes (academic performance or conduct violations) or behavioral observations (e.g., punctuality or number of contacts on social media platforms; Thalmayer et al., 2011). Two reasons can be discussed. On the one hand, it is a commonly known problem when interpreting Cronbach's alpha that it is not independent of test length and that the alpha score naturally decreases with smaller numbers of items (Cronbach, 1951; Ziegler, Kemper, & Kruyen, 2014). On the other hand, neuroticism is not a unidimensional construct but a construct comprising several distinct facets (Costa & McCrae, 1992). Thus, the two items stemming from two distinct facets yield smaller internal consistency scores while being both valid items for the assessment of neuroticism. Due to the aforementioned reasons, it has been argued that short scales might not necessarily need to show as high internal consistency scores as the respective longer scales, especially if group statistics (rather than individuals) are assessed and measurement efficiency is crucial (Ziegler et al., 2014).

Furthermore, the sample size of 70 participants in this study was relatively small. It seems therefore unsurprising that the analyses conducted lacked the power to detect potentially smaller moderating effects of neuroticism.

In addition, our results are based on self-reports, which inherently entails some limitations. Like all self-report data, the appraisal and reporting of occurred daily hassles, the perceived strain and NA in this study may be distorted due to response (Furnham, 1986) or recall biases (albeit less strongly due to the EMA methodology compared to laboratory assessments; Shiffman et al., 2008). Additionally, the evaluations of daily hassles might have influenced each other or shaped a subject's subsequent assessment of NA (e.g., when subjects reported higher number of daily hassles, they might therefore have concluded to be feeling higher NA).

A fourth limitation is a reduced NA variance. Similarly to other studies (e.g., van Eck et al., 1998; Komulainen et al., 2014; Wrzus et al., 2013), on average participants reported low levels of NA across all signals instead of using the full visual analogue scale. This reduced NA variance may have obscured effects.

The results of our study suggest a range of implications for future EMA research in the field. First, they underline the relevance of assessing cumulative effects of daily hassles instead of focusing on one daily hassle. Future EMA research in the field could take greater account of these cumulative effects by implementing more comprehensive daily hassle inventories. Additionally, some of the limitations of this study could be addressed by applying a more extensive neuroticism scale (e.g., the 60-item NEO-Five-Factor-Inventory, Costa & McCrae, 1992) or by including a larger number of participants with a larger age range. Moreover, the effects of primary and secondary appraisal processes (Lazarus & Folkman, 1984) could be assessed using a similar EMA-based study design incorporating items on coping strategies and emotion regulation. In that way, functional coping strategies alleviating or dysfunctional coping strategies increasing the impact of daily hassles on NA could be examined more closely. Furthermore, EMA studies including physiological, and thus more objective, measures for stress reactivity (such as cortisol or cardiovascular activity, for an overview see Smets, de Raedt, & van Hoof, 2018) may circumvent self-report biases or personality-driven response styles, shedding further light on stress reactivity processes in daily life.

To conclude, this study provides further evidence for the importance of daily hassles for affective well-being in everyday life. Our results expand previous EMA research on stress reactivity by employing a comprehensive inventory of daily hassles that allowed for examining cumulative effects of daily hassles on affect. We found a significant association between the cumulative strain ratings of daily hassles and NA reactivity, which was even observable from one signal to the next. Neuroticism, however, did not moderate this association and the notion of a general hyperreactivity of individuals with high levels of neuroticism cannot be supported by this study.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

AUTHOR CONTRIBUTIONS

LKM, AC, KK, RK, OT and TK designed the study. LKM and KK collected the data. AC, RK, OT and TK supervised the study. LKM, AC, OT and TK devised the analytic approach underlying the present article. LKM wrote the manuscript, with additional contributions from AC. MW provided additional guidance in data analysis. All authors provided substantial input and feedback during the writing process and shaped the final version of the manuscript.

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ENDNOTE

[1]The term Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 1987) is often used interchangeably. This paper does not differentiate between EMA and ESM designs due to the very subtle differences between the two methodologies. For a summary on EMA/ESM differences and similarities, see Trull, Ebner-Priemer, Brown, Tomko, and Scheiderer (2012).

REFERENCES

Affleck, G., Tennen, H., Urrows, S., & Higgins, P. (1994). Person and contextual features of daily stress reactivity: Individual differences in relations of undesirable daily events with mood disturbance and chronic pain intensity. *Journal of Personality and Social Psychology*, *66*(2), 329–340. https://doi.org/10.1037/0022-3514.66.2.329

van Eck, M., Nicolson, N. A., & Berkhof, J. (1998). Effects of stressful daily events on mood states: Relationship to global perceived stress. *Journal of Personality and Social Psychology*, *75*(6), 1572–1585.

Baker, S. R. (2006). Towards an idiothetic understanding of the role of social problem solving in daily event, mood and health experiences: A prospective daily diary approach. *British Journal of Health Psychology*, *11*(3), 513–531. https://doi.org/10.1348/135910705X57647

Bolger, N., & Laurenceau, J.-P. (2013). Intensive longitudinal methods: An introduction to diary and experience sampling research. In *Methodology in the social sciences*. New York, NY: Guilford Press.

Bolger, N., & Schilling, E. A. (1991). Personality and the problems of everyday life: The role of neuroticism in exposure and reactivity to daily stressors. *Journal of Personality*, *59*(3), 355–386. https://doi.org/10.1111/j.1467-6494.1991.tb00253.x

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology*, *69*(5), 890–902.

Chan, S. W. Y., Goodwin, G. M., & Harmer, C. J. (2007). Highly neurotic never-depressed students have negative biases in information processing. *Psychological Medicine*, *37*(9), 1281–1291. https://doi.org/10.1017/S0033291707000669

Charles, S. T., Piazza, J. R., Mogle, J., Sliwinski, M. J., & Almeida, D. M. (2013). The wear and tear of daily stressors on mental health. *Psychological Science*, *24*(5), 733–741. https://doi.org/10.1177/0956797612462222

Chiang, J. J., Turiano, N. A., Mroczek, D. K., & Miller, G. E. (2018). Affective reactivity to daily stress and 20-year mortality risk in adults with chronic illness: Findings from the National Study of daily experiences. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *37*(2), 170–178. https://doi.org/10.1037/hea0000567

Chmitorz, A., Kurth, K., Mey, L. K., Wenzel, M., Lieb, K., Tüscher, O., … Kalisch, R. (2020). Assessment of microstressors in adults: Questionnaire development and ecological validation of the Mainz inventory of microstressors. *JMIR Mental Health*, *7*(2), e14566. https://doi.org/10.2196/14566

Costa, P. T., & McCrae, R. R. (1980). Influence of extraversion and neuroticism on subjective well-being: Happy and unhappy people. *Journal of Personality and Social Psychology*, *38*(4), 668–678. https://doi.org/10.1037/0022-3514.38.4.668

Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory and NEO five-factor professional manual*. Odessa, FL: Psychological Assessment Resources.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334. https://doi.org/10.1007/BF02310555

Csikszentmihalyi, M., & Larson, R. (1987). Validity and reliability of the experience sampling method. *Journal of Nervous and Mental Disease*, *175*, 526–537.

David, J. P., Green, P. J., Martin, R., & Suls, J. (1997). Differential roles of neuroticism, extraversion, and event desirability for mood in daily life: An integrative model of top-down and bottom-up influences. *Journal of Personality and Social Psychology*, *73*(1), 149–159.

DeLongis, A., Coyne, J. C., Dakof, G., Folkman, S., & Lazarus, R. S. (1982). Relationship of daily hassles, uplifts, and major life events to health status. *Health Psychology*, *1*(2), 119–136. https://doi.org/10.1037/0278-6133.1.2.119

Ebner-Priemer, U. W., & Trull, T. J. (2009). Ambulatory assessment. *European Psychologist*, *14*(2), 109–119. https://doi.org/10.1027/1016-9040.14.2.109

Fernandez, E., & Sheffield, J. (1996). Relative contributions of life events versus daily hassles to the frequency and intensity of headaches. *Headache: The Journal of Head and Face Pain*, *36*(10), 595–602. https://doi.org/10.1046/j.1526-4610.1996.3610595.x

Furnham, A. (1986). Response bias, social desirability and dissimulation. *Personality and Individual Differences*, *7*(3), 385–400.

Goldberg, D. P., Gater, R., Sartorius, N., Ustun, T. B., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, *27*(1), 191–197. https://doi.org/10.1017/S0033291796004242

Goldschmidt, A. B., Wonderlich, S. A., Crosby, R. D., Engel, S. G., Lavender, J. M., Peterson, C. B., … Mitchell, J. E. (2014). Ecological momentary assessment of stressful events and negative affect in bulimia nervosa. *Journal of Consulting and Clinical Psychology*, *82*(1), 30–39. https://doi.org/10.1037/a0034974

Groth-Marnat, G. (2003). *Handbook of psychological assessment* (4th ed.). Hoboken NJ: John Wiley & Sons.

Gunthert, K. C., Cohen, L. H., & Armeli, S. (1999). The role of neuroticism in daily stress and coping. *Journal of Personality and Social Psychology*, *77*(5), 1087–1100. https://doi.org/10.1037//0022-3514.77.5.1087

Husky, M. M., Mazure, C. M., Maciejewski, P. K., & Swendsen, J. D. (2007). A daily life comparison of Sociotropy-autonomy and hopelessness theories of depression. *Cognitive Therapy and Research*, *31*(5), 659–676. https://doi.org/10.1007/s10608-006-9025-x

Jacobi, F., Höfler, M., Siegert, J., Mack, S., Gerschler, A., Scholl, L., … Wittchen, H.-U. (2014). Twelve-month prevalence, comorbidity and correlates of mental disorders in Germany: The mental health module of the German health interview and examination survey for adults (DEGS1-MH). *International Journal of Methods in Psychiatric Research*, *23*(3), 304–319. https://doi.org/10.1002/mpr.1439

Jacobs, N., Myin-Germeys, I., Derom, C., Delespaul, P., van Os, J., & Nicolson, N. A. (2007). A momentary assessment study of the relationship between affective and adrenocortical stress responses in daily life. *Biological Psychology*, *74*(1), 60–66. https://doi.org/10.1016/j.biopsycho.2006.07.002

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The big five inventory—versions 4a and 54*. Berkeley: University of California.

Johnson, E. I., Husky, M., Grondin, O., Mazure, C. M., Doron, J., & Swendsen, J. (2008). Mood trajectories following daily life events. *Motivation and Emotion*, *32*(4), 251–259. https://doi.org/10.1007/s11031-008-9106-0

Kanner, A. D., Coyne, J. C., Schaefer, C., & Lazarus, R. S. (1981). Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events. *Journal of Behavioral Medicine*, *4*(1), 1–39.

Komulainen, E., Meskanen, K., Lipsanen, J., Lahti, J. M., Jylha, P., Melartin, T., … Ekelund, J. (2014). The effect of personality on daily life emotional processes. *PLoS One*, *9*(10), e110907. https://doi.org/10.1371/journal.pone.0110907

LaBar, K. S., & Cabeza, R. (2006). Cognitive neuroscience of emotional memory. *Nature Reviews*. *Neuroscience*, *7*(1), 54–64. https://doi.org/10.1038/nrn1825

Lazarus, R. S. (1974). Psychological stress and coping in adaptation and illness. *International Journal of Psychiatry in Medicine*, *5*(4), 321–333.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing Company, Inc.

Marco, C. A., & Suls, J. (1993). Daily stress and the trajectory of mood: Spillover, response assimilation, contrast, and chronic negative affectivity. *Journal of Personality and Social Psychology*, *64*(6), 1053–1063.

Martin, M., Ward, J. C., & Clark, D. M. (1983). Neuroticism and the recall of positive and negative personality information. *Behaviour Research and Therapy*, *21*(5), 495–503. https://doi.org/10.1016/0005-7967(83)90041-4

McCrae, R. R., & Costa, P. T. (1986). Personality, coping, and coping effectiveness in an adult sample. *Journal of Personality*, *54*(2), 385–404. https://doi.org/10.1111/j.1467-6494.1986.tb00401.x

Mroczek, D. K., & Almeida, D. M. (2004). The effect of daily stress, personality, and age on daily negative affect. *Journal of Personality*, *72*(2), 355–378. https://doi.org/10.1111/j.0022-3506.2004.00265.x

Müller, K. W., Wölfling, K., Beutel, M. E., Stark, B., Quiring, O., Aufenanger, S., … Reinecke, L. (2018). Insights into aspects behind internet-related disorders in adolescents: The interplay of personality and symptoms of adjustment disorders. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, *62*(2), 234–240. https://doi.org/10.1016/j.jadohealth.2017.09.011

Nezlek, J. B., & Allen, M. R. (2006). Social support as a moderator of day-to-day relationships between daily negative events and daily psychological well-being. *European Journal of Personality*, *20*(1), 53–68. https://doi.org/10.1002/per.566

Park, J. E., Suk, H. W., Seong, S. J., Sohn, J. H., Hahm, B.-J., Lee, D.-W., & Cho, M. J. (2016). Association between personality traits and mental health outcomes in older adults with lifetime trauma exposure: A nationwide community sample. *International Psychogeriatrics*, *28*(9), 1533–1543. https://doi.org/10.1017/S1041610216000077

Peralta-Ramirez, M. I., Jimenez-Alonso, J., Godoy-Garcia, J. F., & Perez-Garcia, M. (2004). The effects of daily stress and stressful life events on the clinical symptomatology of patients with lupus erythematosus. *Psychosomatic Medicine*, *66*(5), 788–794. https://doi.org/10.1097/01.psy.0000133327.41044.94

Piazza, J. R., Charles, S. T., Sliwinski, M. J., Mogle, J., & Almeida, D. M. (2013). Affective reactivity to daily stressors and long-term risk of reporting a chronic physical health condition. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, *45*(1), 110–120. https://doi.org/10.1007/s12160-012-9423-0

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the big five inventory in English and German. *Journal of Research in Personality*, *41*(1), 203–212. https://doi.org/10.1016/j.jrp.2006.02.001

Rammstedt, B., Kemper, C. J., Klein, M. C., Beierlein, C., & Kovaleva, A. (2012). *Eine kurze Skala zur Messung der fünf Dimensionen der Persönlichkeit: Big-Five-Inventory-10 (BFI-10), [A short scale for assessing the Big-5 of Personality: Big-Five-Inventory-10 (BFI-10)] (GESIS-working papers 2012/23)*, Mannheim, Germany: GESIS - Leibniz-Institut für Sozialwissenschaften. http://nbnresolving.de/urn:nbn:de:0168-ssoar-312133.

Rijsdijk, F. V., Riese, H., Tops, M., Snieder, H., Brouwer, W. H., Smid, H. G. O. M., & Ormel, J. (2009). Neuroticism, recall bias and attention bias for valenced probes: A twin study. *Psychological Medicine*, *39*(1), 45–54. https://doi.org/10.1017/S0033291708003231

Röcke, C., Li, S.-C., & Smith, J. (2009). Intraindividual variability in positive and negative affect over 45 days: Do older adults fluctuate less than young adults? *Psychology and Aging*, *24*(4), 863–878. https://doi.org/10.1037/a0016276

Rush, J., & Hofer, S. M. (2014). Differences in within- and between-person factor structure of positive and negative affect: Analysis of two intensive measurement studies using multilevel structural equation modeling. *Psychological Assessment*, *26*(2), 462–473. https://doi.org/10.1037/a0035666

Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology*, *4*(1), 1–32. https://doi.org/10.1146/annurev.clinpsy.3.022806.091415

Sliwinski, M. J., Almeida, D. M., Smyth, J., & Stawski, R. S. (2009). Intraindividual change and variability in daily stress processes: Findings from two measurement-burst diary studies. *Psychology and Aging*, *24*(4), 828–840. https://doi.org/10.1037/a0017925

Smets, E., de Raedt, W., & van Hoof, C. (2018). Into the wild: The challenges of physiological stress detection in laboratory and ambulatory settings. *IEEE Journal of Biomedical and Health Informatics*, *23*(2), 463–473. https://doi.org/10.1109/JBHI.2018.2883751

Smith, M. M., Saklofske, D. H., Keefer, K. V., & Tremblay, P. F. (2016). Coping strategies and psychological outcomes: The moderating effects of personal resiliency. *The Journal of Psychology*, *150*(3), 318–332. https://doi.org/10.1080/00223980.2015.1036828

Smyth, J. M., Wonderlich, S. A., Sliwinski, M. J., Crosby, R. D., Engel, S. G., Mitchell, J. E., & Calogero, R. M. (2009). Ecological momentary assessment of affect, stress, and binge-purge behaviors: Day of week and time of day effects in the natural environment. *The International Journal of Eating Disorders*, *42*(5), 429–436. https://doi.org/10.1002/eat.20623

Stawski, R. S., Sliwinski, M. J., Almeida, D. M., & Smyth, J. M. (2008). Reported exposure and emotional reactivity to daily stressors: The roles of adult age and global perceived stress. *Psychology and Aging*, *23*(1), 52–61. https://doi.org/10.1037/0882-7974.23.1.52

Suls, J. (2001). Affect, stress, and personality. In J. P. Forgas (Ed.), *Handbook of affect and social cognition* (pp. 392–409). Mahwah, New Jersey: Lawrence Erlbaum Associates Publishers.

Suls, J., Green, P., & Hillis, S. (1998). Emotional reactivity to everyday problems, affective inertia, and neuroticism. *Personality and Social*

Psychology Bulletin, *24*(2), 127–136. https://doi.org/10.1177/0146167298242002
Suls, J., & Martin, R. (2005). The daily life of the garden-variety neurotic: Reactivity, stressor exposure, mood spillover, and maladaptive coping. *Journal of Personality*, *73*(6), 1485–1509. https://doi.org/10.1111/j.1467-6494.2005.00356.x
Tessner, K. D., Mittal, V., & Walker, E. F. (2011). Longitudinal study of stressful life events and daily stressors among adolescents at high risk for psychotic disorders. *Schizophrenia Bulletin*, *37*(2), 432–441. https://doi.org/10.1093/schbul/sbp087
Thalmayer, A. G., Saucier, G., & Eigenhuis, A. (2011). Comparative validity of brief to medium-length big five and big six personality questionnaires. *Psychological Assessment*, *23*(4), 995–1009. https://doi.org/10.1037/a0024165
Tong, E. M. W. (2010). Personality influences in appraisal-emotion relationships: The role of neuroticism. *Journal of Personality*, *78*(2), 393–417. https://doi.org/10.1111/j.1467-6494.2010.00620.x
Trull, T. J., Ebner-Priemer, U. W., Brown, W. C., Tomko, R. L., & Scheiderer, E. M. (2012). Clinical psychology. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 620–635). New York: Guilford Press.
van Winkel, M., Nicolson, N. A., Wichers, M., Viechtbauer, W., Myin-Germeys, I., & Peeters, F. (2015). Daily life stress reactivity in remitted versus non-remitted depressed individuals. *European Psychiatry: The Journal of the Association of European Psychiatrists*, *30*(4), 441–447. https://doi.org/10.1016/j.eurpsy.2015.02.011
Wilhelm, P., & Schoebi, D. (2007). Assessing mood in daily life. *European Journal of Psychological Assessment*, *23*(4), 258–267. https://doi.org/10.1027/1015-5759.23.4.258
Wrzus, C., Muller, V., Wagner, G. G., Lindenberger, U., & Riediger, M. (2013). Affective and cardiovascular responding to unpleasant events from adolescence to old age: Complexity of events matters. *Developmental Psychology*, *49*(2), 384–397. https://doi.org/10.1037/a0028325
Zautra, A. J., Affleck, G. G., Tennen, H., Reich, J. W., & Davis, M. C. (2005). Dynamic approaches to emotions and stress in everyday life: Bolger and Zuckerman reloaded with positive as well as negative affects. *Journal of Personality*, *73*(6), 1511–1538. https://doi.org/10.1111/j.0022-3506.2005.00357.x
Ziegler, M., Kemper, C. J., & Kruyen, P. (2014). Short scales—Five misunderstandings and ways to overcome them. *Journal of Individual Differences*, *35*(4), 185–189. https://doi.org/10.1027/1614-0001/a000148

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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APPENDIX A.

Mainz Inventory of Microstressors (MIMIS)—EMA version (English).

The list below contains a collection of possible situations that may be perceived as annoyances or inconveniences. Please indicate which of the following situations have occurred since the last signal, regardless of whether you perceived the situation as an annoyance or inconvenience.

		To what extent did you find the situation mentally straining, on average?[a]				
		Not at all			Very	
1	Losing or displacing objects	0	1	2	3	4
2	Negative event in the media	0	1	2	3	4
3	Negative political event	0	1	2	3	4
4	Social obligation	0	1	2	3	4
5	Interruption during an activity (e.g., at work or during leisure activities)	0	1	2	3	4
6	Waiting time or delay (e.g., waiting for a person; bus or train delay)	0	1	2	3	4
7	Careless mistakes or slips due to a lack of attention	0	1	2	3	4
8	Gossip (including social media)	0	1	2	3	4
9	Discrimination or mobbing by another person (including social media)	0	1	2	3	4
10	Nightmares	0	1	2	3	4
11	Journey/commute to work/university/school	0	1	2	3	4
12	Minor offence (e.g., fine)	0	1	2	3	4
13	Trouble with authorities, state office or other institutions (e.g., tax office, bank, company)	0	1	2	3	4
14	Conflict or disagreement at work (e.g., with colleagues or boss)	0	1	2	3	4
15	Conflict or disagreement **with** close persons (e.g., parents, siblings, partner)	0	1	2	3	4
16	Conflict or disagreement **between** close persons (between parents, siblings, friends)	0	1	2	3	4
17	Conflict or disagreement with other non-related persons (e.g., bus driver, neighbor)	0	1	2	3	4
18	Conflict or disagreement with own child/children	0	1	2	3	4
19	Child care problems	0	1	2	3	4
20	Running errands or transport service for other people (e.g., getting medication for a family member)	0	1	2	3	4
21	Problem/inconvenience due to long distance relationships with friends/relatives	0	1	2	3	4
22	Problem/inconvenience due to a lack of help/support from others	0	1	2	3	4
23	Problem with a pet (e.g., diseases, bad behavior)	0	1	2	3	4
24	Problem/inconvenience due to an unsafe environment (e.g., unsafe neighborhood)	0	1	2	3	4
25	Problem/inconvenience due to dirt, pollution or smell (e.g., in the neighborhood/flat)	0	1	2	3	4
26	Financial problems (not having enough money for basic services, emergencies or special wishes)	0	1	2	3	4
27	Others owe you money	0	1	2	3	4
28	You owe others money (debts)	0	1	2	3	4
29	High or unexpected financial burden (e.g., purchase of expensive products, costs for a car repair)	0	1	2	3	4

(Continues)

	To what extent did you find the situation mentally straining, on average?[a]				
	Not at all			Very	
30 Financial issue (e.g., paying bills, planning retirement provision)	0	1	2	3	4
31 Unexpected or unwanted visit	0	1	2	3	4
32 Side effects of medications	0	1	2	3	4
33 Own physical discomfort	0	1	2	3	4
34 Physical discomfort of a close person (e.g., minor illness, pain)	0	1	2	3	4
35 Lack of sleep or sleeping problems	0	1	2	3	4
36 Seeing a doctor	0	1	2	3	4
37 Paperwork at home (e.g., filling out a form)	0	1	2	3	4
38 Housekeeping (e.g., cooking, cleaning, running errands)	0	1	2	3	4
39 Minor repairs (e.g., at home)	0	1	2	3	4
40 Problems with a technical device (e.g., computer, household appliance, electrical device)	0	1	2	3	4
41 Maintenance (e.g., of the car)	0	1	2	3	4
42 Bad weather (e.g., rain, heat, cold)	0	1	2	3	4
43 Annoying behavior of misconduct of others (e.g., inconsiderate smokers, annoying neighbors)	0	1	2	3	4
44 Bad food (e.g., in the canteen/cafeteria)	0	1	2	3	4
45 Noise (e.g., street or aircraft noise)	0	1	2	3	4
46 Traffic	0	1	2	3	4
47 Searching for a parking space	0	1	2	3	4
48 Problems with a communication medium (e.g., internet, telephone)	0	1	2	3	4
49 Performance situation at work/school/university (e.g., exam)	0	1	2	3	4
50 High demands/high workload at work/school/university	0	1	2	3	4
51 Boring task (e.g., at work/university)	0	1	2	3	4
52 Meeting (e.g., at work/university/club)	0	1	2	3	4
53 Irregular/excessively long working hours	0	1	2	3	4
54 Problem arranging and scheduling appointments	0	1	2	3	4
55 Time pressure	0	1	2	3	4
56 Bad news (e.g., rejection letter, bad grades)	0	1	2	3	4
57 Problem/inconvenience due to job/study/ apprenticeship search	0	1	2	3	4
58 Problem/inconvenience due to house-hunting or moving	0	1	2	3	4
59 No daily hassle occurred since the last signal					

[a]This question was only displayed if the subject had indicated the occurrence of the respective daily hassle.