Situation Contingent Negative Emotions and Performance: The Moderating Role of Trait Neuroticism

Robert E. Wood [a*], Nadin Beckmann[b], Shuang Ren[c], and Bichen Guan[d]

[a] Macquarie Business School, Macquarie University, North Ryde, NSW 2109, Australia. Email: robert.wood@mq.edu.au.

[b] School of Education, Durham University, DH1 3LE, Durham, United Kingdom. Email: nadin.beckmann@durham.ac.uk.

[c] Deakin Business School, Deakin University, Burwood, VIC 3125, Australia. Email: shuang.ren@deakin.edu.au.

[d] School of Business, The University of Queensland, St Lucia, QLD 4067, Australia. Email: b.guan@uq.edu.au.

[*]Corresponding author information: Macquarie Business School, Macquarie University, North Ryde, NSW 2109, Australia. Email address: robert.wood@mq.edu.au. Mob: +61 425 202 976.

This article is in press in *Personality and Individual Differences* (June 2022):

Wood, R. E., Beckmann, N., Ren, S., & Guan, B. (2022). Situation contingent negative emotions and performance: The moderating role of trait neuroticism. *Personality and Individual Differences*.

Situation Contingent Negative Emotions and Performance: The Moderating Role of Trait Neuroticism

Abstract

Negative emotions are related to poor performance in between-person analyses but facilitate performance in within-person analyses, under certain conditions. We examine the effect of situation contingent negative emotions (SCE) on performance, and trait neuroticism as a moderator of that relationship. SCE modelled negative emotions as responses to perceived task challenges using experience sampling data collected over three weeks (2453 responses). Performance was exam scores (*n*=83) in an automotive engineering course. SCE predicted performance and this effect was moderated by trait neuroticism. SCE improved performance for students with lower neuroticism.

Keywords:

Negative emotions; experience sampling method; neuroticism; performance; personality dynamics; situation contingencies

1. Introduction

Trait neuroticism (hereafter neuroticism) is the propensity to experience negative emotional states (hereafter negative emotions; Costa & McCrae, 1992). However, negative emotions are also influenced by other personal factors and situational cues. We argue that the experience of negative emotions will be consistent across situations with similar psychological properties, such as the perceived level of challenge, and that the contingent relationship between the psychological property of the situation and the emotional response is a stable unit of personality, separate from the neuroticism trait. Further, we argue that the strength of the contingent relationship between perceived task challenge and negative emotions will positively relate to performance on tasks that include cumulative effects of problem solving and learning.

Neuroticism and associated negative emotions have a wide range of detrimental effects (Lahey, 2009), such as mental and physical illnesses (Claridge & Davis, 2001), job dissatisfaction (Judge & Bono, 2001), and low self-esteem (Judge et al., 2002). However, the experiences of negative emotions are not uniformly detrimental (Beckmann et al., 2013; Beckmann et al., 2010; Carver, 2004; Smillie et al., 2006), and have been shown to positively relate to cognitive mechanisms, including attention control (van Doorn & Lang, 2010), effort intensity (Smillie et al., 2006), emotion regulation (Barańczuk, 2019), goal prioritization (Carver & Scheier, 1994), planning and information processing (Forgas, 2008).

The seemingly contradictory findings suggest that the different effects of negative emotions depend upon situation characteristics and the mechanisms engaged. On tasks with immediate pressure to perform and heavy workloads, where immediate attentional control is critical for performance, neuroticism and the associated negative emotions typically undermine performance (Cox-Fuenzalida et al., 2004). However, when tasks allow for more sustained processing and cumulative effects of detailed information processing, planning, greater effort, and goal striving, negative emotions can contribute positively to problem solving and learning (Andrews & Thomson, 2009; Forgas, 2008; Smillie et al., 2006).

The aim of this study is to investigate how negative emotional responses to task challenges relate to performance outcomes, and whether that relationship is moderated by neuroticism. Trait neuroticism is measured as a stable disposition. Negative emotions are measured as responses to levels of task challenge repeatedly over a three-week period and modelled as *situation contingent emotions* (SCE). The SCE units are based on the 'if this, then that' units of knowledge, as described in the cognitive-affective processing system (CAPS) framework (Mischel & Shoda, 1995). The moderation effect of neuroticism is based on the affective certainty hypothesis (Tamir & Robinson, 2004), whereby individuals high on neuroticism are more adept at processing negative emotions to capture the benefits of analytical information processing (Bless & Fiedler, 1995) and greater effort (Smillie et al., 2006) associated with negative emotions.

The current study makes several contributions. First, we describe, measure, and test an 'if this, then that' CAPS unit of SCE, show how SCEs vary between individuals, and that differences in SCEs are independent of neuroticism. Second, we demonstrate the predictive validity of SCEs for a real-world task, a course exam, completed eleven weeks after the measurement of SCEs. Third, contrary to our prediction based on the affective certainty hypothesis (Tamir & Robinson, 2004), we show how neuroticism weakens the effects of SCEs on performance.

1.1. Negative emotions are contingent on perceived challenges

According to CAPS, it is differences in the psychological features of situations that influence a person's responses to those situations (Mischel, 1973; Mischel & Shoda, 1995). Negative emotions are a frequent response to perceived challenges during task performance. Falling behind or being confronted by challenges often mobilizes negative affect (Carver, 2004). Increased workloads, difficulty, pressure, and goal blockages can all lead to feelings of frustration, anger, tension, and anxiety (Beckmann et al., 2010; Carver, 2004). For example, frustration and anger are common emotional reactions to the failure of persistent effort to achieve desired incentives, and to the experience of goal blockages (Carver, 2004).

Hypothesis 1: Within-person variability in negative emotions will be contingent on within-person variability in appraisals of task challenge; negative emotions will, on average, be higher when tasks are appraised as more challenging and lower when tasks are appraised as less challenging.

1.2. Situation contingent emotions are positively related to performance

Negative emotions signal a problematic situation requiring attention to detail and effortful information processing which can lead to greater goal striving. Forgas (2008) found negative affect led to cognitive elaboration, which has been shown to facilitate problem solving and enhance learning. Negative emotions, such as frustration and tension, can lead to performance enhancing behaviors, such as goal prioritization (Carver & Scheier, 1994) and information processing (Schwarz, 2012).

If negative emotional responses to task challenges lead to task prioritization, and more effortful, detailed information processing, then the negative emotional responses to task challenges should have a positive effect on the performance of problem solving and learning tasks. Those less reactive to perceived task challenges and who experience less frustration or tension, are less likely to engage in the related mechanisms compared to their more emotionally reactive counterparts. Accordingly, we expect that the stronger the relationship between perceived task challenge and negative emotions, the better the performance on a problem solving and learning task.

Hypothesis 2: Situation contingent negative emotions (SCE) will positively predict problem solving and learning performance after controlling for neuroticism.

1.3. The moderating role of trait neuroticism

According to the affective certainty hypothesis (Tamir & Robinson, 2004), the aim of affect regulation is *affective certainty* through the matching of trait and state affect. Traits and states are considered semantic and experiential sources of affective knowledge, respectively (Robinson & Clore, 2002; Tamir & Robinson, 2004). These two sources of information inputs to a judgement can be either congruent or incongruent. Affective uncertainty occurs when trait and state affect are incongruent (e.g., high neuroticism and positive emotional states), and cognitive resources must be devoted to resolving the emotional turmoil. Affective certainty occurs when the affective traits and states are congruent (e.g., high trait neuroticism and negative emotional states). This enables faster evaluation of situations by facilitating encoding and retrieval processes (Tamir & Robinson, 2004). Performance effects for the interaction between neuroticism and negative affect add further weight to the idea that negative affect can be adaptive (Forgas, 2008; Tamir & Robinson, 2004). The conclusion from this research is that neuroticism enhances the positive effects of negative emotions on task performance by facilitating information processing.

> *Hypothesis 3*: The positive relationship between situation contingent negative emotions (SCE) and performance will be moderated by level of neuroticism; those who score higher on neuroticism will show a stronger, positive SCE-performance relationship than those who score lower on neuroticism.

2. Methods

2.1. Participants

Participants were 83 undergraduates at a Chinese university, enrolled in an automotive engineering course that included topics on vehicle power systems, sustainable vehicle design, vehicle aerodynamics, and autonomous vehicles, amongst others. Prior to participation, one of the authors briefed the students on this research project, explaining (1) how data would be collected; and (2) how their privacy would be protected in line with the ethics approval issued by the author's institute. Participants also received an introduction package containing the description of the project and consent form. Participating students were entered in a raffle for one of two iPads. 85 participants completed the trait and experience sampling measures. Two students did not provide their course grade and were excluded from the analyses. Of those who participated 90% were first-year and the remaining were second-year students; 85.5% were males.

2.2. Design and procedure

A longitudinal design with experience sampling (ESM) data collection was used. The researcher demonstrated how to download the experience sampling software (mEMA) onto the participants' mobile devices during a regular class session. Participants then completed the baseline measures, including a measure of neuroticism, and provided information on demographics. Over the next three weeks, participants received signals at five random points (2 to 2.5 hours apart) during weekdays (9am-7pm), asking them to respond to the ESM items relation to the task they were working on. Each questionnaire remained open for 30 minutes. Participants indicated the type of task they were engaged in: lecture, seminar/tutorial, exam, study, non-study tasks, relaxation, others. Participants received a total of 75 signals (i.e., 5 signals × 15 days = 75 response opportunities). A total of 2453 responses were received, an average response rate of 39.4% to all of the signals sent (*Mean* = 30.0 per person, *SD* = 12.5). Eleven weeks later, the participants' final course grades in the compulsory automotive engineering course were collected from the school.

2.3. Measures

All measures were presented in the participants' native language Mandarin.

2.3.1. *Experience sampling measure*

The experience sampling measure consisted of 49 items, five of which are relevant to the current study as outlined below. Participants were instructed to reflect on the activity they were completing when responding to the ESM measure.

Momentary negative emotions. Four items were used to measure negative emotions. These were "How frustrated/tense/annoyed/distressed are you working on this activity?". These four discrete emotions were chosen because they are high arousal negative emotions in Russell's (1980) circumplex model of affect. High arousal negative emotions, such as frustration, nervousness, and anger, are associated with behavioral activation to regain velocity (Carver, 2004). Participants responded on a Likert scale from 1 (not at all) to 5 (extremely). Item responses were averaged to create scale scores for negative emotions ($\alpha_{\text{within-person}}$ = .77, $\alpha_{\text{between-person}}$ = .98[1]).

Momentary task challenge. A single item assessed participants' perceived momentary task challenge ("How challenging is this activity?"). The single item ensured the participants were responding to the perceived challenge and not some alternative task framing. Participants were asked to rate their perception of task challenge on a Likert scale from 1 (not at all) to 5 (very high). Prior to rating task challenge, participants indicated what task they were engaged in. The most common task was study (42.2%), followed by completing assessments (19.5%), relaxing (15.6%), socializing/exercise (11.1%), tutorials (4.1%) and other tasks (6.8%). Only a handful of responses were completed during lectures (0.7%). The average reported levels of perceived challenge varied across tasks, but all showed considerable variance. Tutorials had the highest mean rating for task challenge (*Mean* = 3.04, *SD* = 1.01), followed by assessments (*Mean* = 2.90, *SD* = .83), study (*Mean* = 2.85, *SD* = .82),

[1] Following Nezlek's (2017) guide; within-person level reliability ($\alpha_{\text{within-person}}$) was estimated with the item level variance, the occasion level variance in multilevel modeling, and the number of items in the scale (p) using the formula $\alpha = \sigma^2_{\text{occasion level}} / (\sigma^2_{\text{occasion level}} + \sigma^2_{\text{item}}/p)$. Between-person level reliability ($\alpha_{\text{between-person}}$) was Cronbach's α for the mean score of each emotion at the between-person level.

socializing/exercise (*Mean* = 2.72, *SD* = .92), lectures (*Mean* = 2.44, *SD* = 1.04), other tasks (*Mean* = 2.43, *SD* = .96) and relaxing (*Mean* = 2.36, *SD* = 1.06).

2.3.2. Trait neuroticism

Neuroticism was assessed using Goldberg's (1999) 50-item International Personality Item Pool measure of the NEO Personality Inventory. Responses to the 10 neuroticism items were on a 5-point Likert-type scale, which were averaged after reverse coding of appropriate items (α = .76).

2.3.3. Grades

The performance score was the participants' final exam grade for the automotive engineering course, as it reflected the cumulative effects of effort and analysis over the 14-week semester. An example of the types of exam questions is: "Explain how the energy stored in petrol and diesel fuels is converted to torque at the flywheel?". The exam was graded on a scale from 0 to 100, and the actual grades ranged from 60 to 96 (*Mean* = 80.61, *SD* = 12.00).

2.4. Data analysis

Multilevel structural equation modeling, using full information maximum likelihood, in Mplus version 8.4 (Muthen & Muthen, 2017), were used for hypothesis testing. We progressively built the model in which we centered the Level 1 variable task challenge around the mean of each individual (group mean centered), and then specified the negative emotions measure as a multilevel latent variable by separating within-person and between-person components. The within-person component represents the variation in an individual's negative emotions across time. The between-person component represents variation between individuals based on the average level of each individual's negative emotions across time. We estimated the standardized factor loadings of the negative emotion items at the within- and between-person levels.

To test Hypothesis 1, at the within-person level (Level 1) negative emotions were regressed on task challenge. Task challenge was constrained as a within-person level variable, while the negative emotions variable was allowed to vary at both the within-person and between-person level. At the between-person level (Level 2), we allowed the Level-1 slope describing the task challenge-negative emotions relationship to vary randomly to capture individual differences in negative emotional responses to task challenge (Model 1). The estimated slope for each individual was saved as a between-person level variable, describing individuals' situation contingent emotional response tendencies (i.e., SCE).

To test Hypothesis 2, performance was regressed on SCE, mean negative emotions, and trait neuroticism at the between-person level (Model 2). SCE was a between-person variable estimated and saved from Model 1. Trait neuroticism as a between-person level variable was grand mean centered. To test Hypothesis 3, we further added the interaction term of SCE and trait neuroticism (Model 3). In both Model 2 and Model 3, the variables mean negative emotions and trait neuroticism were allowed to covary as they both capture the emotion component at the between-person level.

2.5. Power determination

In multilevel analysis, maximining power can be achieved through minimizing the standard error (Scherbaum & Pesner, 2019). We used the PINT program (Bosker et al., 2003) to generate the estimate of the standard error for the multilevel parameter estimates with 83 groups with 30 units in each group. The standard errors for the regression coefficients of Level-1 variables with a random effect and Level-2 variables were .02 and .11, respectively, both under .18, suggesting that we were able to detect effects of moderate size. Following Heck and Thomas's (2015) recommendations, we also ran a Monte Carlo simulation using the number of participants and available time points from the final dataset to estimate the power of individual parameters. The detailed results are in Appendix A.

3. Results

Consistent with the hypotheses, negative emotions were positively related to perceived task challenge at both the within-person (r = .38, p <.001) and the between-person level (r = .55, p = .001). At the between-person level SCE was positively related to performance (r = .19, p = .03). The trait measure of neuroticism was not correlated with performance (r = .05, p = .65). Descriptive statistics, standard factor loadings and ICCs for the negative emotion items are reported in Appendix B.

Table 1 shows the unstandardized results of the random slope model (Model 1) for the average within-person relationship between task challenge and negative emotions, which was positive as predicted in Hypothesis 1 (γ_{10} = .28, p <.001, 95% C.I. = [.22, .33], 1-β = 1.0). On average, participants reported more negative emotions for tasks they perceived as more challenging[2]. Fig. 1 in Appendix B shows the distribution of SCE scores for the sample, which ranged from -.06 to .75, and varied significantly between people (σ^2 = .04, p < .001, 95% C.I. = [.03, .06], 1-β = 1.0).

Table 2 shows the standardized and unstandardized results for the regression models. Model 2 results show SCE was predictive of performance (β_1 = .19, p = .01, 95% C.I. = [.05, .34], 1-β = .45) while controlling for neuroticism and mean negative emotions. The result supported Hypothesis 2.

Model 3 shows that the relationship between SCE and performance was moderated by level of neuroticism (β_4 = -.31, p = .04, 95% C.I. = [-.61, -.02], 1-β = .82). Contrary to Hypothesis 3, the effect of SCE on performance was smaller as neuroticism increased. Fig. 2 in Appendix B shows the standardized regression coefficients of SCE on performance at

[2] We added trait neuroticism as a control to assess whether negative emotions were based on appraisals of task challenge or could be fully explained by trait neuroticism. In comparison to Model 1 (no trait neuroticism control), the results show the within-person SCE relationship remained unchanged (γ_{10} = .28, σ^2 = .04, p <.001).

different levels of neuroticism using the Johnson-Neyman technique (Johnson & Fay, 1950)[3]. When neuroticism (grand mean centered) was equal to or less than 0, the standardized regression coefficient of SCE on performance was positive. When the level of neuroticism was above .10, the standardized regression coefficient of SCE on performance was not significant (95% CI = [-.02, .37]).

Insert Table 1 and 2 about here

---

4. Discussion

While the detrimental effects of neuroticism and negative emotions are well documented, emerging research indicates that they can have performance-facilitating functions – a complexity that the current study attempted to unpack. Understanding the conditions under which neuroticism and negative emotions can facilitate problem solving and learning has both theoretical and practical implications.

4.1. *Theoretical implications*

The originality of this study lies in introducing within-person situation contingent emotional states based on the Mischel and Shoda (1995) construct of behavioral signatures. As demonstrated, when analyzed as within-person emotional responses to task challenges over time, contingent units of emotions varied significantly between individuals. As is often the case, the group average for the between-person relationship masked a range of differences at the within-person level (Minbashian et al., 2010).

The measurement, modelling and testing of the effects of 'if this, then that' contingent units of personality respond to the theoretical challenge posed by Mischel (1973) who argued that variability of the individual's behavior across situations had to be somehow reconciled

[3] Following guidelines by Rogosa (1980) and Preacher et al. (2007), the Johnson-Neyman technique was used to plot the interaction effect and to show how the main effect varies across the full range of values of a moderator. This is in contrast to the pick-a-point approach of one standard deviation above the mean, the mean, and one standard deviation below the mean.

with the evidence that individuals displayed stable and distinctive qualities. Contrary to many of the interpretations of the argument in Mischel (1973), he was not arguing for the prioritization of the situation over the person, but for the integration of the two in assessments of stable situation-person relationships that captures the coherence and stability that underlie the individual's thoughts, feelings and behaviors (Mischel, 2009).

Mischel and Shoda (1995) present 'if this, then that' situation-person relationships stored in long term memory as stable units that differentiate individuals, and are predictive of outcomes, as required for a unit of personality (Beckmann & Wood, 2017). Several studies have now demonstrated that situation contingencies satisfy the stability and differentiation criteria for a unit of personality (Fleeson, 2007). Our findings also provide further evidence in support of the status of dynamic indices, such as the situation contingency units investigated in the current study (i.e., SCE units), as individual differences variables in their own right (Beckmann et al., 2021; Wood et al., 2019).

The second contribution of our research is in demonstrating the predictive validity of SCEs for a real-world task. Only a handful of studies have demonstrated predictive validity of the contingent units studied (e.g., Minbashian et al., 2010; Wood et al., 2019). Students who reported higher levels of negative emotions in response to task challenges performed better in their course. This finding is consistent with the argument that negative affect in response to challenges, particularly when expressed in higher arousal negative emotions, such as tension and frustration, leads to greater goal striving (Carver & Scheier, 2011) and more detailed information processing (Fiedler, 1990; Schwarz, 2012).

Third, our research provides a more nuanced understanding of the neuroticism construct. Contrary to our prediction in Hypothesis 3, those in the incongruent state of low neuroticism and high SCE did not perform worse on their exam than those with higher neuroticism. One possible explanation is that those with higher neuroticism were "overreacting" so their negative emotional reactions to task challenges went from functional to dysfunctional mechanisms (Yerkes & Dodson, 1908).

4.2. Practical implications

This study suggests the potential use of neuroticism and negative emotions in task allocations and behavioral change be considered. The results of ours and other studies (e.g., Smillie et al., 2006) suggest different jobs may require different behavioural signatures, depending upon the task demands for information processing and interpersonal relationships. Based on the evidence for the different information processing approaches (Schwarz, 2012) and interpersonal styles (Lopes et al., 2003) associated with higher scores on neuroticism and extraversion, we would make different predictions for the effects of traits and contingent emotional states on presentational and analytical tasks. For example, low neuroticism plus high contingent negative emotions could enhance performance on analytical tasks but not presentational tasks. The effects for high trait extraversion plus high contingent positive emotionality could have the reverse effects. Understanding how individuals with different personality traits may work better on different tasks and under what conditions should help in the design of jobs and work allocation.

Developmental interventions based on a measure of an 'if this, then that' contingent unit can provide a sharper focus to efforts to modify behavior by including both the situational cues that prime the behavior and the behavior to be changed (Mischel, 2014). Awareness of the contingent relationship can be used to devise a range of strategies, including reframing of the cue or the linking of a different behaviour to the cue when it occurs. Mischel (2014) provides an example of the latter strategy he personally used to stop smoking. Each time he felt the urge to smoke, he would sniff a container filled with old cigarette butts. An example of a reframing strategy is the teaching of students to focus on progress and not shortfall, when evaluating task feedback, which can shift the emotional reaction from negative to positive and enhance persistence on the task (Carver & Scheier, 2011).

4.3. Limitations and further research

We acknowledge limitations that point to the need for further research to bolster and inferences drawn from the current study. First, while the ESM asked the task challenge question before the emotional response questions to ensure the time order requirement of causality was satisfied, future research should consider alternative measurement processes to strengthen causality inferences. Second, the automotive engineering course exam was chosen as a criterion task because it was believed the types of information processing associated with negative emotions would have a positive impact on performance. Without further research on different types of tasks, this limits the generalizability of the current findings to tasks that require detailed, systematic analyses and recall of facts. Third, participants were Chinese university students in China. As with any culture, the question must be asked as to whether the results can be generalized to other settings. Our focus was on pan-cultural effects of neuroticism and contingent negative emotions.

4.4. Conclusion

Neuroticism and negative emotions are often related to poor performance at the between-person level; at the within-person level, negative emotions can involve functional responses to analytical, recollective and attentional challenges. Negative emotional responses to task challenges that elicit approach motivations, such as frustration, tension, and annoyance, have been shown to form functional units of knowledge for those relatively lower in trait neuroticism, at least for tasks on which the cumulative effects of problem solving and learning have a positive impact on performance.

References

Andrews, P. W., & Thomson, J. A., Jr. (2009). The bright side of being blue: Depression as an adaptation for analyzing complex problems. *Psychological Review*, *116*(3), 620-654. https://doi.org/10.1037/a0016242

Barańczuk, U. (2019). The five factor model of personality and emotion regulation: A meta-analysis. *Personality and Individual Differences*, *139*, 217-227. https://doi.org/10.1016/j.paid.2018.11.025

Beckmann, N., Beckmann, J. F., Minbashian, A., & Birney, D. P. (2013). In the heat of the moment: On the effect of state neuroticism on task performance. *Personality and Individual Differences*, *54*(3), 447-452. https://doi.org/10.1016/j.paid.2012.10.022

Beckmann, N., Birney, D. P., Minbashian, A., & Beckmann, J. F. (2021). Personality dynamics at work: The effects of form, time, and context of variability. *European Journal of Personality*, *35*(4), 421-449. https://doi.org/10.1177/08902070211017341

Beckmann, N., & Wood, R. E. (2017). Editorial: Dynamic personality science. Integrating between-person stability and within-person change. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01486

Beckmann, N., Wood, R. E., & Minbashian, A. (2010). It depends how you look at it: On the relationship between neuroticism and conscientiousness at the within-and the between-person levels of analysis. *Journal of Research in Personality*, *44*(5), 593-601. https://doi.org/10.1016/j.jrp.2010.07.004

Bless, H., & Fiedler, K. (1995). Affective states and the influence of activated general knowledge. *Personality and Social Psychology Bulletin*, *21*(7), 766-778. https://doi.org/10.1177/0146167295217010

Bosker, R. J., Snijders, T. A. B., & Guldemond, H. (2003). *PINT (Power IN Two-level designs) User's Manual*. In [Computer software and manual]. https://www.stats.ox.ac.uk/~snijders/multilevel.htm

Carver, C. S. (2004). Negative affects deriving from the behavioral approach system. *Emotion*, *4*(1), 3-22. https://doi.org/10.1037/1528-3542.4.1.3

Carver, C. S., & Scheier, M. F. (1994). Situational coping and coping dispositions in a stressful transaction. *Journal of Personality and Social Psychology*, *66*(1), 184-195. https://doi.org/10.1037/0022-3514.66.1.184

Carver, C. S., & Scheier, M. F. (2011). Self-regulation of action and affect. In C. S. Carver & M. F. Scheier (Eds.), *Handbook of self-regulation: Research, theory, and applications, 2nd ed.* (pp. 3-21). Guilford Press.

Claridge, G., & Davis, C. (2001). What's the use of neuroticism? *Personality and Individual Differences*, *31*(3), 383-400. https://doi.org/10.1016/S0191-8869(00)00144-6

Costa, P. T., & McCrae, R. R. (1992). The five-factor model of personality and its relevance to personality disorders. *Journal of Personality Disorders*, *6*(4), 343-359. https://doi.org/10.1521/pedi.1992.6.4.343

Cox-Fuenzalida, L.-E., Swickert, R., & Hittner, J. B. (2004). Effects of neuroticism and workload history on performance. *Personality and Individual Differences*, *36*(2), 447-456. https://doi.org/10.1016/S0191-8869(03)00108-9

Fiedler, K. (1990). Mood-dependent selectivity in social cognition. *European review of social psychology*, *1*(1), 1-32. https://doi.org/10.1080/14792779108401855

Fleeson, W. (2007). Situation‐based contingencies underlying trait‐content manifestation in behavior. *Journal of Personality*, *75*(4), 825-862. https://doi.org/10.1111/j.1467-6494.2007.00458.x

Forgas, J. P. (2008). Affect and cognition. *Perspectives on Psychological Science*, *3*(2), 94-101. https://doi.org/10.1111/j.1745-6916.2008.00067.x

Heck, R. H., & Thomas, S. L. (2015). *An introduction to multilevel modeling techniques: MLM and SEM approaches using Mplus, 3rd ed*. Routledge/Taylor & Francis Group. https://doi.org/10.4324/9781315746494

Johnson, P. O., & Fay, L. C. (1950). The Johnson-Neyman technique, its theory and application. *Psychometrika*, *15*(4), 349-367. https://doi.org/10.1007/BF02288864

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology*, *86*(1), 80-92. https://doi.org/10.1037/0021-9010.86.1.80

Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2002). Are measures of self-esteem, neuroticism, locus of control, and generalized self-efficacy indicators of a common core construct? *Journal of Personality and Social Psychology*, *83*(3), 693-710. https://doi.org/10.1037//0022-3514.83.3.693

Lahey, B. B. (2009). Public health significance of neuroticism. *American Psychologist*, *64*(4), 241-256. https://doi.org/10.1037/a0015309

Lopes, P. N., Salovey, P., & Straus, R. (2003). Emotional intelligence, personality, and the perceived quality of social relationships. *Personality and Individual Differences*, *35*(3), 641-658. https://doi.org/10.1016/S0191-8869(02)00242-8

Minbashian, A., Wood, R. E., & Beckmann, N. (2010). Task-contingent conscientiousness as a unit of personality at work. *Journal of Applied Psychology*, *95*(5), 793-806. https://doi.org/10.1037/a0020016

Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, *80*(4), 252-283. https://doi.org/10.1037/h0035002

Mischel, W. (2009). From Personality and Assessment (1968) to Personality Science, 2009. *Journal of Research in Personality*, *43*(2), 282-290. https://doi.org/https://doi.org/10.1016/j.jrp.2008.12.037

Mischel, W. (2014). *The marshmallow test: Mastering self-control*. Little, Brown and Co.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review*, *102*(3), 246-268. https://doi.org/10.1037/0033-295X.102.2.246

Nezlek, J. B. (2017). A practical guide to understanding reliability in studies of within-person variability. *Journal of Research in Personality*, *69*, 149-155. https://doi.org/https://doi.org/10.1016/j.jrp.2016.06.020

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, *42*(1), 185-227. https://doi.org/10.1080/00273170701341316

Robinson, M. D., & Clore, G. L. (2002). Belief and feeling: Evidence for an accessibility model of emotional self-report. *Psychological Bulletin*, *128*(6), 934-960. https://doi.org/10.1037/0033-2909.128.6.934

Rogosa, D. (1980). A critique of cross-lagged correlation. *Psychological Bulletin*, *88*(2), 245-258. https://doi.org/10.1037/0033-2909.88.2.245

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161-1178. https://doi.org/10.1037/h0077714

Scherbaum, C. A., & Pesner, E. (2019). Power analysis for multilevel research. In *The handbook of multilevel theory, measurement, and analysis.* (pp. 329-352). American Psychological Association. https://doi.org/10.1037/0000115-015

Schwarz, N. (2012). Feelings-as-information theory. In P. A. M. V. Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 1, pp. 289-308). Sage Publications Ltd. https://doi.org/10.4135/9781446249215.n15

Smillie, L. D., Yeo, G. B., Furnham, A. F., & Jackson, C. J. (2006). Benefits of all work and no play: The relationship between neuroticism and performance as a function of resource allocation. *Journal of Applied Psychology*, *91*(1), 139-155. https://doi.org/10.1037/0021-9010.91.1.139

Tamir, M., & Robinson, M. D. (2004). Knowing good from bad: The paradox of neuroticism, negative affect, and evaluative processing. *Journal of Personality and Social Psychology*, *87*(6), 913-925. https://doi.org/10.1037/0022-3514.87.6.913

van Doorn, R. R. A., & Lang, J. W. B. (2010). Performance differences explained by the neuroticism facets withdrawal and volatility, variations in task demand, and effort allocation. *Journal of Research in Personality*, *44*(4), 446-452. https://doi.org/10.1016/j.jrp.2010.05.004

Wood, R. E., Beckmann, N., Birney, D. P., Beckmann, J. F., Minbashian, A., & Chau, R. (2019). Situation contingent units of personality at work. *Personality and Individual Differences*, *136*, 113-121. https://doi.org/https://doi.org/10.1016/j.paid.2018.01.026

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Punishment: Issues and experiments*, 27-41. https://doi.org/10.1002/cne.920180503

Table 1

Results of the random slope model of task challenge and negative emotions (Model 1).

	Estimate	SE	95% C.I.
Level 1: Within-person			
Residual variances (σ^2)	.33***	.03	[.26, .39]
Level 2: Between-person			
Intercept	2.82***	.08	[2.67, 2.97]
Slope (SCE) mean (γ_{10})	.28***	.03	[.22, .33]
Slope (SCE) variance (τ_{11})	.04***	.01	[.03, .06]

Note. SCE = situation contingent negative emotion, SE = standard error, 95% C.I. = 95% confidence intervals of estimates (unstandardized). Level 1: Negative emotions$_{ij}$ = $\beta_{0j} + \beta_{1j} \times$ Task challenge$_{ij}$ + r_{ij}, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10} + u_{1j}$, γ_{10} = the mean of slopes (i.e., SCE), σ^2 = variance of r_{ij}, τ_{11} = variance of u_{1j}. *** $p < .001$.

Table 2

Results of the regression models predicting performance.

	Model 2					Model 3				
	Estimate	SE	95% C.I.	β	95% C.I.	Estimate	SE	95% C.I.	β	95% C.I.
Intercept	79.50^{***}	5.34	[69.03, 89.96]	$-.09^{***}$	[-.97, .78]	81.93^{***}	5.65	[69.03, 89.96]	$.11^{***}$	[-.81, 1.03]
SCE	14.14^{*}	5.50	[3.36, 24.92]	$.19^{*}$	[.05, .34]	11.38^{*}	5.31	[.98, 2.48]	$.15^{*}$	[.01, .29]
Mean negative emotions	-1.00	1.97	[-4.87, 2.87]	-.08	[-.37,.22]	-1.58	2.07	[-5.63, 2.48]	-.09	[-.32, .14]
Trait neuroticism	1.06	2.08	[-3.01, 5.13]	.06	[-.16, .27]	$6.14^{\dagger}$	3.52	[-.77, 13.05]	.33	[-.04, .70]
SCE × Trait neuroticism						-17.25^{*}	8.30	[-33.51, -.99]	$-.31^{*}$	[-.61, -.02]

Note. Estimate = unstandardized regression coefficients. β = standardized regression coefficients. SE = standard error, 95% C.I. = 95% confidence intervals, SCE = situation contingent negative emotions. Model 2: Performance = $\beta_0 + \beta_1 \times$ SCE + $\beta_2 \times$ Mean negative emotions + $\beta_3 \times$ Trait neuroticism. Model 3: Performance = $\beta_0 + \beta_1 \times$ SCE + $\beta_2 \times$ Mean negative emotion + $\beta_3 \times$ Trait neuroticism + $\beta_4 \times$ SCE × Trait neuroticism. In Model 2 and 3, Mean negative emotions was allowed to covary with Trait neuroticism. $^{\dagger}\ p < .10$; $^{*}\ p < .05$; $^{**}\ p < .01$; $^{***}\ p < .001$.