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## Neuroticism and momentary differentiation of positive and negative affect



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### ABSTRACT

Affective differentiation is the degree to which positive affect (PA) and negative affect (NA) are uncorrelated. The dynamic model of affect (Zautra, Potter, & Reich, 1997) posits that the link between PA and NA should be stronger when stress is high. Because neuroticism relates to more negative everyday stress perceptions and therefore higher daily stress, we hypothesized that neuroticism should be associated with lower affective differentiation on a daily basis. We examined how neuroticism impacts momentary affective differentiation in undergraduate students ( $n = 126$ ) using an experience sampling design with mood monitored four times daily for one week. We found that neuroticism moderates the within-person relationship between PA and NA: those who are higher in neuroticism experience less affective differentiation. This effect was not mediated or moderated by recent major life stress. We replicated the main finding in two subsequent samples ( $n = 102$  and  $n = 120$ , respectively), and thus present the first large set of studies to demonstrate consistently that neuroticism moderates the within-person link between PA and NA.

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### 1. Introduction

Feeling good and feeling bad are often considered opposite. However, emotion experience is often complex, and evidence suggests that there are times when one can simultaneously feel positive and negative emotions (e.g., Larsen, McGraw, & Cacioppo, 2001). As the debate on the bipolarity versus independence of negative and positive emotions has evolved, there has been increased recognition of the nuances of when and for whom emotion converges along a single positive to negative dimension. In this study, we investigate the role of individual differences in neuroticism in the relationship between positive and negative emotion.

Historically, there were two opposing perspectives on the relationship between positive affect (PA) and negative affect (NA). The first perspective was that PA and NA are essentially opposites, varying inversely (e.g., Russell & Carroll, 1999). The second perspective was that PA and NA are independent constructs (e.g., Diener & Emmons, 1985). According to the dynamic model of affect (DMA; Zautra, Potter, & Reich, 1997), however, the question is not *whether* emotion is correlated, but instead *under what contexts* emotion becomes unidimensional. According to the DMA, affect

can be either one bipolar dimension or two separate dimensions, depending on the situation (Reich, Zautra, & Davis, 2003). Zautra and colleagues (1997; Davis, Zautra, & Smith, 2004; Reich et al., 2003), argue that in situations of low stress, cognitive resources are available to process complex information, and thus affect is more likely bivariate and uncorrelated. However, under situations of high stress, attentional resources are depleted, so greater efficiency in information processing is required. Consequently, generalization of complex information occurs, the ability to interpret experiences in a nuanced way is limited, and PA and NA tend to converge into one bipolar dimension. Zautra and colleagues (e.g., Davis et al., 2004) refer to the degree to which PA and NA are unlinked as affective differentiation.

Support for the DMA has been obtained in a number of studies of chronic pain patients (e.g., Potter, Zautra, & Reich, 2000), breast cancer patients (Dasch et al., 2010), healthy controls (e.g., Reich, Zautra, & Potter, 2001), and people experiencing romantic relationship loss (Murdock, Fagundes, & Lovejoy, 2014) or bereavement (Coifman, Bonanno, & Rafaeli, 2007). All of the above demonstrate that, consistent with the DMA, stress stemming from various types of life events moderates affective differentiation in daily experience. When stress is high, the inverse within-person association between PA and NA tends to be greater.

The theoretical foundation of the DMA (i.e., that stress influences whether affect is univariate or bivariate) suggests that individual differences in variables related to how one experiences

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life stress might also be associated with affective differentiation. Specifically, neuroticism, which is by definition associated with high negative emotionality (McCrae & Costa, 1987), has been shown to relate to everyday stress perceptions and emotional experience (e.g., Gunthert, Cohen, & Armeli, 1999). Given that those high in neuroticism will likely be taxed by feeling higher stress on a day to day basis, DMA theory suggests that they should experience greater convergence of PA and NA into one dimension.

Although very few studies have investigated this question, some do provide support for the idea that neuroticism is related to affective differentiation. For example, Ong and Bergeman (2004) found in a daily diary study of 40 older adults that neuroticism was related to less affective differentiation. In a paper and pencil diary study of 184 adults (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000), neuroticism was again related to less affective differentiation. However, Rafaeli, Rogers, and Revelle (2007) found in a study of 26 undergraduates that neuroticism was not related to affective differentiation (which they call affective synchrony), but the sample was quite small.

Although neuroticism has received a little attention as a moderator of affective differentiation, there are a number of limitations of the few existing studies. Two have very low sample sizes, and so it is difficult to have confidence in one null result (Rafaeli et al., 2007) or one confirming result (Ong & Bergeman, 2004). The larger Carstensen et al. (2000) study has the advantage of being an ecological momentary assessment design. However, the researchers used paper and pencil assessments of everyday affect, and such assessments are known to be vulnerable to backfilling questionnaires (i.e., completing assessments at a later time than when they should have been completed; Stone, Shiffman, Schwartz, Broderick, & Hufford, 2002). Also, it is possible that the moderating effect of neuroticism on differentiation might, in turn, be moderated by life stress. For instance, neuroticism might have a greater effect on differentiation among those who are under the strain of major life stress, whereas those low in neuroticism might be less impacted by life stress in their experience of everyday emotion. The studies described above have not examined this possibility. Given these concerns, we wanted to: (1) replicate the effect across three sizable samples; (2) capitalize on the ability to electronically monitor participants in their naturalistic environments; and (3) examine the possible moderating effect of life stress on the neuroticism-differentiation relationship.

## 2. Method

Three separate samples were analyzed for this study and are described below.

### 2.1. Sample 1

#### 2.1.1. Participants

Participants were 145 undergraduates recruited through psychology courses and a university-wide email announcement. Nineteen completed fewer than half the daily assessments and were not included in the analyses for this study due to concerns about them taking their participation seriously. Table 1 contains demographics information.

#### 2.1.2. Measures

Participants completed questionnaires as part of a larger project on daily emotion regulation. The following scales were included in the present analyses.

**2.1.2.1. Neuroticism.** The NEO-FFI Neuroticism Scale (Costa & McCrae, 1992) is a 12-item measure of the tendency to experience

**Table 1**

Demographic characteristics of the three samples.

	Study 1	Study 2	Study 3
Age			
Mean	19.32 (1.59)	19.88 (3.13)	19.72 (1.58)
Sex			
Male	32 (25%)	23 (23%)	39 (33%)
Female	94 (75%)	79 (77%)	81 (67%)
Race			
White	96 (76%)	82 (80%)	90 (75%)
Black or African-American	5 (4%)	6 (6%)	5 (4%)
Asian	7 (6%)	7 (7%)	9 (8%)
Other	15 (12%)	7 (7%)	11 (9%)
Unknown	3 (2%)	–	5 (4%)
Hispanic	9 (7%)	8 (8%)	8 (7%)

negative emotionality. It includes items assessing anxiety, hostility, depression, impulsiveness, and vulnerability, rated from 1 (*strongly disagree*) to 5 (*strongly agree*). The NEO-FFI has consistently demonstrated adequate reliability (Costa & McCrae, 1992).

**2.1.2.2. Life stress.** Because life stress has been found to moderate the within-person relationship between PA and negative emotion (Zautra et al., 1997), we included it as a potential mediating or moderating variable. The *Life Experiences Survey* (LES; Sarason, Johnson, & Siegal, 1978) is a 59-item self-report questionnaire assessing the number of life-changing events one has experienced in the past three months, as well as the impact they have had. Each item represents a life event, such as “death of a close family member”. The last ten items, such as “changing a major,” apply specifically to college students. The participant checks each event experienced within the past three months, and rates the perceived strength of the impact at the time the event occurred on a scale from –3 (*extremely negative*) to 3 (*extremely positive*). The sum of the ratings declared negative by the participant is the negative change score and represents perceived amount of negative life stress.

**2.1.2.3. Momentary PA and NA.** Participants were “beeped” four times daily for one week to answer questions about their emotions and emotion-related behaviors. Specifically, participants were asked to rate on a 1 (*not at all*) to 5 (*extremely*) scale to what degree they had felt each of four positive emotions (happy, content, proud, and grateful) and three negative emotions (anxious, sad, and angry) since last being “beeped.” Some of these items were taken from the Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson & Clark, 1994), and similar items have been used in other daily emotion studies and been found to be related to relevant stress and emotion constructs (e.g., Wenzel, Gunthert, & Forand, 2006). Participants were also asked about coping behaviors, emotion amplification and suppression, desirable and undesirable events, and alertness, but this study focuses on the emotional intensity questions.

#### 2.1.3. Procedure

Students first completed the battery of questionnaires in the laboratory. Then they received a Personalized Digital Assistant (PDA) device to carry with them for the week. The PDAs were programmed using the Purdue Momentary Assessment Tool (PMAT; Weiss, Beal, Lucy, & MacDermid, 2004) to prompt participants 4 times a day for 7 days, resulting in 28 assessments per participant (although several participants completed up to 30 assessments due to the timing of their scheduled appointments for dropping off their devices). The PDAs were set to “beep” participants at 11:15 a.m., 2:05 p.m., 6:40 p.m., and 9:52 p.m. We selected times when we estimated that undergraduates would typically be awake, and we oversampled times between classes to minimize classroom

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