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Intra-individual variability and psychological flexibility: Affect and health in a National US sample

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ABSTRACT

Intra-individual variability (IIV) and psychological flexibility (PF) in affect both describe affective change over time (i.e., within-person variability). However, IIV and PF might differ from each other and predict different psychological and physical health outcomes. A large sample of adults (n = 793) completed two assessments of daily stress, daily affect, and health over a 10-year interval in The National Study of Daily Experiences (an 8-day daily diary portion of the Midlife Development in the United States study). IIV and PF in affect were modestly reliable within and between assessments. IIV, operationalized as total variability, predicted worse psychological and physical health concurrently and prospectively. PF, operationalized as changes in dimensionality, predicted better psychological and physical health concurrently and prospectively. Other operationalizations of PF were not consistently related to health. Within-person variability in affect could therefore be adaptive or maladaptive depending on how it was defined.

1. Introduction

Short-term changes that are more or less reversible and that may differ across individuals comprise within-person variability or intra-individual variability (IIV) (Nesselroade, 2001). However, IIV is only one way of characterizing within-person variability. There is a growing interest in psychological flexibility (PF), a construct that appears to hold promise for understanding resilience and vulnerability to psychological distress (Kashdan & Rottenberg, 2010). Operationally defining PF can be difficult, as can distinguishing between PF and IIV (Kashdan & Rottenberg, 2010). Empirical studies appear to disagree about the adaptiveness of within-person variability: IIV has been associated with poorer psychological and physical outcomes, whereas PF may be related to better psychological and physical health outcomes (Kashdan & Rottenberg, 2010; Röcke & Brose, 2013).

There is some evidence that both IIV and PF are stable over time and may represent persistent individual differences that could affect long-term health outcomes. IIV (total variability) in affect had test-retest correlations of 0.46–0.90 over periods of up to 2 months (Eid & Diener, 1999; Penner, Shiffman, Paty, & Fritzsche, 1994). One study of flexibility in affect regulation reported a test-retest correlation of 0.45 over 3 years (Westphal, Seivert, & Bonanno, 2010). However, further assessment of the reliability and validity of IIV and PF would advance our understanding of how these constructs relate to each other and to psychological and physical health and whether they constitute stable individual differences.

IIV has been operationalized in a number of ways, most commonly as the individual's standard deviation (iSD) (see Ram & Gerstorf, 2009; Röcke & Brose, 2013 for excellent reviews of IIV methodology). IIV operationalized in this way is distinct from the mean level of the response; it specifically refers to variability around the means. It is important to note that assessment of IIV does not require characterization of the situation or pairing of response and situation. Thus, IIV represents the range or frequency of a response, uncharacterized by situational change. IIV in affect is therefore the range of emotional experience over time, typically operationalized as the iSD of the individual's affect (Eid & Diener, 1999).

PF is more complex than IIV in both its definition and operationalization. One of the more common ways of defining PF is the ability to vary one's responses in a contextually dependent manner in order to appropriately meet situational demands (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Cheng, 2001; Fujimura & Okanoya, 2012; Tracey, 2005; Westphal et al., 2010). PF differs from IIV in that PF refers to within-person variability where the response is dependent on the situation and is

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patterned and predictable. PF in affect therefore refers to the ability to match one's emotional experience appropriately to situational cues (Fujimura & Okanoya, 2012; Waugh, Thompson, & Gotlib, 2011).

Operationalizing PF in affect therefore requires a theory that defines what the "appropriate" emotional experience is and calculation of the difference between an individual's affect in different situations and the "appropriate" affect as defined by the model. Mathematically, when the response being measured can be plotted on Cartesian coordinates, the Euclidean distance between "appropriate" and actual responses can be calculated; the smaller the mean distance across assessments, the better the fit (e.g., Cheng, 2001; Tracey, 2005). PF with regard to affect regulation has been defined as the ability to modulate affective expression in accordance with situational demands or to enhance or suppress affective expression when prompted. In one study, PF in affect was operationalized as the difference in emotional expression during positive and negative stimuli, where those with more differentiation between positive and negative expressions were considered to have greater flexibility (Waugh et al., 2011). In another, PF was calculated as the difference between emotional expression in the control condition and emotional expression when instructed to enhance or suppress expression, summed to get an overall index of flexibility (Bonanno et al., 2004).

In sum, operationalizing PF requires a theory from which one can derive an index of fit by comparing observed responses with theoretically adaptive responses across different situations. Therefore, PF concerns the covariation of response and situation and, importantly, compares this covariation with a theoretical standard.

There are a number of theories that provide a possible standard for positive affect (PA) and negative affect (NA) in situational context. Most of them imply relationships between NA and PA in the situation. First, NA and PA may be inversely correlated, such that increases in NA imply decreases in PA and vice versa (Feldman Barrett & Russell, 1998; Russell & Carroll, 1999). Second, NA and PA may be orthogonal, such that changes in one do not imply changes in the other (Cacioppo & Berntson, 1994; Watson & Clark, 1997; Watson & Tellegen, 1985). Third, the relationship between NA and PA may itself vary, switching between a bipolar relationship and an orthogonal relationship, depending on the situation (Davis, Zautra, & Smith, 2004).

The Emotional Congruency Model (*Congruent*) theory predicts that it is most adaptive to experience emotions congruent with the situation. That is, "appropriate" responses comprise increased PA and decreased NA in positive situations; decreased PA and increased NA in negative situations; and the ability to switch between these profiles. In one study (Waugh et al., 2011) affect was rated using a dial, with negative at 0 degrees and positive at 180 degrees. This measurement strategy implies an inverse or bipolar relationship between NA and PA. Situation was defined as exposure to a positive or negative image. People whose affect rating more consistently matched the situation (affect closer to the positive pole when viewing a positive image, and affect closer to the negative pole when viewing a negative image) had higher trait resilience scores. The authors defined affective flexibility in this study as the ability to "switch responses when the emotional valence of the event change, and maintain responses with the emotional valence when the events do not change." In another study (Fujimura & Okanoya, 2012) affect was measured using a grid with valence and arousal dimensions. Participants indicated their current affect by checking one area on the grid. This measurement strategy also implies inverse or bipolar NA and PA, with arousal being a separate dimension. Situation was defined as exposure to positive, negative, or neutral images, with the arousal properties of the images consistent in all of the tasks. People whose affect ratings more closely matched the image valence also had higher HRV, which has been linked to successful self-regulation (Segerstrom, Hardy, Evans, & Winters, 2011). Higher affective flexibility, as match between affect and situation, was therefore suggestive of better self-regulatory ability. These studies reflect the Emotional Congruency Model, where NA and PA are inversely correlated, and affect and the valence of the situation match.

The Maintenance of Emotional Complexity Model (*Complex*) predicts that the ability to experience positive affect during a stressor may buffer against development of depressive symptoms (Fredrickson, Tugade, Waugh, & Larkin, 2003), as well as shortening the cardiovascular recovery time following negative events (Tugade & Fredrickson, 2004). In the first study (Fredrickson et al., 2003), PA and NA were rated using a modified Differential Emotions Scale (DES), and separate subscales were created for PA and NA. This operationalization of PA and NA as discrete scales reflects a model of PA and NA as separate dimensions (Watson & Tellegen, 1985). Those with higher PA during a stressful event also had higher ratings of resilience and lower incidence of depressive symptoms. In the second study (Tugade & Fredrickson, 2004), a modified version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used to construct separate PA and NA subscales. Again, those with higher PA during a stressful task also had higher resilience and a faster physiological recovery from a stressful task. In these studies, emotional flexibility was the ability to maintain positive affect in the face of negative events. Therefore, in contrast to *Congruent*, the *Complex* theory implies that although NA may increase in negative situations, PA should be maintained. That is, levels of PA should be resilient to the influence of negative events and should not be inversely correlated with NA, which may be reactive to negative events. In this model, NA should depend on the situation, whereas the level of PA should remain stable across situations, resulting in dissociation between NA and PA.

The Dynamic Model of Affect (*Dynamic*) theory specifies that the *relationship* between PA and NA depends on the presence of negative events (Zautra, Smith, Affleck, & Tennen, 2001). Under non-stressful conditions, it is thought that people receive the most benefit from independence between PA and NA. Independence yields the maximum amount of information about situations, because emotional responses on one affective dimension are not limited by experience or lack of experience on the other dimension (i.e., there is higher emotional complexity). However, the added information of greater emotional complexity results in higher cognitive demand. The *Dynamic* theory states that emotional complexity is therefore adaptive in low-stress situations but maladaptive in high-stress situations, in which cognitive resources are scarce. In stressful situations, adopting a simpler representation of one's affective experience reduces cognitive load, freeing up resources for managing the situation. In addition, as affect becomes more unidimensional, more PA during a stressful situation would be related to less NA. The *Dynamic* theory suggests that positive experiences also have the potential to decrease NA under stress. In this study, NA and PA were measured using the PANAS, and separate subscales for PA and NA were calculated. Hierarchical Linear Modeling was used to examine the relationship between NA, PA, and increased stress due to physical pain. The relationship between NA and PA changed under stress: NA and PA became more inversely correlated as pain increased. In this model, therefore, the inverse relationship between PA and NA is stronger during stressful situations and weaker during non-stressful situations, and the ability to switch between modes (NA and PA are bipolar during high stress; NA and PA are orthogonal during low stress) adaptively uses cognitive resources and provides an additional means of decreasing NA under stress, to wit, PA.

Carefully distinguishing among IIV and the *Congruent, Complex,* and *Dynamic* theories of PF in affect allows one to determine which