DO AFFECTIVE DYNAMIC FEATURES PREDICT JOB PERFORMANCE?

by

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ABSTRACT

The affective revolution in the organizational sciences, along with methodological advances in experience sampling, has led to a greater theoretical interest in the temporal dynamics of affect (e.g., variability, inertia, instability). Related research in health and personality psychology suggests that temporal parameters of affect are predictive of well-being. However, despite the theoretical and methodological appeal, recent work suggests that affective dynamic features are not predictive of broad well-being outcomes beyond the mean level. Given the practical and methodological costs of examining affective dynamic features in organizational research, I seek to determine (a) the predictive validity of these different types of dynamic features on job performance (task performance, organizational citizenship behavior [OCB], and counterproductive work behavior [CWB]); and (b) the incremental value of dynamic features over mean levels of affect. To do so, I assess three key temporal parameters of affect (variability, inertia, instability) from daily diary assessments of affect from 597 workers (mean days = 51, total assessments = 30,565), looking at both weekly and overall levels. The findings suggest that affective dynamic features measured at the overall level were predictive of within-person variability in task performance and counterproductive work behavior (as well as mean CWB), even after controlling for the mean. Therefore, empirical and theoretical looks at affective dynamic features of employees may inform our understanding of their short-term performance variability.

INTRODUCTION

Organizational sciences have recognized that the study of organizational phenomena requires the lens of time for nearly two decades (Ancona, Goodman, Lawrence, & Tushman, 2001). Since organizational constructs are rarely static and unchanging, time is an essential dimension in developing theory and understanding the nature of organizational constructs as well as their interrelationships (Fried, Grant, Levi, Hadani, & Slowik, 2007; Pitariu & Ployhart, 2010). Because of the dynamic underpinning of organizational constructs, scholarly attention is increasingly being paid to dynamic within-person processes, where the person-level fluctuations of constructs are the phenomena of interest. As a result, there have been multiple theoretical and empirical investigations into within-person variability in both employee experiences such as affective experiences (e.g., Beal & Ghandour, 2011; Ilies & Judge, 2002); job attitudes (e.g., Boswell, Shipp, Payne, & Culbertson, 2009); justice reactions (e.g., Hausknecht, Sturman, & Roberson, 2011; Matta, Scott, Colquitt, Koopman, & Passantino, 2017); stress, burnout, and reactions to change (e.g., Dunford, Shipp, Boss, Angermeier, & Boss, 2012; Lang & Bliese, 2009), and behavioral outcomes such as performance (e.g., Dalal, Bhave, & Fiset, 2014). These studies have shown the importance of the dynamic properties of organizational constructs. For instance, fluctuations in fairness (operationalized as individual standard deviation in daily fairness scores over a 3-week period) were more stress-inducing compared to consistent unfairness (Matta et al., 2017). These findings suggest that temporal parameters of organizational constructs that summarize within-person patterns of changes over time are vital to our theoretical understanding of organizational phenomena (Shipp & Cole, 2015).

A consideration of time is especially relevant in affect and emotion research where change in affect is fundamental to its measurement and theory. Past research has largely focused on affective disposition (the tendency to experience certain types and levels of affective state) operationalized as the mean levels of affective state (Diener, Thapa, & Tay, 2020; Thapa, Beck, & Tay, 2020). Recently, there has been increasing theoretical and empirical interest in affective changes as a focal construct (e.g., affect spin; Beal, 2011; Beal, 2013) both in terms of within a person as well as between persons. To investigate such between-person differences in within-person phenomena, researchers generally operationalize person-level estimates of different types of affective changes over time as a single parameter. For example, variability in affect can be operationalized as variance or standard deviation, which is distinct from the mean. These temporal affective parameterizations, also labelled *affective dynamic features*, include variability (dispersion of affect around the mean), inertia (stability of affect over time, i.e. autocorrelations), and instability (extreme deviation from one affective moment to the next) (Kuppens & Verduyn, 2017). Researchers have started to challenge the assumption that the mean aggregate of states and experiences can hold the most information and offer solutions directed at stable levels of state variability (e.g., Eid & Diener, 1999; Kuppens, van Mechelen, Nezlek, Dossche, & Timmermans, 2007; Moskowitz & Zuroff, 2004). Affective dynamic features reveal temporal within-person processes that are thought to have empirical effects on outcomes beyond the mean level.

The outcomes of affective dynamic features have primarily been studied in the affective sciences (e.g. Kuppens & Verduyn, 2017), health sciences (e.g. Ong & Ram, 2017), and personality (Timmermans, Van Mechelen, & Kuppens, 2010). They have been shown to predict important psychological outcomes such as psychological heath (e.g. life satisfaction, depression, anxiety), self-esteem and physical health outcomes (Chan, Zhang, Fung, & Hagger, 2016; Gruber, Kogan, Quoidbach, & Mauss, 2013; Koval, Sütterlin, & Kuppens, 2016; Röcke, Li, & Smith, 2009). In the context of work, these explorations have been limited in examining how they predict job performance. An exception of this was an experience sampling study where researchers found that daily affect spin predicted organizational citizenship behavior (OCB) through decreased positive mood Clark, Robertson, & Carter, 2018). Such findings suggest that fluctuations in affective processes can predict performance through state affect effects on work behavior.

Though understudied, studying the degree to which affective temporal dynamic features (e.g., variability, inertia, instability) predict different dimensions of job performance (i.e., task performance, organizational citizenship behavior [OCB], and counterproductive work behavior [CWB]) is critical to pushing the study of organizational science forward. The present study aims to make a number of theoretical, methodological, practical, and empirical contributions. First, I lay out a theoretical argument of how dynamic parameters add to the current understanding of affective experiences in the workplace. Second, I argue that these different temporal dynamic features represent different types of within-person processes and delineate their potential conceptual linkages to job performance. Third, I take a methodological approach in establishing that these measures are conceptually distinct and have incremental predictive validity over the established similar measures (e.g. the mean). Fourth, I argue that as more organizations seek to assess the affective state of workers over time instead of global assessments (Barsade, & O'Neill, 2016), it is vital to determine whether the costly efforts of measuring affective temporal dynamic features through experience sampling can be justified by establishing predictive validity of affective dynamics and job performance (Beal, 2015). Finally, empirically, recent null effects of affective dynamics predicting psychological outcomes contradict past findings on the predictive validity of affective dynamic features. Thus, some have recently suggested that complex temporal affect parameters have little predictive validity for well-being over the mean and variability (Dejonckheere et al., 2019). In the present study, I seek to use a large experience sampling dataset to determine if these parameters have any predictive validity for different dimensions of job performance.

Importance of Temporal Affective Parameters in the Workplace and Workplace Performance

Theoretical models of affect in the workplace of job performance suggest that temporal features and variability of both affect and job performance are critical in understanding the interplay among the two in the aggregate. First, adding to the traditional "trait" concept (or the within-person equivalent of the mean score in a distribution) that reference the general tendency of a person to experience positive or negative affect, affective dynamics introduce additional concepts that capture the within-person tendency for fluctuations in such positive and negative affective experience (Eid & Diener, 1999). Within-person level theories about affect and performance suggest a direct relationship between state-level affect and performance. For instance, affective events theory suggests that affective reactions to affective events at work can influence an individuals' work motivation and subsequently, your work performance (Seo, Barrett, & Bartunek, 2004). Similarly, the experience of positive and negative affect has a within-person, state-level relationship with helping and counterproductive behavior respectively (Matta, Erol-Korkmaz, Johnson, & Bicaksiz, 2014; George, 1991). At a higher level of aggregation, high fluctuations in affective experience can likely mean that an employee's affective experience is volatile, which may result in less productive and less helpful on average. Thus, there is precedence to suggest that affective dynamic features should predict *mean-level* job performance, which is a focus of the present study.

Second, there have been multiple calls for investigation into within-person variability in job performance (Dalal, Alaybek, Lievens, Bhave, & Fiset, 2020; Dalal et al., 2014). As before, since affective states are associated with work performance on the within-person level (for e.g. negative affect state and CWB; Matta, Erol-Korkmaz, Johnson, & Bicaksiz, 2014; positive affect state and OCB; George, 1991), it is possible that volatility of affective experience might directly correlate with volatility in their performance. In other words, there are direct associations between momentary assessments of affect and performance of job-related behaviors, like voluntary helpful behavior, such that an individual may be more likely to engage in helpful behavior when experiencing positive affect. Thus, if someone fluctuates frequently in their experience of affective states, it stands to reason that their voluntary behaviors will fluctuate as well. Affective dynamics therefore also provide unique conceptualization of employee affective experience such that may have additional implications for *variability* in performance.

While investigating the importance of parametrizations of affective fluctuations in the workplace, it is methodologically and conceptually necessary to consider both time-structured and unstructured metrics of variability (Ram & Gerstorf, 2009). Research in organizational science has largely focused on time-unstructured variability – mainly, intraindividual variability and affect spin – in the workplace (Beal & Ghandour, 2011; Clark et al., 2018). However, variability as a sole affective dynamics measure has been criticized for its lack of representativeness of affective fluctuations because of its neglect of time (Trull, Lane, Koval, & Ebner-Priemer, 2015): affective variability, even in forms of affective spin, is a dispersion variable and does not include time in its mathematical calculation. As such, many researchers argue that it is essential to consider other temporal parameters such as affective stability – measure of extreme deviation of affect from one extreme to the next that considers both variability and time – and inertia – that considers stability of affect from one moment to the next (Ong & Ram, 2017; Trull et al., 2015). In other words, it may not just matter that one fluctuates in their experienced affect but that they experience extreme fluctuations from one moment to another.

Each of these three dynamic features, though mathematically similar, conceptually differ and therefore, can have unique ramifications for different types of performance. High variability in both positive and negative affect can indicate a volatile affective experience, intense affective reactions to situations, and issues with affective regulation, and therefore, worse performance. While instability is similar to variability in representing fluctuations, it deals with fluctuations from one point of measurement to the next. Therefore, it can have specific implications for the temporal properties of affective fluctuations as it relates to performance. For example, some helping behavior in the workplace is expected to be reactionary to negative affect experienced (e.g. guilt) and attempts to combat it (Yang, Simon, Wang, & Zheng, 2016). Therefore, negative instability may be positively correlated with organizational citizenship behavior. Similarly, inertia, while seemingly is the opposite of instability, represents the carryover effects of affect over time and therefore, may be inversely related to variability in work outcomes, such as organizational citizenship behavior. At the same time, because they are mathematically similar, it is important to study them together to accurately flesh out what parameter is important. I delve into each feature in detail below in concept and in relation to each of the performance outcomes.

Finally, empirically and practically, it is important to understand the extent how the introduction of new constructs predict outcomes organizational researchers are interested in, above and beyond existing constructs. Construct proliferation is a major problem in organizational science, and addition of any construct necessitates evidence of discriminant validity above existing, conceptually similar constructs (Shaffer, DeGeest, & Li, 2016), Along these lines, the affective dynamics literature has faced some criticism about the need to establish incremental validity of each temporal parameter beyond the mean. Dejonckheere et al.'s (2019) recent meta-analysis contradicts previous findings, including another recent meta-analysis (Houben, Van Den Noortgate, & Kuppens, 2015) that establish the relationship between affective temporal parameters and wellbeing, and instead suggest that the more complicated temporal parameters introduced in the literature to predict well-being outcomes, such as measures of emotional interdependency, inertia, and instability, emotional granularity, emotional dialecticism, and emodiversity, are unable to establish incremental prediction beyond the mean and the variability. As a result, the current paper attempts to establish the predictive validity of each temporal affective parameters; and also explore the extent they are predictive beyond the mean levels of state affect. I limit my investigation to inertia, instability, and variability because they are more mathematically and conceptually distinct than the many of the measures explored in Dejonckheere et al.'s (2019) meta-analysis, while representing fluctuations in affective experience. Specifically, I explored the potential varying effects of these affective dynamic features on different dimensions of performance (task performance, organizational citizenship behavior, and counterproductive work behavior) as well as their summarized constructs: mean and variability.

Types of Affective Dynamics and Relation to Performance

In this study, I test three parameters of both positive and negative affect: variability, instability, and inertia. They are the most studied dynamic features in affective sciences and signify individual affective fluctuations from multiple perspectives (Houben et al., 2015). While research in organizational science has largely focused on affective spin and positive – negative affect transition, I largely focus on the unidimensional assessment of affective fluctuations. Since positive and negative valence is theorized to be independent, looking at fluctuations within each valence can inform us of their independent processes and capture instances where one may feel low positive affect but not necessarily high negative affect.

I detail what each parameter represents conceptually below, along with their relation to performance.

Variability. Affective variability is the most researched affective dynamic feature in health, clinical, personality, and even social psychology (Eid & Diener, 1999; Houben, Van Den Noortgate, & Kuppens, 2015). It indicates how and the extent to which fluctuations in affect deviate from one's mean affect. Primary research in this area has found that high variability in negative and positive affect predicts adverse psychological outcomes including lower life satisfaction, higher depression, psychological distress, and physical ill health, the latter two multiple years later and cross-culturally (Chan et al., 2016; Gruber et al., 2013; Hardy & Segerstrom, 2017; Ong & Ram, 2017).

Relation to performance. Higher levels of variability in both positive and negative affect could be related to performance in multiple ways. First, high variability in negative and positive affect predicts adverse psychological outcomes including higher depression and psychological distress (Chan et al., 2016; Gruber et al., 2013; Hardy & Segerstrom, 2017; Ong & Ram, 2017). Part of the reason for such adverse reaction could be because high variability may also reflect sensitivity of valuation systems involved in emotion generation and regulation (Kuppens & Verduyn, 2015), where someone may be more prone to a more intense response to desirable or undesirable situations. This can reflect more distractibility and therefore, in work context, a larger tendency to have fluctuations in performance based on events experienced. In addition, high variability may reflect larger cognitive load during work and attentional pull by situational circumstances. Such cognitive and attentional load could result in worse task performance (Beal, 2005).

Inertia. Inertia is the extent to which affective states are resistant to change, or persistent over time (Koval et al., 2016; Kuppens, Allen, & Sheeber, 2010). It has been posited that high levels of positive and negative inertia reflect a type of psychological maladjustment due to lack of emotional reactivity. Indeed, positive and negative emotion inertia are associated with low self-esteem and depression (Kuppens et al., 2010). Emotional inertia particularly is linked to emotional regulation as it seems to stem from difficulties regulating one's emotions – that is, individuals with poorer emotion regulation are more likely to get "stuck" in emotional states (Koval, Butler, Hollenstein, Lanteigne, & Kuppens, 2015). It is also related to cognitive perseverative tendencies such as rumination (Koval, Kuppens, Allen, & Sheeber, 2012) and linked to inefficient (at least in the sense of having an impact on emotional experience) regulatory strategies such as suppression (Koval, et al., 2015). Moreover, it is not surprising that as emotional inertia reflects emotional resistance to change and thus the general failing of emotion regulation goals and efforts, it is associated with poor psychological adjustment (Kuppens & Verduyn, 2015). However, other studies have found an association between higher levels of positive affect inertia and positive well-being outcomes such as better recovery for participants with recurring depression (Höhn et al., 2013). This finding aligns with the broaden-and-build theory of positive emotion which posits that resilient individuals use positive emotions as a repository to buffer negative experiences (Fredrickson, 2001). Inertia, in this case, can be theorized as a reflection of this resource building. Positive affective inertia therefore may reflect effective resource building while negative affective inertia could reflect rumination or negative reinforcement cycles. However, low levels of negative affect combined with high negative affect inertia may result in better functioning. Therefore, independent of positive and negative valence, there is still question as to whether or not inertia is beneficial or harmful.

Relation to performance. Inertia is understudied in the workplace, however, based on studies in other disciplines, it is likely that (negative affect) inertia negatively predicts job performance because of the regulatory issues associated with it. However, depending on the contexts, inertia may be tied to positive or negative functioning. For example, positive emotional inertia in stressful workplaces may be adaptive while emotional inertia in circumstances that require adaptive performance may be maladaptive. Therefore, high inertia is generally adaptive, but it needs to be contextually sensitive. A high level of positive inertia coupled with high mean positive affect, for instance, suggests a sense of stable happiness but if it is invariable in contexts where fluctuations are expected (e.g. stressful situations), it can represent a deficiency in emotional flexibility. Investigating levels of inertia at within and between person may help delineate effects of inertia on work outcomes.

Instability. Affective instability has largely been studied in health sciences particularly due to its relation to mental health disorders. Participants with borderline personality disorder, for instance, have higher negative affect instability compared to clinically undiagnosed populations or those with depressive disorders (Ebner-Priemer et al., 2007; Trull et al., 2008). In terms of normal population, high affective instability may reflect "dysregulation of affect", specifically inability to down-regulate overly intense experiences.

Relation to performance. In a normal working population, large amount of instability in both positive and negative affect may likely represent readiness for response to environmental factors. Therefore, negative instability represents stronger negative reactions to daily events which could then suggest lower job performance as a result. However, positive instability could represent more positive reactions to daily events and therefore, higher job performance.

Timeframes and Affect Valence

Each affective dynamic feature may have differing relevance to different work outcomes depending on different timeframes of measurements. Affective dynamics should be assessed within each individual (i.e., intraindividual) and can be viewed in varying time frames (i.e., momentary, daily, weekly). In terms of affective measurement, moment-to-moment fluctuations in labs may measure individual reactions to the same situations, while daily variations can include both situational changes along with individual affective changes. Depending on the timeframe of aggregation however, a shorter timeframe of calculation for daily variability may be more representative of differences in situations, while longer timeframe can capture more of individual tendency to fluctuate. Similarly, if the outcome of focus is week-level performance, it would be informative to look at affective dynamic features on two different levels: overall and weekly to see how overall dynamic features – on the person level – and weekly level – deviations within the person based – predicts different performance outcomes. In this study, I calculate affective features on the weekly level and over the course of the study (~7 weeks) and test how it predicts weekly job performance.

Research Question 1: Do temporal affect parameters predict *mean-level* job performance outcomes over and above mean-level affect?

a. At the overall level
b. At the weekly level

Research Question 2: Do temporal affect parameters predict *variability* in job performance outcomes over and above mean-level affect?

c. At the overall level
d. At the weekly level

METHOD

Participants and Procedure

The data for this study originated from the Multimodal Objective Sensing to Assess Individuals with Context (MOSAIC) program, from joint collaboration between MITRE corporation, MIT Lincoln Laboratory, Georgia Institute of Technology, and more. The daily diary data used in this study was part of the "ground truth" assessments, the peer-reviewed assessments, as validation tools for the sensor-based data streams that the project collected. There were 597 full-time working participants in this study (mean age = 34.27, 58% male), who responded to a daily diary survey for the average of 51.3 days (total assessments = 30621, total weekly assessments = 5639).

Every daily survey contained short version of Positive and Negative Affect Schedule – Short version (PANAS), along with questions about the context (e.g. participant's social and physical environment while filling the survey), stress, and anxiety. Three times a week however, these surveys were accompanied by job performance survey which included items on their self-reported task performance, organizational citizenship behavior, and counterproductive behavior.

Measures

Job Performance

Job performance refers to employee behaviors that help attain organizationally relevant goals (Campbell, McHenry, & Wise, 1990; Campbell & Wiernik, 2015). In organizational science literature, job performance has three broad dimensions: task performance, organizational citizenship behavior, and counterproductive work behavior (Rotundo & Sackett, 2002; Viswesvaran & Ones, 2000).

Task performance. A key dimension of job performance is task performance. Task performance concerns role prescribed duties or actions that are formally recognized and rewarded by management (Viswesvaran & Ones, 2000). The ground truth assessments selected to measure task performance are the In-Role Behavior (IRB) measure (Williams & Anderson, 1991) and the Individual Task Proficiency (ITP) measure. IRB contains 7 items (ranging from 1 (Strongly disagree) to 7 (Strongly agree)) with statements about their task performance, while ITP contains 3 items (1 (very little) to 5 (a great deal)). The reliabilities of these task performance measures were over .80 (IRB: α = .91; ITP: α = .83).

Operationalization. For the purpose of this study, the two measures of task performance surveys in a week were aggregated to calculate mean task performance (ITP and IRB) and calculate the standard deviation to operationalize variability in task performance (ITP and IRB). Because ITP and IRB are on different scales and represent different dimensions of task performance, I aggregate these two measures separately. The reliability of a specific individual's average IRB and ITP mean ratings across time were .87 and .94, while variability ratings were .54 and .71 respectively. While this reliability estimate does not answer whether or not there is reliable change within person over time, it reflects between-individual ratings across time.[1]

Organizational citizenship behavior and counterproductive work behaviors. Organizational citizenship behaviors (OCBs) are discretionary actions that are not officially required or recognized by the organization, but that foster the effectiveness of the group and its members (Cortina & Luchman, 2013; Motowidlo & Kell, 2013; Organ, 1997). Examples of OCBs can include having enthusiasm and putting extra effort on tasks (Griffin, Neal, & Parker, 2007) or helping other members. Meanwhile, Counterproductive work behaviors (CWBs) are intentional actions that harm the organization or others at the organization (Sackett, 2002). Similar to OCBs, CWBs can be directed towards either other individuals (CWB-I) or the organization (CWB-O; Campbell & Wiernik, 2015).

OCBs and CWBs were measured using Dalal et al.'s (2009) OCB/CWB scale containing 16 total items: eight OCB items and eight CWB items. Respondents were asked to respond "yes"

[1] I attempted to report reliability of within-person changes but due to missing data, there were not enough observations to be able to calculate a subject X week random effect. The reported reliabilities reflect the average reliability of subject over time: $\frac{\sigma_{ID}^2}{\sigma_{ID}^2+\sigma_{Residual}^2/k}$ where k is # of weeks.

or “no” to each item based on their workplace behavior for that day. The scale produced two scores per day: an OCB Score, which was calculated by aggregating the OCB items, and a CWB Score, which was calculated by the CWB item, with higher scores indicating higher average respective behaviors. The reliability (α) of Organizational Citizenship measure was .89 and of Counterproductive Work Behavior .81.

Operationalization. The 3 daily OCBs and CWBs surveys in a week were aggregated to calculate mean OCBs and CWBs and calculate the standard deviation to indicate variability in OCBs and CWBs. The reliability of a specific individual’s average OCB and CWB mean ratings across time were .41 and .82, while variability ratings were .66 and .87 respectively.

Mean Affect

Mean affect. The Positive and Negative Affect Schedule-Short (PANAS-S) consisted of 10 items about the way participant felt right now with 5 items pertaining to positive affect (alert, excited, enthusiastic, inspired, determined) and the 5 pertaining to negative affect (distressed, upset, scared, afraid, nervous) (Watson, Clark, & Tellegen, 1988). The response scale ranged from 1 (Not at all or very slightly) to 5 (Extremely). Daily positive affect was the aggregate of 5 positive items ($\alpha = .78$) while daily negative affect was the aggregate of the 5 negative items ($\alpha = .87$). The reliability of a specific individual’s average positive and negative affect mean ratings across time were .97 and .95 respectively.

Affective Dynamic Features

The daily affect ratings were used to form affective dynamic features. These variables were formulated within-person per week and overall through the study separately for positive and negative affect.

Affective variability. Intraindividual Variability (IIV) was calculated as the individual's standard deviation (iSD) for affect in a week and over the course of the study. The reliability of a specific individual's average positive and negative affect variability in ratings across time were .88 and .90 respectively.

Affective inertia. Inertia was calculated by the first-order autoregressive slope of affect in a level-1 multilevel model where the outcome was affect at time t and the autoregressive slope represents how strongly person i's level of affect at time t is related to their level of affect at time t – 1, that is the previous day. These estimates for each week and overall study were entered into the models predicting job performance outcomes. The reliability of a specific individual's average positive and negative affect inertia in ratings across time were .28 and .32 respectively.

Affective instability. Affective instability was calculated as the MSSD (the Mean square of successive differences) in a week and over the course of the study. The reliability of a specific individual's average positive and negative affect inertia in ratings across time were .83 and .81 respectively.

Statistical Analyses

In calculation of the weekly measures, the total number of observations was 5589 with 597 person-level variables. A large portion of the data were missing primarily for variability in performance outcomes (~ 55% missing rate for all weekly variability calculation of performance outcomes). Since performance is calculated only 3 times a week, any missing data disallows calculation of variability. Mean weekly performance outcomes did not have the same issue since one or two assessment per week allows for calculation of the mean (missing rate was ~17% for all the weekly mean performance outcomes). However, any imputation may bias the results since the outcome is related to deviations from the mean. Multiple imputation is not applicable in this case since it would not satisfy MAR or CMAR criterion. Thus, the present study compared the participant affective dynamics data between weeks where they had the variability of job outcomes data to weeks where they did not, and reported any discrepancy in the supplementary analyses. In addition, the final model retained a majority portion of the participant-level data (missing ~9%, n = 544), because most of the missing data was week-level.

In the calculation of the affect dynamics measures, missing values were excluded by leaving an empty row in the data file, in order to maintain equal intervals for the calculation of

MSSD and AR. There was substantial portion of missing values in weekly affective inertia because some participants had 0 variance in one week. In such cases, inertia was calculated as *NA* since there was no variance. I considered labelling inertia as 1 in that case because technically, in these scenarios the values never wavered. However, doing so increased correlation between standard deviation and inertia: for example, for negative affect inertia where it would be the most beneficial, the data increased by 916 observations but the correlation between inertia and variability increased from .01 to -.3. The results themselves did not change so I added the results with this new formulation of inertia in the Appendix (Table 4 and 5).

The structure of the presentation of results is as follow: first, I present Pearson's correlations between all affect dynamics measures (SD, MSSD, AR) and the performance outcome variables in Table 1. I also report the correlation between weekly and overall level respective calculations of the affective dynamic features as well as their correlations with each other. Second, I examined the associations between the affect dynamics measures and performance outcomes using three multilevel regression models. I used lme4 (Bates, Mächler, Bolker, & Walker, 2015) packages in R (R Core Team, 2019) to run the multilevel models and lmertest (Kuznetsova, Brockhoff, & Christensen, 2017) to obtain *p*-values for the *t* tests for objects returned by lmer function of lme4 package. I created 8 sets of models in total for 8 outcome variables: different mean and variability in multiple dimensions of job performance (task performance: task proficiency and in role behavior; organizational citizenship behavior; and counterproductive work behavior).

Table 1. Means, Standard Deviations of *Uncentered* and Correlations of *Centered* Affective Dynamic Features, on a Weekly and Overall Level, and Performance Variables (Task Performance, Organizational Citizenship Behavior, and Counterproductive Behavior) Between Person at the Lower Quadrant and Pooled Within-Person at the Upper Quadrant

Variability	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
Weekly PA														
1. Mean	2.35	0.73		.04**	.09**	.14**	.00	.00	-.06**	-.04**				
2. Inertia	-0.12	0.44	.04**		-.27**	.03*	.02	.06**	.01	.03*				
3. Instability	0.63	0.73	.09**	-.24**		.78**	.00	-.01	.10**	.07**				
4. Variability	0.51	0.28	.13**	.12**	.73**		.01	.03	.09**	.11**				
Weekly NA														
5. Mean	1.31	0.40	.00	.02	.01	.01		.03	.46**	.60**				
6. Inertia	-0.12	0.42	.00	.08**	-.00	.05**	.01		-.16**	.00				
7. Instability	0.27	0.59	-.06**	.01	.10**	.09**	.47**	-.14**		.79**				
8. Variability	.28	0.27	-.04**	.04**	.07**	.13**	.58**	.09**	.73**					
Overall PA														
9. Mean	0.00	0.64	.00	.00	.00	.01	.00	.01	.02	.03*				
10. Inertia	-0.00	0.21	.00	-.27**	.00	-.23**	.00	-.05**	.01	-.04**	-.00			
11. Instability	0.00	0.42	.01	.09**	.01	.01	-.01	.06**	-.00	-.03*	.28**	-.32**		
12. Variability	0.00	0.19	.01	-.03	.01	-.11**	.00	.03*	.01	-.05**	.32**	.08**	.87**	
Overall NA														
13. Mean	0.00	0.31	.01	-.01	-.01	-.03*	.01	-.11**	-.01	-.18**	.06**	.02	.15**	.17**
14. Inertia	-0.00	0.21	-.00	-.03*	.01	-.02	.00	-.29**	-.00	-.23**	-.04**	.14**	-.10**	-.03**
15. Instability	-0.00	0.34	.00	.03*	-.00	-.02	.00	-.01	-.02	-.14**	.03*	-.08**	.37**	.33**
16. Variability	-0.00	0.22	.00	.01	.00	-.03*	.01	-.12**	-.01	-.25**	.01	-.00	.30**	.31**

Table 1. continued

Variability	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
Task Performance														
17. IRB Mean	4.87	0.60	.18**	.01	.00	.02	-.19**	-.01	-.09**	-.14**	.19**	.01	.01	.02
18. IRB Var	0.33	0.42	-.05**	-.00	.11**	.10**	.12**	.03	.07**	.12**	-.04*	-.04	.10**	.08**
19. ITP Mean	4.17	0.80	.05**	.01	.01	-.01	-.04*	.01	-.03*	-.02	.19**	.01	.07**	.08**
20. ITP Var	0.38	0.42	.02	.01	.04*	.04*	.03	-.00	.00	-.00	-.09**	-.01	.06**	.06**
OCB														
21. Mean	1.77	1.34	.04**	-.00	.00	-.01	-.05**	-.02	-.03*	-.05**	.21**	-.02	.10**	.10**
22. Variability	2.85	1.40	-.01	-.03	.01	.00	.03	-.02	.03	.02	-.12**	-.02	-.01	-.01
CWB														
23. Mean	0.30	0.40	-.02	.01	-.01	.00	.02	-.01	.02	-.01	-.15**	-.05**	.02	.02
24. Variability	0.53	0.42	-.03	-.07**	-.03	.01	.03	-.03	.03	-.02	-.08**	-.07**	.08**	.06**

Table 1. continued

Variability	13	14	15	16	17	18	19	20	21	22	23
14. Inertia	.29**										
15. Instability	.71**	-.01									
16. Variability	.83**	.31**	.86**								
Task Performance											
17. IRB Mean	-.20**	-.04**	-.14**	-.18**							
18. IRB Var	.12**	.03	.11**	.14**	-.53**						
19. ITP Mean	-.18**	-.05**	-.10**	-.14**	.71**	-.31**					
20. ITP Var	.12**	.03	.09**	.13**	-.33	.44**	-.43**				
OCB											
21. Mean	-.00	-.01	.04**	.02	.28**	-.12**	.35**	-.19**			
22. Variability	.03	-.01	-.00	.02	-.22**	.19**	-.26**	.22**	-.49**		
CWB											
23. Mean	.15**	.05**	.14**	.16**	-.32**	.14**	-.31**	.15**	-.12**	.17**	
24. Variability	.13**	.06**	.12**	.15**	-.15**	.11**	-.13**	.09**	-.05**	.14**	.53**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively.

*$p < .05$; **$p < .01$.

To tackle part a and b or research questions 1 and 2, I used multilevel models with affective dynamics created on the weekly level and over the course of the study (~7 weeks).

Level 1:

$Y_{ij} = \beta_{0j} + \beta_{1j}$ Positive Mean

$+ \beta_{2j}$ Positive Inertia

$+ \beta_{3j}$ Positive Instability

$+ \beta_{4j}$Positive Variability

$+ \beta_{5j}$ Negative Mean

$+ \beta_{6j}$ Negative Inertia

$+ \beta_{7j}$ Negative Instability

$+ \beta_{8j}$ Negative Variability

$+\beta_{5j}$ Week

$+ \varepsilon_{ij}$

Level 2:

$\beta_{0j} = \gamma_{01}$ Positive Overall Mean

$+ \gamma_{02}$ Positive Overall Inertia

$+ \gamma_{03}$ Positive Overall Instability

$+\gamma_{04}$ Positive Overall Variability

$+ \gamma_{05}$ Negative Overall Mean

$+ \gamma_{06}$ Negative Overall Inertia

$+ \gamma_{07}$ Negative Overall Instability

$+ \gamma_{08}$ Negative Overall Variability

where i and j represents the week and the individual respectively. Y_{ij} represents one of the 8 different performance outcomes summarized in terms of their mean or variability. The Level 1 coefficients (β_{1j} to β_{8j}) represent weekly affective dynamic features (including the affect mean) that are centered by subtracting with corresponding individual overall affective dynamic feature. These coefficients represent deviation from their person-level statistics. The Level 2 parameters (γ_{01} to γ_{08}) represent overall affective dynamic features that are grand-mean centered. I initially planned to include random slopes for each weekly affective dynamic feature; however, the models did not converge because there was not enough variance left to account for. Therefore, the final models only included random intercept of individual. From the final model, I reported the estimates, *t*-statistic, *p*-value and the bootstrapped 95% confidence intervals (number of bootstraps = 1000).

Because of the expected correlations between the predictors, I checked the collinearity diagnostics to detect problematic multicollinearity; some variance inflation factor (VIF) values were over 10: mainly the overall summaries of instability, variability, and mean of both positive and negative affect, suggesting serious problem with multicollinearity (Hair, Anderson, Tatham, & Black, 1998). To counteract this, I first grand-mean centered all of affective dynamic feature variables calculated at the overall timeframe. In my supplemental analyses, I also ran separate models: a) one set with individual affective dynamic features, b) then another set with their mean affective dynamic feature, and c) finally one with all of the predictor variables of interest. I report findings from the final model and note any discrepancy with the findings of their singular models in supplementary analyses.

RESULTS

Correlations Between Affect Dynamics on Weekly and Overall Level

First, looking at the uncentered summarized (affective dynamic features and the mean) at the weekly and overall level, there was high correlation between the corresponding variables: the correlation between the weekly and overall level for summarized negative affect features (inertia $r = .20$, instability $r = .55$, variability $r = .63$, and mean $r = .77$) and positive affect features (inertia $r = .17$, instability $r = .57$, variability $r = .59$, and mean $r = .87$) were all significant ($p < .01$). To counter potential multicollinearity issues and also signify within-person deviation from individual level overall affective dynamic feature, I did a variation of centering within-cluster (CWC) by subtracting the weekly values by their corresponding overall measures. In the next step, I group mean centered the overall measures by subtracting each individual overall measure with the grand average. Consequently, the correlation between the weekly and overall level for centered summarized features were much smaller (negative affect: inertia $r = -.29$, instability $r = -.02$, variability $r = -.25$, and mean $r = .01$; positive affect features: inertia $r = -.27$, instability $r = .01$, variability $r = -.11$, and mean $r = 0$) (See Table 1).

Due to the conceptual and mathematical similarity between the dynamic measures, multicollinearity is a major issue that needs to be considered. On both weekly and overall level, the variability measures for both positive and negative affect were significantly correlated with their respective affect's mean (Weekly: positive $r = .13$, negative $r = .73$; Overall: positive $r = .32$, negative $r = .83$) and the instability (Weekly: positive $r = .73$, negative $r = .73$; Overall: positive $r = .87$, negative $r = .86$). As stated above, I also tested for multicollinearity and found that variance inflation factors (VIF) exceeded 10 for positive and negative affect variability at the overall level, and positive affect instability overall. Therefore, claims of multicollinearity cannot be rejected. As a potential solution, I also ran the models without positive and negative affect variability overall and reported the models in the supplemental analyses.

Task Performance

The full model with all of the fixed effects statistics is shown in Table 2.

Table 2. Fixed Effects of Variables Predicting Mean and Variability in Two Types of Task Performance

	In-Role Performance (IRB)		Individual Task Proficiency (ITP)	
	Mean	Variability	Mean	Variability
Level 1				
Intercept	6.05*** (.04)	.52*** (.03)	4.05*** (.03)	.45*** (.02)
Week	.01* (0.00)	-.01** (0.00)	.02*** (0.00)	-.01** (0.00)
Positive Affect Mean	.15*** (.04)	-.11** (.04)	.13*** (.03)	-.01 (.03)
Positive Affect Variability	-.06 (.11)	-.07 (.11)	.08 (.09)	-.05 (.08)
Positive Affect Inertia	-.02 (.04)	.04 (.04)	.01 (.03)	.04 (.03)
Positive Affect Instability	0.00 (.04)	.08* (.04)	-.01 (.03)	.04 (.03)
Negative Affect Mean	-.25*** (.06)	.09 (.07)	-.16** (.05)	.05 (.05)
Negative Affect Variability	.03 (.11)	.12 (.13)	-.03 (.09)	.11 (.09)
Negative Affect Inertia	-0.00 (.03)	.01 (.03)	0 (.03)	0 (.03)
Negative Affect Instability	.04 (.04)	-.07 (.05)	-.02 (.03)	-.04 (.04)
Level 2				
Positive Affect Mean	.30*** (.05)	-.07** (.02)	.23*** (.04)	-.06*** (.02)
Positive Affect Variability	.02 (.50)	-.26 (.26)	.29 (.45)	-.12 (.21)
Positive Affect Inertia	-.11 (.23)	.06 (.12)	-.06 (.21)	.08 (.10)
Positive Affect Instability	-.07 (.23)	.26* (.12)	-.07 (.21)	.14 (.10)
Negative Affect Mean	-.73*** (.16)	.14 (.09)	-.61*** (.15)	.12 (.07)
Negative Affect Variability	-.29 (.39)	.49* (.21)	-.27 (.35)	.42* (.17)
Negative Affect Inertia	.19 (.17)	-.05 (.09)	.23 (.16)	-.10 (.07)
Negative Affect Instability	.22 (.20)	-.25* (.11)	.26 (.18)	-.23** (.09)
ICC_{Null}	.41	.23	.53	.31
ICC_{Full}	.40	.20	.50	.28
Observations	3,603	2,078	3,606	2,077
Log Likelihood	-4,164.60	-1,723.52	-3,414.85	-1,118.97
Akaike Inf. Crit.	8,369.20	3,487.04	6,869.69	2,277.95
Bayesian Inf. Crit.	8,492.99	3,599.82	6,993.50	2,390.72

Note. Values are for fixed effects (γs) with standard errors. The model contains Level 1 (Weekly) affective dynamic features that are centered by subtracting with corresponding individual overall affective dynamic feature. The Level 2 variables represent Overall affective dynamic features that are grand mean centered. Values in parentheses are standard errors.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Mean Task Performance

In-Role Behavior (IRB). At Level 1, controlling for all Level 1 and Level 2 variables, positive affect mean was a positive predictor of mean in-role behavior (b = .15, t = 4.05, p < .001, 95% CI [.07, .21]), and so was negative affect mean (b = -.25, t = 4.10, p < .001, 95% CI [-.38, -.13]). None of the affective dynamic features [inertia, variability, and instability] of either positive or negative valence were significant predictors of mean in-role behavior.

At Level 2, controlling for all Level 1 and Level 2 variables, positive and negative affect mean were significant positive (b = .30, t = 6.42, p < .001, 95% CI [.21, .39]) and negative predictors (b = -.73, t = 4.47, p < .001, 95% CI [-.41, -1.06]) of IRB, respectively. Again, none of the affective dynamic features [inertia, variability, and instability] of either positive or negative valence were significant predictors of in-role behavior.

Individual Task Proficiency (ITP). At Level 1, controlling for all Level 1 and Level 2 variables, positive affect mean was predictive of mean ITP (b = .13, t = 4.69, p < .001, 95% CI [.08, .19]) and so was negative affect mean (b = -.16, t = 4.13, p < .01, 95% CI [-.25, -.06]). Again, none of the affective dynamic features [inertia, variability, and instability] of either positive or negative valence were significant predictors of Individual Task Proficiency.

At Level 2, negative mean affect overall was negatively predictive of Individual Task Performance (b = -.61, t = 4.13, p < .001, 95% CI [-.93, -.30]), while positive mean overall was positively predictive ITP (b = .23, t = 5.52, p < .001, 95% CI [.15, .32]).

Variability in Task Performance

In-Role Behavior (IRB). At Level 1, controlling for all Level 1 and Level 2 variables, positive affect mean was predictive of variability in IRB ($b = -.11$, $t = 2.75$, $p < .01$, 95% CI [-.03, -.18]) and but negative affect mean was not. Similarly, none of the affective dynamic features [inertia, variability, and instability] of either positive or negative valence were significant predictors of variability in in-role performance, except for positive affect instability ($b = .08$, $t = 2.12$, $p < .05$, 95% CI [.01, .15]).

At Level 2, again, positive affect mean was predictive of variability in IRB ($b = -.07$, $t = 2.93$, $p < .01$, 95% CI [-.02, -.12]). However, negative affect mean was not a significant predictor of variability in IRB. Negative affect instability measured at the overall level was a significantly negative predictor of variability in IRB ($b = -.25$, $t = 2.33$, $p < .05$, 95% CI [-.04, -.46]), while negative variability was positively predictive of variability in IRB ($b = .49$, $t = 2.30$, $p < .05$, 95% CI [.07, .91]). In addition, positive affect instability was also a positive predictor of variability in IRB ($b = .26$, $t = 2.10$, $p < .05$, 95% CI [.02, .49]).

Individual Task Proficiency (ITP). At Level 1, none of the affective variables (mean, variability, inertia, and instability) were significant predictors of variability in ITP.

At Level 2, mean positive affect was a negative predictor of variability in ITP ($b = -.06$, $t = 3.35$, $p < .01$, 95% CI [-.10, -.03]). Negative variability was a positive predictor of variability in ITP ($b = .42$, $t = 2.48$, $p = .01$, 95% CI [.08, .75]), while negative affect instability measured at the overall level was a significantly negative predictor of variability in ITP ($b = -.23$, $t = 2.67$, $p = .01$, 95% CI [-.06, -.37]),

Organizational Citizenship Behavior

The full model with all of the fixed effects statistics is shown in Table 3.

Table 3. Fixed Effects of Variables Predicting Mean and Variability in Organizational Citizenship Behavior and Counterproductive Work Behavior

	Organizational Citizenship Behavior		Counterproductive Work Behavior	
	Mean	Variability	Mean	Variability
Level 1				
Intercept	.82*** (.01)	.09*** (0.00)	.16*** (.01)	.08*** (0.00)
Week	.01*** (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Positive Affect Mean	.03*** (.01)	-0.00 (.01)	-.01* (.01)	-.01 (.01)
Positive Affect Variability	.03 (.02)	0.00 (.02)	-.01 (.02)	.03 (.02)
Positive Affect Inertia	-.01 (.01)	-.01 (.01)	0.00 (.01)	.01 (.01)
Positive Affect Instability	-.01 (.01)	-0.00 (.01)	-0.00 (.01)	-.01* (.01)
Negative Affect Mean	-.02 (.01)	.02* (.01)	.01 (.01)	.02* (.01)
Negative Affect Variability	-.02 (.02)	-.02 (.02)	.01 (.02)	-.03 (.02)
Negative Affect Inertia	-0.00 (.01)	-0.00 (.01)	-0.00 (.01)	-0.00 (.01)
Negative Affect Instability	-0.00 (.01)	.01 (.01)	-0.00 (.01)	.02* (.01)
Level 2				
Positive Affect Mean	.05*** (.01)	-.02*** (0.00)	-.04*** (.01)	-.01*** (0.00)
Positive Affect Variability	.03 (.09)	0.00 (.05)	.19* (.08)	.08 (.05)
Positive Affect Inertia	-.01 (.04)	-.03 (.02)	-.09* (.04)	-.04* (.02)
Positive Affect Instability	0.00 (.04)	0.00 (.02)	-.08* (.04)	-.02 (.02)
Negative Affect Mean	-.03 (.03)	.02 (.02)	.03 (.03)	.02 (.02)
Negative Affect Variability	-0.00 (.07)	.03 (.04)	.05 (.06)	.07 (.04)
Negative Affect Inertia	.01 (.03)	-.03 (.02)	-.01 (.03)	-.02 (.02)
Negative Affect Instability	.03 (.04)	-.04 (.02)	.03 (.03)	-.03 (.02)
ICC_{Null}	.18	.27	.37	.42
ICC_{Full}	.16	.26	.35	.40
Observations	3,606	2,077	3,606	2,076
Log Likelihood	2,056.56	1,950.83	2,319.96	2,071.44
Akaike Inf. Crit.	-4,073.12	-3,861.66	-4,599.93	-4,102.88
Bayesian Inf. Crit.	-3,949.31	-3,748.88	-4,476.12	-3,990.12

Note. Values are for fixed effects (γs) with standard errors. The model contains Level 1 (Weekly) affective dynamic features that are centered by subtracting with corresponding individual overall affective dynamic feature. The Level 2 variables represent Overall affective dynamic features that are grand mean centered. Values in parentheses are standard errors.

**p* < 0.05; ***p* < 0.01; ****p* < 0.001.

Mean OCB. At Level 1, mean positive affect significantly predicted mean OCB (b = .03, t = 4.84, p < .001, 95% CI [.02, .04]). The mean negative affect and the affective dynamic features (inertia, instability, and variability) of either valence were not predictive of mean OCB.

At Level 2 as well, mean positive affect significantly predicted mean OCB (b = .05, t = 6.53, p < .001, 95% CI [.04, .07]). None of the affective dynamic variables (inertia, instability, and variability) were significant predictors of mean OCB and neither was mean negative affect.

Variability OCB. At Level 1, negative affect mean was negatively predictive of variability in organizational citizenship behavior (b = .02, t = 2.03, p = .04, 95% CI [.002, .04]). The mean positive affect and the affective dynamic features (inertia, instability, and variability) of either valence were not predictive of variability in OCB.

At Level 2, mean positive affect significantly predicted variability in OCB (b = -.02, t = 4.47, p < .001, 95% CI [-.01, -.03]). The mean negative affect and the affective dynamic features (inertia, instability, and variability) of either valence were not predictive of variability in OCB.

Counterproductive Work Behavior

The full model with all of the fixed effects statistics is shown in Table 3.

Mean CWB. At Level 1, controlling for all Level 1 and 2 variables, only positive affect mean was predictive of mean CWB (b = -.01, t = 2.47, p = .01, 95% CI [0, -.3]). The mean negative affect and the affective dynamic features (inertia, instability, and variability) of either valence were not predictive of mean CWB.

At Level 2, mean positive affect was predictive of mean CWB (b = -.04, t = 4.97, p = .01, 95% CI [-.2, -.05]). Similarly, positive affect inertia (b = -.09, t = 2.42, p = .02, 95% CI [-.01, -.17]), instability (b = -.08, t = -2.23, p = .03, 95% CI [-.01, -.16]), and variability (b = .19, t = -2.38, p = .02, 95% CI [.04, .36]) were all predictive of mean CWB.

Variability in CWB. At Level 1, neither positive nor negative mean affect were predictive of variability in CWB. Negative affect instability (b = .02, t = 2.05, p = .03, 95% CI [0, .03]) and positive affect instability (b = -.01, t = 2.29, p = .05, 95% CI [-.002, -.02]) were both predictive of variability in CWB. However, inertia and variability of either valence were not predictive of mean CWB.

At Level 2, positive mean affect was predictive of variability in CWB (b = -.01, t = 3.11, p = <.01, 95% CI [0, .-02]). Similarly, positive affect inertia (b = -.04, t = 1.97, p = .05, 95% CI [0, .-09]) was negatively predictive of variability in counterproductive work behavior. The remaining affective dynamic features (positive affect instability and variability, and negative inertia, instability, and variability) were not predictive of variability in CWB.

DISCUSSION

In this study, I tested whether affective dynamic features were predictive of job performance, when accounting for the mean. Of all 12 affective dynamic features considered – positive and negative affect inertia, variability, instability measured at both weekly and over the course of the full 7 weeks – we found that negative affective instability and variability, measured over the course of the study, were significant predictors of *variability* in both measures of task performance. Similarly, weekly positive and negative affect instability and overall positive affect inertia were significant predictors of variability in counterproductive work behavior while positive affect variability, instability, and inertia calculated overall were predictive of mean counterproductive work behavior. None of the affective dynamic features, measured at the weekly and overall level, predicted mean levels of task performance, nor the mean and variability in organizational citizenship behavior.

While mean task performance was not predicted by affective dynamic features in the final model containing all affective dynamic features and the mean, the variability in task performance was predicted by negative affect variability (measured at the level of the individual), wherein, all else held constant, high person-level fluctuations in negative affect over the course of the study predicted higher variability in task performance. As theorized earlier, variability reflects increased fluctuations and sensitivity of valuation systems involved in emotion generation and regulation that result in greater emotional reactivity to events (Kuppens & Verduyn, 2015). This can suggest more distractibility by negative affective events and consequently, larger tendency to have fluctuations in performance based on events experienced. As theorized earlier, those who experience high variability overall may experience larger attentional pull due to perceived stressful situations, leading in work performance inconsistencies (Beal, Weiss, Barros, & MacDermid, 2005).

Similarly, the mean and variability in counterproductive work behavior (CWB) were predicted by affective dynamic properties of positive affect, on the weekly and the overall level. However, such positive affective dynamic—CWB links are contrary to the existent literature, which found a stronger symmetrical affect valence – work outcomes relationship. Conceptual understandings of CWB draw a causal effect of negative affect on counterproductive behaviors (Dalal, Lam, Weiss, Welch, & Hulin, 2009). While the affective state – CWB state level relationship may reflect this symmetry (e.g. experiencing negative affect such as anger may direct someone to behave in counterproductive ways), looking at person-level fluctuations in positive affect may add additional nuance to this understanding of CWB. Based on our findings, those with overall high variability, low inertia, and low instability in positive affect report higher rate of counterproductive behavior. Therefore, those experiencing a lower day-to-day transfer of positive affect may be likely to engage in counterproductive behavior. Based on the broaden-and-build theory (Fredrickson & Joiner, 2002), lower positive affect inertia suggests that a person may not be able to use their sustained positive affect as a buffer during negative events and therefore, they may be more likely to engage in volatile counterproductive behavior. Future research should explore inertia in different situations to observe if higher positive inertia predicts less fluctuating counterproductive behavior under adverse circumstances. Consistency of person-level positive affect inertia under strong situational forces may be an important predictor of work behavior, as examined in past personality consistency research (Green et al., 2018).

In general, the full study measures of affective dynamic features were more often predictive of job performance outcomes compared to the weekly measures. This suggests that individual difference variables looking at differences in affective fluctuations (calculated over an extended period of time) may be more predictive of performance compared to the situationally sensitive measures afforded by shorter timeframes. A part of the reason for this discrepancy could be due to the large proportion of missing weekly data for job performance variability outcomes. At the same time, this study had large number of participants and still a substantial number of weekly observations. Therefore, this finding may signify that the calculation of affective dynamic features calculated over a longer timeframe or as the individual difference variable may be more informative or reliable predictor of performance outcomes because they represent individual tendencies for affective reactions more clearly. Existing literature tends to measure affective dynamics with the full ESM or daily diary dataset (Kuppens & Verduyn, 2017) but a few studies have looked at within-person variation in other affective dynamic features and not found direct effects to work behavior (Clark, Robertson, & Carter, 2018). This current study corroborates such past findings.

On a similar vein, the present study findings also corroborate extant assertions about mean or trait affect-performance outcomes relationships. The correlations observed between mean overall positive affect and job performance (task performance $r = .13$ to $.19$, OCB $r = .21$, CWB r

=-.15) was similar to meta-analytic correlation found by Shockley et al (2012) between trait level affect and job performance outcomes (task performance r = .16, OCB r =.19, CWB r =-.28). The correlation between mean overall negative affect and job performance in this study (task performance r = -.09 to -.18, OCB r = 0, CWB r =.15) was similar to Shockley et al (2012) (task performance r = -.13, OCB r =-.08, CWB r = .25), though OCB in our study was not as negatively correlated to negative affect. Similarly, mean level positive affect in the model was a positive predictor of mean task performance and organizational citizenship behavior and a negative predictor of mean counterproductive work behavior both at the overall and the mean level while the mean negative affect was a negative predictor of task performance. However, negative mean affect was not a significant predictor of either OCB or CWB in the final models when controlling for positive mean affect. This suggests that positive affect may be more important than negative affect when it comes to job performance (Fredrickson, 2006; Junça-Silva, Caetano, & Lopes, 2017).

There is, however, a need to exercise caution in interpreting these estimates. Negative affective instability calculated overall was a significant predictive of variability in both task proficiency and in-role behavior. Despite this, the observation that the correlational and multilevel modeling results were in opposite directions suggests that multicollinearity was a likely cause of this discrepancy. Therefore, there is cause for interpretation with some caution. However, the observed multicollinearity itself is informative. For one, despite conceptual distinctions between variability and instability, they are highly correlated. Both measures are also highly correlated with mean. In partial support to Dejonckheere et al.'s (2019) finding, affective dynamic features may not be incrementally predictive of many work behaviors because affective mean does account for much of the variance (particularly in conjunction with the variability). Finally, another methodological call for concern is from the lack of reliability estimates for within-person changes over time. Due to missing data in weeks within person, the number of observations were not high enough to produce a person x week random effect coefficient and therefore, I was not able to calculate the reliability of within-person change in items. It is possible that there was not enough within-person change to reliably estimate within-person changes in average performance which could provide some reasoning for the lack of significant findings for all of the level-1 variables.

The present study is one of the firsts to examine whether affective dynamic features predict different dimensions of individual work performance and its fluctuations. This study follows up on recent calls to look at the individual differences in affective dynamic features as predictors of short-term variability in job performance (Dalal et al., 2020) and finds them to be particularly informative in predicting such variability. The findings of this study informs future research by identifying what affective feature may be relevant in predictions of what types of performance: future research can subsequently inform more nuanced explanations about how and when these measures of affective fluctuations can affect different dimensions of work performance. The next iteration of this research can also explore this finding by also studying supervisor reported behavior to see if these fluctuations reflect fluctuations in their actual behavior or individual perceptions of it. Finally, to the organizations aimed at reducing counterproductive work behavior and maintaining stable task performance of their employees, the present study suggests a person-centric understanding of the employee affective experience and a focus on not just how they are doing in general but how much they fluctuate in their day-to-day affective experience.

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APPENDIX

There was substantial portion of missing values in weekly affective inertia because some participants had 0 variance in one week. In such cases, inertia was calculated as *NA* since there was no variance. I considered labelling inertia as 1 in that case because technically, in these scenarios the values never wavered. However, doing so, increased correlation between standard deviation and inertia: for eg., for negative affect inertia where it would be the most beneficial, the data increased by 916 observations but the correlation between inertia and variability increased from .01 to .3. The results themselves did not change so I added the results with this new formulation of inertia in the Appendix below (Table 4 and 5).

Table 4. Fixed Effects of Variables Predicting Mean and Variability in Two Types of Task Performance With Modified Inertia

	In-Role Performance (IRB)		Individual Task Proficiency (ITP)	
	Mean	Variability	Mean	Variability
Level 1				
Intercept	6.03*** (.03)	.52*** (.03)	4.03*** (.03)	.45*** (.02)
Week	.01* (0.00)	-.01** (0.00)	.03*** (0.00)	-.01** (0.00)
Positive Affect Mean	.16*** (.03)	-.09** (.04)	.14*** (.03)	-.01 (.03)
Positive Affect Variability	.05 (.09)	-.07 (.11)	.08 (.09)	-.05 (.08)
Positive Affect Inertia	-.05 (.03)	.03 (.04)	.01 (.03)	.04 (.03)
Positive Affect Instability	-.04 (.04)	.08* (.04)	-.01 (.03)	.04 (.03)
Negative Affect Mean	-.26*** (.06)	.09 (.07)	-.14** (.05)	.05 (.05)
Negative Affect Variability	.01 (.11)	.15 (.13)	-.03 (.09)	.11 (.09)
Negative Affect Inertia	-0.00 (.03)	.01 (.03)	0 (.03)	0 (.03)
Negative Affect Instability	.06 (.04)	-.07 (.05)	-.02 (.03)	-.04 (.04)
Level 2				
Positive Affect Mean	.32*** (.05)	-.08** (.02)	.24*** (.04)	-.07*** (.02)
Positive Affect Variability	.02 (.50)	-.04 (.26)	.19 (.45)	-.12 (.21)
Positive Affect Inertia	-.12 (.23)	.01 (.12)	-.06 (.21)	.08 (.10)
Positive Affect Instability	-.07 (.23)	.15 (.12)	-.07 (.21)	.14 (.10)
Negative Affect Mean	-.75*** (.16)	.13 (.09)	-.57*** (.15)	.12 (.07)
Negative Affect Variability	-.37 (.39)	.52* (.21)	-.36 (.35)	.34* (.17)
Negative Affect Inertia	.28 (.17)	-.10 (.09)	.22 (.16)	-.10 (.07)
Negative Affect Instability	.28 (.20)	-.25* (.11)	.26 (.18)	-.18** (.09)
Observations	4,331	2,452	4,334	2,451
Log Likelihood	-4,898.77	-2,019.71	-4,018.12	-1,308.94
Akaike Inf. Crit.	9,837.54	4,079.42	8,076.25	2,657.88
Bayesian Inf. Crit.	9,965.01	4,195.51	8,203.73	2,773.96

Note. Values are for fixed effects (γs) with standard errors. The model contains Level 1 (Weekly) affective dynamic features that are centered by subtracting with corresponding individual overall affective dynamic feature. The Level 2 variables represent Overall affective dynamic features that are grand mean centered. Values in parentheses are standard errors.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 5. Fixed Effects of Variables Predicting Mean and Variability in Organizational Citizenship Behavior and Counterproductive Work Behavior With Modified Inertia

	Organizational Citizenship Behavior		Counterproductive Work Behavior	
	Mean	Variability	Mean	Variability
Level 1				
Intercept	.82*** (.01)	.09*** (0.00)	.16*** (.01)	.08*** (0.00)
Week	.01*** (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Positive Affect Mean	.03*** (.01)	-0.00 (.01)	-.01* (.01)	-.01 (.01)
Positive Affect Variability	.03 (.02)	0.00 (.02)	-.01 (.02)	.03 (.02)
Positive Affect Inertia	-.01 (.01)	-.01 (.01)	0.00 (.01)	.01 (.01)
Positive Affect Instability	-.01 (.01)	-0.00 (.01)	-0.00 (.01)	-.01* (.01)
Negative Affect Mean	-.02 (.01)	.02* (.01)	.01 (.01)	.02 (.01)
Negative Affect Variability	-.02 (.02)	-.02 (.02)	.01 (.02)	-.03 (.02)
Negative Affect Inertia	-0.00 (.01)	-0.00 (.01)	-0.00 (.01)	-0.00 (.01)
Negative Affect Instability	-0.00 (.01)	.01 (.01)	-0.00 (.01)	.02* (.01)
Level 2				
Positive Affect Mean	.06*** (.01)	-.02*** (0.00)	-.04*** (.01)	-.01*** (0.00)
Positive Affect Variability	.03 (.09)	0.00 (.05)	.19* (.08)	.08 (.05)
Positive Affect Inertia	-.01 (.04)	-.03 (.02)	-.09* (.04)	-.04* (.02)
Positive Affect Instability	0.00 (.04)	0.00 (.02)	-.08* (.04)	-.02 (.02)
Negative Affect Mean	-.03 (.03)	.02 (.02)	.03 (.03)	.02 (.02)
Negative Affect Variability	-0.00 (.07)	.03 (.04)	.05 (.06)	.07 (.04)
Negative Affect Inertia	.01 (.03)	-.03 (.02)	-.01 (.03)	-.02 (.02)
Negative Affect Instability	.03 (.04)	-.04 (.02)	.03 (.03)	-.03 (.02)
Observations	4,334	2,451	4,334	2,449
Log Likelihood	2,582.34	2,306.76	2,926.67	2,505.40
Akaike Inf. Crit.	-5,124.68	-4,573.52	-5,813.35	-4,970.80
Bayesian Inf. Crit.	-4,997.19	-4,457.44	-5,685.86	-4,854.7

Note. Values are for fixed effects (γs) with standard errors. The model contains Level 1 (Weekly) affective dynamic features that are centered by subtracting with corresponding individual overall affective dynamic feature. The Level 2 variables represent Overall affective dynamic features that are grand mean centered. Values in parentheses are standard errors.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.