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Citation

Within-Person Job Performance Variability Over Short Timeframes: Theory, Empirical Research, and Practice

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Abstract

We begin by charting the evolution of the dominant perspective on job performance from one that viewed performance as static to one that viewed it as dynamic over long timeframes (e.g., months, years, decades) to one that views it as dynamic over not just long but also short timeframes (e.g., minutes, hours, days, weeks)—and that accordingly emphasizes the within-person level of analysis. The remainder of the article is devoted to the newer, short-timeframe research on within-person variability in job performance. We emphasize personality states and affective states as motivational antecedents. We provide accessible reviews of relevant theories and highlight the convergence of theorizing across the personality and affect antecedent domains. We then focus on several major avenues for future research. Finally, we discuss the implications of these perspectives for personnel selection and performance management in organizations as well as for employees aiming to optimize their job performance.

Keywords

Job performance, within-person, within-subject, intraindividual, personality states, state affect

According to Socrates, the sages were in virtual consensus that "all things [are] the offspring of flux and motion" (Plato 1992, p. 15). Although it is probably safe to assume that the sages did not specifically have job performance in mind, job performance certainly exhibits considerable flux and motion—or, to be more specific, considerable variability within a given employee across time and situations. Studying job performance as static, and focusing only on between-person variability in performance, therefore yields an incomplete picture.

We define job performance as employee behavior that is relevant to the accomplishment of organizational goals (see also Campbell 1990, Campbell & Wiernik 2015). Such behavior includes, at a minimum, task performance ("[behavior] that [contributes] to the production of a good or the provision of a service"), organizational citizenship behavior (OCB; "behavior that contributes to the goals of the organization by contributing to its social and psychological environment"), and counterproductive work behavior [CWB; "voluntary behavior that harms" or is intended to harm "the well-being of the organization" and/or its stakeholders (Rotundo & Sackett 2002, pp. 67–69)]. Job performance has also often been posited to include proactive behavior ("anticipatory action that employees take to impact themselves and/or their environments"; Grant & Ashford 2008, p. 8), creative behavior ("the production of novel, useful ideas or problem solutions"; Amabile et al. 2005, p. 368), and adaptive performance ("behavioral modifications made in response to the demands of a new or changing environment, or situational demands"; Baard et al. 2014, p. 50). Because our focus is on work behavior relevant to organizational goals, we use the terms behavior and performance interchangeably. In contrast, we—following other performance researchers (e.g., Campbell 1990)—use the term effectiveness to describe the results of performance (e.g., dollar amount of sales for a salesperson). Although we make a distinction between performance and effectiveness, and although comparatively little existing research discusses within-person variability in effectiveness at the timeframes of interest here, we do discuss effectiveness wherever possible.

We review the existing research on short-timeframe within-person variability in job performance. We begin by providing a brief historical overview, charting the evolution of the dominant perspective from one that viewed job performance as static to one that viewed it as dynamic over longer timeframes (e.g., months, years, and decades)1 to, most recently, one that views it as dynamic simultaneously over not just long but also short timeframes (e.g., minutes,

hours, days, and at most weeks). We then provide a rationale for studying within-person performance variability over short timeframes. After that, we discuss important antecedents of within-person performance variability over short timeframes. In particular, we focus on the impact of personality states (versus traits) and affective states, in conjunction with work situations, on momentary job performance. We then turn to future research directions, necessary research designs and data-analytic techniques, and, finally, suggestions for practice.

LONG-TIMEFRAME JOB PERFORMANCE VARIABILITY AND ITS ANTECEDENTS: A BRIEF HISTORICAL OVERVIEW

The question of whether job performance is static or variable over longer timeframes (e.g., months, years, or decades) is closely linked to the research on dynamic criteria (e.g., Hulin et al. 1990, Sturman 2007). The concept of dynamic criteria denotes "changes in the rank-ordering of individuals in their performance over time" (Barrett et al. 1985, p. 51) and has been studied extensively in the organizational and educational psychology domains. To shed light on whether performance changes over time, Sturman et al. (2005) conducted a meta-analysis of 22 longitudinal between-person samples. Importantly, they made a distinction between stability (i.e., degree to which the true performance score stays the same over time) and temporal consistency (i.e., degree to which observed performance measures correlate over time). Accordingly, they were able to disentangle the degree to which the change in measured performance over time is a result of error in the measurement of performance versus real change in performance. Stability over a 1-year time lag varied from 0.67 to 0.85 (depending on type of performance measure and job complexity), whereas temporal consistency ranged from 0.36 to 0.59. So, despite some stability, the main conclusion is that performance is a dynamic construct.

Apart from examining the stability of job performance, the body of research on dynamic criteria has inspired theoretical models explaining why such dynamism exists as well as empirical studies of long-timeframe antecedent–performance relationships. Below, we focus on such theorizing and long-timeframe empirical research related to two major performance antecedents, ability and motivation, consistent with the classic formulation that ability represents the capacity to perform and motivation represents the willingness to perform (Campbell 1990, Van Iddekinge et al. 2018). However, we also recognize a third determinant—the work situation, which represents the opportunity to perform, and which influences the extent to which ability and motivation can influence performance (Blumberg & Pringle 1982).

In the ability domain, the evidence has swayed over the years in favor of a changing-task model (i.e., the importance of specific abilities as determinants of performance fluctuates over time due to changes in work tasks), as compared to a changing-person model (i.e., people's abilities develop over time; Alvares & Hulin 1972). For example, Ackerman's (1988) theory of skill acquisition is a variant of the changing-task model. Ackerman's model posits that general mental ability plays a particularly important role in early learning stages but becomes less important as task experience increases. Keil & Cortina's (2001) meta-analysis found some support for these propositions, with task consistency serving as a key moderator. Recently, Dahlke et al.'s (2018) multiwave study of four years of students' cognitive test scores and four years of those students' college grades also emphasized the role of changes in the performance requirements and the criterion domain for the decreasing criterion-related validities of cognitive abilities (see also Reeve & Bonaccio 2011).

Murphy (1989) developed another variant of the changing-task model. His stage model of performance posits that the importance of ability and motivation as determinants of performance differs across job stages because the situational characteristics of jobs change over time. In the transitional job stage, there is a need to learn new things and thus cognitive ability is proposed to be an important determinant of performance. Conversely, this is less the case in the more routine maintenance job stage in which motivation and more specifically personality are expected to emerge as performance predictors. Thoresen et al. (2004) tested Murphy's model and found mixed support for it. Lievens et al.'s (2009) longitudinal follow-up of a medical student cohort provides another example of different personality traits emerging as determinants of performance due to shifting performance requirements across time. For example, Lievens et al. reported the most marked change for extraversion. In the early preclinical years, this trait was a negative predictor of performance. Yet, when students' interpersonal interactions with patients increased in the clinical and clerkship years, extraversion became a significant positive predictor.

In the motivation domain, most research on long-timeframe performance variability has focused on personality. Research on long-timeframe personality change (e.g., Baltes 1997, Roberts et al. 2006) has taken a somewhat different route from the previously described research on long-timeframe ability change. Although the personality research has also emphasized theoretical models and the empirical study of long-timeframe changes in ability and personality (and therefore, implicitly, in performance), the differences are that this research has been based on variants of the changing-person model and that reciprocal effects of the environment on personality are also factored in. Baltes's (1997)

metatheory of selective optimization with compensation provides a variant of the changing-person model in that the person's abilities and motivation (including personality), and as a result performance, change over time as a function of age (as opposed to task tenure/practice), thereby questioning the stability perspective (see Moghimi et al. 2016 for a review). Roberts et al.'s (2006) seminal study on long-timeframe personality change also challenged the idea that personality is stable. These authors demonstrated that people become more conscientious, more extraverted, and less neurotic over time. Across the life span and trait domains, this might amount cumulatively to one standard deviation (Roberts & Mroczek 2008). Although the social investment principle (young adults' increased commitment to roles within social institutions, such as family and work; Roberts et al. 2008) has emerged as a general explanation for personality maturation during young adulthood (20 to 40 years), Tasselli et al. (2018) posited that, in organizational settings, personality can more generally change due to both self-driven and external processes. Whereas self-driven processes refer to self-development and self-actualization, external events relate to phenomena such as unemployment (Boyce et al. 2015), major career stages (e.g., leaving college, early career, mid-career, retirement; see Woods et al. 2013 for a review), and specific situational factors (e.g., work experiences, mobility across cultures, work autonomy, and coworker relationships; see Tasselli et al. 2018 for a review). As regards the influence of within-person personality change on job performance, Ng & Feldman (2013) suggested that the increases in conscientiousness and agreeableness likely lead to higher task performance and OCB as well as lower CWB across the lifespan.

WITHIN-PERSON JOB PERFORMANCE VARIABILITY OVER SHORT TIMEFRAMES

As the previous section suggests, the job performance literature has begun to appreciate the importance of within-person variability across time and situations. This is arguably overdue, given that recent meta-analytic work suggests that an appreciable portion of the variability in job performance is attributable to within-person sources. McCormick et al. (2019) estimated that, on average across studies, 48%, 42%, and 41% of the variability in task/job performance, CWB, and OCB, respectively, was attributable to within-person factors. Using a larger corpus of research, but also potentially somewhat different conceptualizations of the forms of job performance,2 Podsakoff et al. (2019) obtained relatively similar estimates of 50%, 45%, and 45% for task/job performance, CWB, and OCB, respectively. By and large, then, these meta-analyses suggest that slightly under half the variability in various forms of job performance appears to be attributable to within-person sources. However, although meta-analyses often have a stifling effect on future primary studies, there are two reasons why these meta-analytic estimates should be viewed instead as catalysts for additional primary studies.

First, it seems reasonable to expect that estimates of within-person variability will be influenced by various substantive factors.3 This is a poorly understood area, and therefore fertile ground for future research. Due to space constraints, we limit ourselves to mentioning that Podsakoff et al.'s (2019) aforementioned meta-analytic estimate of within-person variability in task/job performance excluded studies of effectiveness. In fact, compared to performance (i.e., behavior), effectiveness (i.e., the results of performance) is considered to be influenced to a greater extent by situational factors (Campbell 1990). Therefore, estimates of within-person variability may differ for studies of performance versus effectiveness. This may explain why an earlier meta-analysis (Dalal et al. 2014), which combined studies of effectiveness with studies of performance, yielded higher estimates of within-person variability in task performance (62%) and overall job performance (64%).4

Second, the levels of analysis described in these estimates are not precise. The between-person level conflates that level with all higher levels (e.g., the between-team level, the between-organization level, and indeed the between-country level). Without meta-analytic estimates that disentangle performance variability at different levels of analysis, researchers are limited in their ability to isolate the effects of factors emanating at each higher level of analysis on within-person performance variability. Similarly, the within-person level conflates within-person variability attributable to multiple timeframes. It is likely that, were studies to be conducted along multiple timeframes (e.g., minutes, hours, days, weeks, months, years, and decades) simultaneously, we would find not only different (probably higher) amounts of within-person performance variability but also different magnitudes of antecedent–performance relationships. For example, knowledge, skills, abilities, and personality traits, which do not vary appreciably within short timeframes, should be more important antecedents of job performance at longer timeframes, whereas personality states and affective states should be more important antecedents at shorter timeframes. We discuss research designs emphasizing multiple timeframes in the section titled Necessary Research Designs and Data-Analytic Techniques.

Studying within-person performance variability at short timeframes is important for two additional reasons. First, research over several decades in various domains (e.g., psychophysics, learning) suggests the existence not only of short-timeframe within-person variability in behavioral responses (e.g., their magnitude, intensity, latency, and quality)

but also of individual differences in this within-person variability, such that the characteristic amount of within-person variability in behavior over time is greater for some people than for others (Fiske & Rice 1955). Moreover, research on habitual or routinized behavior suggests that the automation of behavioral responses to situational cues—in other words, the hard-wiring of "if [short-timeframe situation], then [behavior]" contingencies—may serve as a basis for these individual differences in behavioral variability (Wood & Rünger 2016). We discuss both situation-behavior contingencies and individual differences in within-person performance variability in more depth below, the former primarily in the context of our discussion of the cognitive-affective processing (or personality) system (CAPS) and the latter primarily in the section titled Beyond the Mean: Additional Individual Differences in Job Performance.

Second, studying short-timeframe performance variability could improve our understanding of the mechanisms that underlie the discrepancies between actual performance levels and performance ratings (e.g., Murphy 2008). Job performance ratings in organizations involve judgments of one's own, another employee's (e.g., a subordinate's), or a team's performance within a given time period. Forming such judgments involves remembering the individual performance episodes that collectively compose the focal time period (e.g., one year in the case of annual performance appraisals) and then combining those memories into a single evaluation—both of which are cognitively taxing processes (e.g., Kahneman 2000). Prior work in the judgment and decision-making area suggests that, when forming retrospective evaluations of past experiences, people cope with their cognitive limitations by relying on representative experiences or Gestalt characteristics of experience profiles instead of considering every single individual experience (Ariely & Carmon 2000). A subset of the Gestalt characteristics literature—namely, the literature on the peak-end rule (Ariely & Carmon 2000, Kahneman 2000)—suggests that, when retrospectively evaluating a sequence of past experiences with variable intensities, instead of considering all of the experiences in the sequence equally, people draw heavily from the peak (i.e., the most extreme) and the end (i.e., the final) experiences (for reviews, see Fredrickson 2000, Kahneman 1999).

Moreover, the research literature on dynamic performance appraisals (e.g., Lee & Dalal 2011, Reb & Cropanzano 2007, Rudolph et al. 2015) is essentially an application of the Gestalt characteristics literature to performance ratings. This literature, however, has not typically focused on performance variability at timeframes shorter than weeks, even though the aforementioned peak-end effect often appears to operate within shorter timeframes such as minutes, hours, and days. For instance, the literature on episodic memory suggests that the memory of an experience shows a sharp decline within hours after the experience and fades away completely within just a few weeks after the experience (Robinson & Clore 2002). As such, a focus on shorter-timeframe variability can allow researchers to better examine the peak-end rule as it applies to job performance.

Our review therefore focuses particularly on variability over short timeframes: that is, minutes, hours, days, or at most weeks, rather than months, years, or decades. Consistent with previous definitions (Alaybek & Dalal 2019, Dalal et al. 2014), we define performance variability as the change in an employee's performance levels over time and/or across situations. A further distinction is often made between different forms of within-person performance variability. Specifically, cycles refer to "approximately sinusoidal functions containing recurring peaks and troughs"; trends refer to linear or nonlinear (also referred to as growth curves) increases or decreases; and discontinuities, which include but are not limited to peaks and troughs, refer to sudden, event-driven changes in the direction and/or magnitude of performance levels (Dalal et al. 2014, p. 1400).

Important Antecedents of Within-Person Performance Variability over Short Timeframes

In this section (see also Table 1), we discuss theoretical developments and empirical studies on key antecedents of within-person job performance variability over short timeframes. We do not aim to provide an exhaustive review of antecedents (for that, see Alaybek & Dalal 2019, Dalal et al. 2014). For instance, as indicated in the previous section, given that we are focusing on short-timeframe variability, and given that knowledge, skills, and abilities are not expected to be important antecedents to short-timeframe performance variability (see, however, Dalal & Sheng 2019), we focus on two major categories of antecedent constructs—personality and affect—that fall within the motivation domain and that have been shown to predict performance variability over short timeframes. Our purpose, in focusing on personality and affect specifically, is not only to provide accessible reviews of relevant theories but also to depict the recent evolution of theorizing within, and the convergence of theorizing across, these two antecedent categories. Moreover, because many of these newer theoretical perspectives on personality and affect originated from outside organizational psychology and organizational behavior, extending these perspectives to organizational settings in and of itself opens up several important avenues for future research.

In addition, despite the importance of situational factors for the models of within-person performance variability, we do not review situational antecedents separately. This is because the prior work that examined the impact of situations on

short-timeframe within-person performance variability has frequently relied on theories involving personality and/or affect. We therefore follow suit, although we return to the role of situations in the section titled Future Research Directions.

Table 1: Within-person theories involving personality and affect antecedents of job performance variability over short timeframes

Name of theory	Brief summary of theory	Applications within the job performance domain
CAPS (Mischel & Shoda 1995)	Identical situational characteristics can result in different perceptions and, ultimately, different behavior across people. Within a given person, there exists a stable "if [situation], then [behavior]" signature.	Koopman et al. (2016), Minbashian et al. (2010)
Density distributions theory (Fleeson 2001, Fleeson & Jayawickreme 2015)	Temporal density distributions of personality represent short-timeframe fluctuations in personality that can be observed as situation-specific behavioral expressions of traits. These density distributions differ reliably across persons, suggesting within-person personality variability versus consistency as a stable individual difference. Within-person personality variability and personality mean score can additively and interactively predict within-person variability in job performance.	Debusscher et al. (2016), Judge et al. (2014)
Personality strength theory (Dalal et al. 2015)	Personality strength, defined as the forcefulness of internal cues regarding the desirability of potential behaviors, is associated with lower variability in situations experienced over time (via situational choice, shaping, and interpretation) and, consequently, lower within-person performance variability over time. Personality strength may also weaken the impact of situational variability on performance variability.	Green et al. (2019)
AET (Weiss & Cropanzano 1996; see also Cropanzano et al. 2003) and related theories [e.g., broaden-and-build theory (Fredrickson 2003); episodic process model (Beal et al. 2005)]	Discrete workplace events cause discontinuities in employees' mood cycles (e.g., a sudden increase in negative or positive affect). These discontinuities, in turn, influence employee performance. Increases in negative emotions yield virtually immediate increases in CWB. Increases in positive emotions improve receptivity to new information, build resource capacity, and yield gradual increases in OCB as well as creative and proactive behavior. Changes in affect yield within-person variability in task performance through attentional pull and affect regulation.	Beal et al. (2005), Matta et al. (2014), Merlo et al. (2018), Weiss & Beal (2005)

Abbreviations: CAPS, cognitive-affective processing (or personality) system; CWB, counterproductive work behavior; OCB, organizational citizenship behavior.

Personality

In the traditional definition of traits, the notions of stability (across time) and consistency (across situations) constitute pivotal features (Allport 1927). Recently, the issue of within-person stability and consistency versus within-person variability has witnessed a marked resurgence of interest due to two main theories: (a) CAPS and (b) density distributions theory. We discuss each of these theories and then a newer theory, personality strength theory.

CAPS (Mischel & Shoda 1995) is a theory relevant to understanding within-person fluctuations in behavior across situations. According to CAPS, people's behavior results from how people perceive and process situational characteristics. That is, situational features engender cognitive and affective units (encoding strategies, self-regulatory strategies, expectancies and beliefs, goals and values, and affective responses), which lead to different construals of the situational features between individuals. As such, this theory builds on the longstanding distinction between objective situations (as consensually defined by people who experience those situations) and psychological situations (a person's unique construal of the situation, as influenced by his or her personality; Dalal et al. 2015).

The theory originated from observing and coding the interactions of a group of boys at a summer camp. Although there was little consistency in behavior across situations for the whole group, individual boys showed consistent behavior patterns in specific situations. For example, some boys expressed hostility when reprimanded by adults, whereas others expressed hostility when teased by peers. Thus, individual boys varied consistently in their behavior across situations,

depending on how they perceived the situational features. Since Mischel & Shoda's (1995) original study, several studies in the personality and interpersonal domain have confirmed these findings (see, e.g., Church et al. 2013, Fournier et al. 2009). In the organizational psychology and organizational behavior literature, Minbashian et al. (2010) found that people whose state conscientiousness was more contingent on task demands performed better because they were able to increase their conscientiousness-related behavior in the face of more urgent and more difficult tasks. Koopman et al. (2016) integrated CAPS with conservation of resources theory (Halbesleben et al. 2014) to examine employees' daily engagement in OCB as an antecedent to employee well-being. They argued that employees could perceive engagement in OCB as a resource-generating event, thereby increasing positive affect, or as a resource-consuming event, thereby decreasing perceptions of work goal progress. Accordingly, the within-person relationship between daily OCB and well-being could be positive (mediated by positive affect) or negative (mediated by perceived work goal progress).

CAPS therefore posits that identical situational characteristics can result in different cognitions and affects and, ultimately, different behavior across people. For example, criticism from a supervisor might be interpreted as a threat to job security by Employee A, who then engages in CWB, but as a learning opportunity by Employee B, who then engages in OCB. Within each person (e.g., Employee A), however, there exists a stable pattern of reacting to specific situations, given the person's unique perception of the situational characteristics. This stable pattern of variability is referred to as the behavioral signature of the personality. As such, behavioral signatures of personality denote stable within-person "if [situation], then [behavior]" patterns that differ between persons.

Density distributions theory (Fleeson 2001, Fleeson & Jayawickreme 2015) is the second theory that has led to a surge of recent interest in within-person variability in personality. According to the theory, personality states denote short-timeframe fluctuations in personality-relevant behavior that can be observed as situation-specific expressions of traits. Fleeson (2001) used experience sampling methods to assess consistency directly. He monitored individuals' behavior relative to the Big Five personality traits (extraversion, conscientiousness, agreeableness, neuroticism, and openness to experience) across more than 50 observations in a two-week period. Subsequent meta-analytic findings by Fleeson & Gallagher (2009) suggest that between 49% and 78% of the variability in personality trait expression actually occurs within individuals across situations rather than between individuals. Importantly, this line of research has additionally demonstrated that not only the mean but also the variance of the temporal density distributions of personality differs reliably across persons. This has led to the suggestion that the extent of within-person variability versus consistency should itself be regarded as a stable individual difference.

To clarify, personality states do not negate the existence of personality traits. In fact, Fleeson (2001) argued that the personality trait should be thought of as the mean level of personality states across situations or timepoints. Fleeson & Jayawickreme (2015) referred to such a trait conceptualization as "whole trait theory" because both consistency and within-person variability across situations are considered to be meaningful substantive sources of trait information. The overarching idea is that although the conventional view of traits provides a useful summary of a person's general behavioral tendencies across many situations (e.g., his or her average level of conscientiousness), additional information can be obtained if we know how much variability in trait expression a particular person displays across various situations (Huang & Ryan 2011).

For example, Employee A and Employee B might have identical mean (trait) levels of conscientiousness across situations. However, Employee A might exhibit high conscientiousness consistency across situations (i.e., a narrower and higher-peaked distribution of conscientiousness), whereas Employee B might exhibit low conscientiousness consistency (i.e., a broader and lower-peaked/flatter distribution). Thus, an important conceptual benefit of density distributions theory is that it has moved beyond the conventional trait (or mean across occasions) level of personality and has embraced the study of within-person consistency (versus variability) across time or situations in state levels of personality. Whereas individual differences in personality traits are a force for stability, individual differences in within-person personality consistency are a force for stability in variability (Fleeson & Jayawickreme 2015).

These ideas have also made inroads into our field. For example, Judge et al. (2014) found that within-person models of agreeableness, conscientiousness, and extraversion that included autoregressive, concurrent, and cross-lagged effects explained approximately 50% of the within-person variance in daily OCB. As another example, Debusscher et al. (2016) measured employees' state personality levels during work hours and found that within-person conscientiousness variability weakened the positive relationship between state conscientiousness and momentary task performance.

There is no inherent discrepancy between CAPS and density distributions theory. In fact, the latter builds upon the former. Specifically, in density distributions theory, the "if [situation], then [behavior]" patterns—and the individual differences therein—that are the focus of CAPS refer to the explanatory aspect of personality that underlies the

descriptive aspect of personality: namely, the density distribution of trait-relevant behavior (Fleeson & Jayawickreme 2015).

Personality strength theory (Dalal et al. 2015) is a recent organizational psychology and organizational behavior theory that builds on CAPS and density distributions theory by further emphasizing individual differences in personality variability across time and situations. Dalal et al. defined personality strength as "the forcefulness of implicit or explicit internal cues regarding the desirability of potential behaviors" and argued that "a strong personality…reduces variability in behavior across situations within persons, thereby inoculating one's behavior from the impact of the situation" (p. 263, emphasis in original). Their theoretical model, which aimed to encapsulate various research literatures (e.g., self-monitoring, traitedness, self-concept clarity), delineated the effects of individual differences in personality strength. These effects include within-person variation in both objective and subjective (perceived) situations experienced over time as well as, ultimately, within-person variation in job performance over time. Specifically, Dalal et al. proposed that, compared to weak personalities, strong personalities not only experience a weaker impact of experienced situations on job performance but also that—prior to this—they more actively choose, shape, and interpret situations to be homogeneous (specifically, trait-level-consistent) with regard to their behavioral requirements. A recent empirical test (Green et al. 2019) found substantial support for this model in the prediction of within-person variability in OCB. Thus, as with CAPS and density distributions theory, personality strength theory expands the traditional definition of traits beyond purely dispositional models. All three theories assert, consistent with empirical evidence, that variability in personality—and in turn behavior/performance—across situations and time is meaningful rather than artifactual.

Affect

The most influential theoretical framework pertaining to within-person variability in job performance is affective events theory (AET; Weiss & Cropanzano 1996). The theory includes a between-person Situation → Attitude → Behavior pathway that is consistent with traditional (static) thinking in organizational psychology and organizational behavior. This between-person pathway involves features of the work situation that differ between rather than within jobs. These features of the work situation lead to between-person differences in job attitudes (e.g., job satisfaction) and, ultimately, to between-person differences in turnover and related behavior.

However, the novel portion of AET is its second, parallel, within-person Event → Affect → Behavior pathway. In this pathway, the work situation is represented by events whose occurrence varies within persons over time. These events, via an appraisal process, have affective implications (hence the name of the theory), thereby disrupting the baseline physiologically- and location/activity-driven system consisting of affect cycles of multiple periodicities (e.g., daily and weekly cycles). These event-driven changes in affect in turn lead to momentary changes in levels of behavior corresponding to many forms of job performance.

AET was developed as a way to shift the paradigm from studying the effects of stable situations (and dispositions) to studying the effects of volatile events (Weiss & Beal 2005). The theory's major contribution, therefore, is that researchers today more often understand and study affect and behavior as dynamic constructs rather than dispositionalizing them by studying them as constructs that are static within, and that vary only between, people. Weiss & Beal (2005) therefore suggest that AET has done for affect what CAPS (Mischel & Shoda 1995) did for personality: Both theories take within-person variability in behavior and its motivational antecedents seriously rather than treating it as error.

However, AET was intended as an organizing framework rather than as a source of precise predictions regarding structures, processes, and timeframes (Weiss & Beal 2005). Additional research was and is therefore needed to essentially fill in the blanks. Although a start has been made in this regard, much remains to be done (Weiss & Beal 2005). We discuss structures, processes, and timeframes in turn.

With regard to structures, research has recently begun to examine the structure of work events. For example, Ohly & Schmitt (2015) identified 11 clusters of affective work events that can be mapped onto relevance to the personal values of agency and communion. Additionally, Morgeson et al.'s (2015) event system theory contends that event strength is a function of event novelty, disruption, and criticality.

Importantly, these efforts to understand the structure of work events were influenced by AET. In contrast, research on the structure of affect has a longstanding history that comfortably predates AET (and indeed is summarized in Weiss & Cropanzano's 1996 seminal AET paper). Unfortunately, however, this literature has been bogged down in vociferous yet seemingly interminable debates about the nature of factors (e.g., hedonic tone and activation versus positive affect

and negative affect) and the type of structure (e.g., circumplex versus 3-level hierarchy; Cropanzano et al. 2003). The lack of progress in this area is an obstacle to understanding within-person (or for that matter between-person) Affect → Behavior relationships.

In addition, the structure of job performance is not well understood at the within-person level. Given that there is no guarantee that structures are isomorphic across levels of analysis (Molenaar & Campbell 2009), and given the paucity of empirical work aimed at determining the factor structure of job performance at the within-person level, it is unclear whether the between-person structure will be replicated at the within-person level (Dalal 2005, Dalal et al. 2009). Finally, the importance of the structure of affect and that of job performance can also be seen through patterns of Affect → Behavior relationships. For example, Spector & Fox (2002) suggested that positive affect is particularly likely to facilitate OCB rather than inhibiting CWB, and that negative affect is particularly likely to facilitate CWB rather than inhibiting OCB (for supportive evidence, see, e.g., Dalal et al. 2009).

With regard to processes, a perusal of boxes-and-arrows models provided in the empirical within-person job performance literature reveals a procession of Event → Affect → Behavior models consistent with AET, albeit often with additional refinements. For instance, Matta et al. (2014) invoked emotion regulation strategies—or, rather, individual differences therein—to argue that Event → Negative Affect relationships would be weaker among employees who habitually used the reappraisal strategy, whereas Negative Affect → CWB relationships would be stronger among employees who habitually used the suppression strategy.

Beal et al. (2005) provided a more dramatic contribution in terms of processes with their episodic process model linking momentary affective experiences to momentary changes in task performance. They contended that, within the context of a performance episode, on-task (versus off-task) focus is influenced proximally by the self-regulation of attention. Task-relevant affect, however, is a distal (but important) predictor that acts through various constructs such as task attentional pull, off-task attentional demands, and affect regulation. In a partial empirical test of this model, Merlo et al. (2018) demonstrated that Affect → Performance relationships were mediated by the attention-related constructs of difficulty focusing and time on task.

Little work thus far has been conducted on Event → Affect → Behavior timeframes, but an exception comes from the aforementioned literature on the underlying affect cycles that are disrupted by the workplace events that are the focus of AET. This research on cycles (see Watson 2000 for a review) supports the existence of affect cycles at multiple timeframes simultaneously: for instance, annual (seasonal) cycles overlaid on weekly cycles overlaid on daily cycles. In terms of Affect → Behavior relationship timeframes, we also specifically highlight Fredrickson's (2003) broaden-and-build theory. This theory uses an evolutionary perspective to suggest that Affect → Behavior timeframes are shorter (more-or-less immediate) for the relationships between negative affect and forms of job performance such as CWB, whereas the corresponding timeframes are slightly longer (gradual) for the relationships between positive affect and forms of job performance such as creative behavior, proactive behavior, and OCB.

FUTURE RESEARCH DIRECTIONS

Much work is needed in several areas of the performance variability literature for a more complete understanding of when, how, why, and at which levels of analysis performance variability occurs. In the current section (see also Table 2), rather than providing a comprehensive listing of future research directions related to within-person performance variability (for that, see Alaybek & Dalal 2019, Dalal et al. 2014), we focus on future research directions relevant specifically to shorter-timeframe variability.

Table 2: Avenues for future research

Future research domain	Research questions within each domain	How to investigate these research questions
Examine the within-person structure of job performance	To what extent does the within-person structure of job performance resemble the between-person structure? Moreover, is the within-person structure of job performance the same at multiple timeframes: for instance, minutes, hours, days, weeks, months, years, and decades?	Design "measurement burst" (Sliwinski 2008, Sliwinski et al. 2009, Stawski et al. 2016) studies to obtain performance data from the same individuals across multiple short and long timeframes. Use data-analytic techniques such as chain P-technique (Cattell 1963), dynamic (Nesselroade et al. 2002), and/or multilevel (Reise et al. 2005) factor analysis.
Articulate the antecedent-performance causal cycle (Mitchell & James 2001)	What are the timeframes during which an increase in the antecedent leads to the following in the performance construct: no change, an increase, an equilibrium, and a decrease back to baseline? Under what circumstances do antecedent-performance relationships exhibit sleeper effects or opponent-process effects?	Increase the precision of theoretical propositions (Edwards & Berry 2010) by articulating propositions about each stage of the antecedent-performance causal cycle. This requires elaboration of and integration across antecedent-performance theories with the aim of understanding the forms of variability posited and the timeframes across which they are posited to operate.
Consider job performance as an antecedent (rather than only as an outcome)	What are the within-person outcomes of job performance? With which constructs does performance have a reciprocal within-person relationship, such that it is simultaneously an antecedent and an outcome?	Make use of two types of theories that are likely to be particularly useful here. First, some theories (e.g., Spector & Fox 2010a,b) consider an instance of job performance (e.g., enacting CWB at time t) to itself be an affective event. Under this framework, AET and related theories can be recast as theories of the relationship between an instance of performance at time t and an instance of either that same form or another form of performance at time $t + 1$. Second, Antecedent → Performance theories that include feedback loops or bidirectional relationships (e.g., Spector & Fox 2002) can be elaborated upon to generate reverse-direction (i.e., Performance → "Antecedent") predictions.
Emphasize individual difference variables resulting from within-person variability	What is the impact of the many possible variability-related individual differences in personality and affect (e.g., instability, inertia, spin, attractor strength, daily cycle) on job performance?	Apply theories such as the DynAffect and PersDyn models (Kuppens et al. 2010, Sosnowska et al. 2019) to the prediction of momentary job performance. Examine the possibility of corresponding variability-related individual differences in job performance itself.

Future research domain	Research questions within each domain	How to investigate these research questions
Understand the role of the situation in explaining short-timeframe within-person job performance variability	What are the ways in which work situations (in conjunction with personality and affect) influence momentary job performance?	Move away from ad hoc, idiosyncratic conceptualizations of situations by using intact situational taxonomies. Studies of events may benefit most from using taxonomies of work events (e.g., Morgeson et al. 2015, Ohly & Schmitt 2015), whereas studies of both chronic and transient situations at multiple levels of analysis may benefit most from using more general taxonomies of situations (e.g., Rauthmann et al. 2014). Use these taxonomies to examine (and compare) various theory-driven within-person effects of situations on job performance: for instance, a Situations → Affect/Personality → Performance effect, a Personality → Situations → Performance effect, an effect of Situations on Performance Variability, and a moderating effect of Situations (at multiple levels of analysis) on Personality → Performance relationships. Use the taxonomies also to examine whether situations influence effectiveness (results of performance) to a greater or lesser extent than they influence performance (behavior) itself.
Study performance variability at levels of analysis higher than the individual employee	What are the antecedents of within-team and within-organization performance variability over short timeframes? What is the relationship between within-team performance variability and the within-person performance variability of the team's members?	Generate theoretical propositions by extending within-person theories such as AET to the team level (e.g., to study group affect; Barsade & Knight 2015) and/or by using inherently within-team theories (e.g., Marks et al. 2001). Operationalize within-team performance variability using team-level key performance indicator scores collected continuously by technology, via repeated team-level performance ratings by team leaders, or via repeated team-member performance scores that are aggregated to the team level. Use similar ideas to examine performance variability at even higher levels of analysis, such as the within-organization level.
Explore alternatives to self-report data	To what extent does an exclusive reliance on self-report data (e.g., in experience sampling studies) influence substantive conclusions? To what extent do differences reflect various explanations: for instance, same-source bias (when using only self-report data) versus the appropriateness of various approaches for measuring job performance components (e.g., CWB may be better measured through self-reports than supervisor-reports; Berry et al. 2012)?	Explore alternatives to self-reports of the antecedents of job performance: for instance, information about location (as an objective measure of one aspect of the situation) obtained from wearable sensors or mobile phones. Additionally, explore alternatives to self-reports of job performance (or effectiveness) itself: for instance, daily sales volume for a salesperson (a measure of effectiveness), observer coding of organizational-goal-relevant behavior from videos, and—for studies lasting only a few minutes—continuous rating assessments via other-reports.

Abbreviations: AET, affective events theory; CWB, counterproductive work behavior.

Variation Versus Covariation

Within-person performance variability research has typically focused on the density distributions of the antecedents of job performance or of job performance itself. These efforts led to the previously discussed meta-analytic estimates of the proportion of variation in various forms of performance attributable to within-person sources (McCormick et al. 2019, Podsakoff et al. 2019). Moreover, as discussed previously, the structure of job performance is not well understood at the within-person level. Therefore, one direction for future research involves establishing the structure of job performance and its antecedents across the between-person and within-person levels, which would allow us to understand the density distribution of these constructs in their totality.

Another direction for future research involves expanding the current focus on density distributions to antecedent-performance causal cycles. Just as researchers need to understand the density distribution of job performance, which reflects the shape of the distribution of within-person variation in job performance, they also need to understand antecedent-performance causal cycles, which reflect the shapes of the covariation functions between antecedents and

performance. More specifically, the causal cycle (Mitchell & James 2001) summarizes the timeframes during which a change in the level of one construct exerts an impact on another construct that is at first negligible, then increases, then remains relatively stable, and finally decreases. Thus, studying the antecedent-performance causal cycle involves conceptually integrating the forms of the relationships and the timeframes within which they are expected to occur into concrete, testable propositions. An example involves the aforementioned broaden-and-build theory (Fredrickson 2003), which could be reinterpreted as follows: Over a timeframe of up to several seconds, negative affect yields peaks in CWB, whereas over a timeframe of up to minutes, hours, or days, positive emotions yield linear or nonlinear trends in creative, proactive, and citizenship behavior.

McCormick et al. (2019) discuss how temporal theorizing can be fashioned into formal hypothesis statements. Specifically, the authors suggest that the hypothesis "Individuals' daily positive affect is positively related to their daily citizenship behavior over time" (Ilies et al. 2006, p. 564) could be reworded to posit "Individuals' experience of daily positive affective events is positively related to their daily citizenship behaviors for the 1 [hour] after the positive affective events occur. At the end of an hour, there is no relationship" (McCormick et al. 2019). In fact, in accordance with Mitchell & James's (2001) concept of the causal cycle, McCormick et al.'s example could in our view be specified even more precisely, as follows: "A single positive affective event leads to a quadratic (diminishing returns) increasing trend in citizenship behavior for the 1 hour after the positive affective event occurs. Near the end of the hour, citizenship behavior returns to baseline within a few minutes and there is no further effect of the event." Additional possibilities might include a sleeper effect (Pratkanis et al. 1988), such that the increase in citizenship behavior as a function of the positive affective event occurs after a time lag, and an opponent-process effect (Solomon & Corbit 1974), such that, when decreasing from its maximum level, citizenship behavior actually overshoots its baseline level briefly before returning to it. Future research could empirically assess possibilities such as these in the context of forms of job performance.

Reverse-Direction Temporal Relationships (Performance as an Antecedent)

Another avenue for future research involves examining within-person temporal relationships in a reciprocal determination framework that features performance, person factors, and situation factors as both causes and consequences, acting upon each other rapidly and reciprocally (Bandura 1983). Although a few longitudinal panel studies have examined reciprocal relationships of performance with other constructs, these studies have mostly been conducted at the between-person level. We argue that theories of reciprocal determinism are most effective at the within-person level, which inherently takes time into account. The premise behind this argument is that reciprocal relationships essentially involve feedback loops, wherein the person perceives the change in the level of performance as a deviation from a standard and reacts to this deviation by adjusting the level of another construct (e.g., personal performance goal). The change in the other construct, in turn, influences performance either by creating a bigger deviation from the standard (a positive feedback loop) or by reducing the deviation from the standard (a negative feedback loop). Exemplars of within-person research on reciprocal relationships include Vancouver & Purl's (2017) work on the relationship between self-efficacy and performance (see also Sitzmann & Yeo 2013) and Lord et al.'s (2010) work on negative feedback loops of self-regulation of work behavior and cognition. Of more direct relevance to the theories discussed in this review, Spector & Fox (2002) discuss bidirectional links between positive affect and OCB and between negative affect and CWB.

In addition, some theories (e.g., Spector & Fox 2010a,b) consider an instance of job performance by the employee himself or herself to constitute an affective event. Under this framework, AET and related theories can be recast as theories of the relationship between an instance of performance at time t (e.g., CWB at time t) and an instance of either that same form or another form of performance at time t + 1 (e.g., CWB or OCB at time t + 1), with the relationship being mediated by the employee's affective reactions to the first instance of performance. Thus, here performance is both cause and consequence. Overall, then, more theoretical and empirical within-person research is needed that casts performance as an antecedent to other variables.

Beyond the Mean: Additional Individual Differences in Job Performance

The between-person perspective on job performance suggests that trait levels of personality and affect drive characteristic levels of job performance. The within-person perspective suggests, as discussed previously, that both personality and affect can be thought of as motivational states that influence momentary job performance. However, the within-person perspective provides a conceptually richer way of thinking about even between-person research questions (Dalal et al. 2014). In particular, the within-person perspective suggests the existence of a plethora of potential

individual differences in personality and affect. Apart from the within-person perspective's perspective on the traditional concept of a "trait" (i.e., the average score from a temporal density distribution of states), several additional individual differences can be fashioned from a temporal distribution of personality or affect data.

One possibility alluded to previously is to consider within-person variability as an individual difference, given that it exhibits appreciable stability over time (Fleeson & Jayawickreme 2015). This, however, lends itself to various operationalizations, depending on the study's focus (e.g., variability versus instability versus inertia): for instance, the within-person standard deviation, coefficient of variation, relative variability index, root mean squared successive difference, skewness, and kurtosis (Mestdagh et al. 2018; see also Kuppens 2019, Kuppens & Verduyn 2017). A second possibility, suggested by the peak-end rule, is to examine individual differences in maximum (peak) and minimum (trough) levels of both performance and its antecedents. A third possibility is to examine individual differences in cycles at various periodicities (i.e., timeframes): for instance, individual differences in daily, weekly, and annual (seasonal) affect and hence performance cycles.

Researchers in social-personality psychology have also begun to adopt more systematic, model-based approaches to studying individual differences in personality and affect. One such approach involves three types of within-person variability—namely, flux, pulse, and spin—that are considered "dynamic additions to the personality lexicon" (Moskowitz & Zuroff 2004, p. 880). Flux is operationalized as the standard deviation around the mean in the four poles formed from two personality dimensions (e.g., dominance-submissiveness and quarrelsomeness-agreeableness) considered simultaneously. The information from the four poles is combined to form the pulse (i.e., "variability about an individual's mean extremity of behavior scores on the interpersonal circumplex") and spin (i.e., "variability about an individual's mean angular coordinate on the interpersonal circumplex") (Moskowitz & Zuroff 2004, p. 880). Kuppens et al. (2007) applied this idea to individual differences in affect, thereby conceptualizing affect pulse and affect spin constructs. Although these constructs have occasionally been invoked in the organizational psychology and organizational behavior realm (e.g., Beal et al. 2013), they have thus far rarely been invoked in the prediction of job performance specifically. An exception is Clark et al. (2018), who showed that daily affect spin predicts daily OCB.

Another approach, the DynAffect model, conceptualizes three individual differences in affect (Kuppens et al. 2010). The first individual difference pertains to the affective "home base," or "set point," representing a fixed-point attractor. In conventional parlance, this would reflect the trait level. The second individual difference pertains to event-driven variability around the home base. The third individual difference pertains to attractor strength—namely, regulatory processes that influence dynamic properties such as the duration of affective states, their inertia, and their return to the home base. This third individual difference is related to the idea of the emotion regulation strategy of reappraisal. The DynAffect model lends itself to specific operationalizations of these variability-related individual differences (Kuppens & Verduyn 2017). For instance, emotional inertia can be operationalized as the autoregressive effect of an emotion component over time. Most recently, the model has been extended from the domain of affect to the domain of personality (see Sosnowska et al.'s 2019 PersDyn model)—thereby reflecting a convergence in thinking regarding variability-relevant individual difference variables across the personality and affect domains.

Thus far, neither the DynAffect and PersDyn models in particular nor the various operationalizations of variability-related individual differences in personality and affect in general have been studied in the context of job performance. This presents a wealth of directions for future research. One possibility is that multiple variability-related individual differences will simultaneously exert effects on momentary job performance. For example, it may be that instances of CWB—via state negative affect—are particularly likely to be enacted by employees with high "home base" levels of negative affect as well as low attractor strength. A second—not mutually exclusive—possibility is that the variability-related individual differences in personality and affect (e.g., daily and weekly cycles) may find reflections in corresponding individual differences in job performance.

Impact of Work Situations on Within-Person Performance Variability

As can be seen from our review of theories of personality states (CAPS, density distributions theory, personality strength theory, and PersDyn) and affective states (AET and DynAffect), work situations result in within-person variability in the antecedents of job performance and, ultimately, in performance itself. However, as alluded to previously, the role of work situations in within-person performance variability is not yet well-understood. We discuss two important issues in turn: how work situations should be conceptualized, and what roles work situations might play in influencing within-person performance variability.

Conceptualization of work situations. The aforementioned personality and affect theories suggest the importance of transient situations, often in the form of events. An examination of boxes-and-arrows models in the short-timeframe

within-person performance variability literature also suggests the importance of events, albeit under a dizzying array of conceptualizations: Different studies have emphasized event valence (positivity versus negativity), event source (e.g., interpersonal versus organizational stressors), and a plethora of event types (e.g., upward and downward comparisons, mistreatment by customers, experiences of incivility, and instances of family-to-work conflict). Therefore, one option in terms of capturing situational content would involve the use of a taxonomy generated through recent research on the structure of work events (e.g., Morgeson et al. 2015, Ohly & Schmitt 2015).

Although events do occur at multiple levels of analysis (Morgeson et al. 2015), situations at the between-person level are often chronic rather than transient or event based (Weiss & Cropanzano 1996). From this perspective, a more general situational taxonomy—which can be applied to both chronic and transient situations—may be helpful when simultaneously studying multiple levels of analysis. A recent but increasingly influential taxonomy, which also has the benefit of being designed to be personality relevant, includes the situational dimensions of duty, intellect, adversity, mating, positivity, negativity, deception, and sociality (Rauthmann et al. 2014). Furthermore, although the previously discussed taxonomies describe the content of situations, it is also important to consider whether situations (regardless of content) are strong or weak, because strong situations attenuate and weak situations facilitate the behavioral expression of personality (Meyer et al. 2010).

Our overall point is not that one of the taxonomies discussed in this section is superior to the others but rather that future within-person performance research could benefit from adopting less idiosyncratic and instead more comprehensive, taxonomy-based perspectives. Depending on the specific goals of the study (e.g., a focus specifically on events versus a focus on situational characteristics that occur at multiple levels of analysis; a focus on situational content versus a focus on situational strength; a focus on personality-situation interactions), one or more of the taxonomies discussed in this section are likely to offer a good starting point.

Effects of work situations on within-person performance variability. Most of the personality and affect theories we reviewed (e.g., CAPS, density distributions theory, AET) suggest a main effect of transient situations on momentary job performance at the within-person level of analysis. Such a main effect is also suggested by personality strength theory, which emphasizes variability-related individual difference variables, and hence the between-person level of analysis. However, one difference is that density distributions theory, AET, etc., suggest that situations influence personality and affect at the within-person level, whereas personality strength theory suggests that personality consistency influences situational consistency at the between-person level through mechanisms such as situational choice, shaping, and interpretation. Future research could therefore examine, at multiple levels of analysis, when situational variability influences and is influenced by personality and affect variability—as well as, of most relevance here, the distal effects on performance.

In addition, future research could examine the cross-level effects of situations on within-person performance variability. For instance, situational strength is believed to restrict between-person variance in job performance and thereby to attenuate between-person relationships between personality traits and characteristic levels of job performance (Meyer et al. 2010; although see also Dalal et al. 2019). However, situational strength may also restrict within-person variance in job performance and thereby attenuate within-person relationships between personality (and affect) states and momentary job performance. These effects may moreover be attributable to situational strength at multiple levels of analysis: the within-person level itself (Green et al. 2019), the between-person/job level (Meyer et al. 2014), the occupation level (Meyer et al. 2009), the organization level (as organizational climate strength; Lee & Dalal 2016), and/or the societal level (as cultural tightness-looseness; Gelfand & Lun 2013, Gelfand et al. 2006). Future research could therefore examine multilevel models of the impact of situational features on momentary job performance.

Finally, it has been suggested that, compared to performance (behavior), effectiveness (the results of performance) is more a function of the situation (Campbell 1990). Future research could therefore compare the extent of within-person variability in performance versus effectiveness that is attributable to situational factors. Generally, situational effects may have a larger influence on within-person variability in effectiveness than in performance. However, findings may depend on the precise situational factors being implicated. For instance, situational constraints (an aspect of situational strength; Meyer et al. 2010) may lead to a restriction of variance in effectiveness, such that within-person effectiveness is consistently low even if within-person performance is highly variable. Overall, then, future research could examine situational factors that moderate the within-person relationship between performance and effectiveness.

Short-Timeframe Performance Variability at Other Levels of Analysis

Future research could also examine performance variability at other levels of analysis. For example, although there is an extensive body of research on team performance and effectiveness (Mathieu et al. 2008), and although theories of team

processes and performance commonly include the idea that teams are dynamic entities (e.g., Marks et al. 2001), much less research has examined team performance episodes and within-team performance variability over time (Mathieu et al. 2014). Within-team performance variability can be operationalized via team-level key performance indicator scores collected continuously by technology (Tetrick et al. 2016), via repeated team-level performance ratings by team leaders, or via repeated team-member performance scores that are aggregated to the team level. Two empirical within-team studies, both of which used business simulations to examine teams' performance (or rather effectiveness) trajectories via team-level key performance indicators, reported discrepant but in both cases appreciable performance variability attributable to within-team sources: 81% (Dierdorff et al. 2011) versus 47% (Mathieu & Rapp 2009).

Thus, an immediate goal of future within-team performance variability research could be to more precisely estimate the proportion of performance variability that is located within teams, as well as to explain the factors that increase or decrease this estimate. There are several ways to achieve this goal. First, researchers could apply one of the previously described theories at the team level. For example, AET can be applied at the team level to examine temporal fluctuations in group affect (Barsade & Knight 2015) as an outcome of team events and as an antecedent to team performance variability. Second, researchers could directly apply theories of team processes and performance cycles (Marks et al. 2001), which are inherently theories of within-team phenomena, to examine within-team performance variability as an outcome of team and task characteristics. Third, researchers could integrate theories of within-team processes and performance cycles with theories of within-person performance variability. For example, Marks et al.'s (2001) model, which delineates the transition and action processes repeatedly experienced by teams, and Lang & Bliese's (2009) model, which specifies the form of performance variability during transition, could be integrated to build within-team temporal hypotheses that specify the form of performance variability and the timeframe within which it should occur as a result of changes in the environment.

Moreover, drawing from the meso-frameworks of organizational entities (House et al. 1995), "which suggest that any outcome of interest is the result of a confluence of influences emanating from different levels of analysis" (Mathieu & Taylor 2007, p. 141), future performance variability research could emphasize cross-level effects. Future studies could also examine the relationship between within-team performance variability and the within-person performance variability of team members, and whether this relationship varies as a function of situational factors.

However, cross-level effects could focus not only on within-person and within-team performance variability but also on higher levels of analyses such as the within-organization level. For example, Morgeson et al.'s (2015) aforementioned event system theory posits that strong events can originate at multiple hierarchical levels (individual, team, organization, and the organization's environment) and can exert cross-level effects. Drawing from this proposition, future empirical research could, for instance, examine the impact of changes in an organization's reputation (e.g., Orlitzky & Benjamin 2001) on short-timeframe performance fluctuations of both the organization itself (e.g., stock prices) and its employees.

Having reviewed several future research directions for short-timeframe performance variability, we now turn to the necessary research designs and data-analytic techniques to test these questions. After that, we turn to the practical implications of short-timeframe performance variability for both employees and employers.

Necessary Research Designs and Data-Analytic Techniques

A proper treatment of the research questions we discussed in the previous section requires repeated collection of data on the focal constructs (e.g., job performance, antecedents, and moderators) from the same persons using the same measures over short timeframes. This is accomplished ideally via (near-)continuous measurement techniques (also referred to as continuous rating assessments; Gabriel et al. 2017) that automatically generate data using technology. For example, eye-tracking software can provide continuous data on cognitive antecedents (e.g., eye fixation duration as a measure of attention) as well as emotional antecedents (e.g., pupil diameter as a measure of arousal) of performance (Meißner & Oll 2017). Wearable sensors can provide continuous data on both person-level antecedents (e.g., location as an objective measure of situation) and team-level antecedents (e.g., boundary spanning) of performance (Chaffin et al. 2017). With regard to continuous measurement of performance, geographic positioning systems can be used to track the movement of employees who work outside office buildings (e.g., to log truck drivers' movement patterns as a measure of safety behavior; Şimşek et al. 2013), and video recordings can be coded to generate measures of individual- and team-level behavior of interest (e.g., Waller & Kaplan 2018). Other recordings (e.g., emails or phone conversations; Campbell & Wiernik 2015) can be used as continuous measures of within-person effectiveness (or the variability thereof; e.g., for a help desk technician, variability in the number of email transactions or length of phone calls required to troubleshoot technical issues). In addition, key financial indicators from business simulations could be employed as continuous measures of team effectiveness (e.g., Dierdorff et al. 2011, Mathieu & Rapp 2009). The use of non-self-

report approaches to measuring performance and/or its antecedents may help reduce same-source bias in estimates of within-person relationships. However, in some cases (such as the measurement of CWB; Berry et al. 2012), self-reports may be superior to some other forms of measurement.

Maximizing the number of measurement occasions with continuous measurement techniques not only increases statistical power and reliability (Ployhart & Vandenberg 2010) but also elicits exactly when, how, and why fluctuations occur even within very short timeframes (e.g., several seconds). More often than not, however, researchers cannot collect such data for various reasons (e.g., lack of resources, privacy issues). Under such circumstances, researchers can use what personality researchers have recently called intensive longitudinal methods (Sened et al. 2018), which are study designs involving data collection with short intervals. A widely used intensive longitudinal method is the experience sampling method (also referred to as the daily diary method, ecological momentary assessment, or ambulatory assessment; for a review, see Beal 2015). Two important decisions in designing experience sampling studies involve determining the timeframe at which each of the focal constructs varies (i.e., timeframe of the variation) and the time gap between adjacent measurements (i.e., timeframe of the covariation). The former decision should be based on the timeframes at which fluctuations in performance and other focal variables are expected theoretically and/or observed empirically in previous research. The latter decision should be based on expectations regarding the predictor-criterion causal cycle (Mitchell & James 2001; see also Dormann & Griffin 2015). Unfortunately, however, theories related to within-person performance variability are often silent or imprecise regarding the timeframes for variation and covariation, leaving inferences about timeframes as an exercise for the reader.5 If the ideal timeframes are unknown a priori, a suggestion for empirical researchers is to include as many measurements as possible (while being mindful of constraints such as respondent irritation and fatigue, which may adversely influence data quality), with time gaps between measurements as short as possible. This is because, if needed, granular data can always be aggregated up to higher timeframes. Finally, recent reviews have identified several design- and measurement-related factors that influence the estimated proportion of within-person variation in performance (and other) constructs in experience sampling studies. These factors include sample characteristics, total study duration, number of timepoints, number of items used to measure the construct, and number and type of response options (McCormick et al. 2019, Podsakoff et al. 2019).

One variation on the typical experience sampling design is the "measurement burst" design (Sliwinski 2008, Sliwinski et al. 2009, Stawski et al. 2016), which involves collecting multiple "bursts" of data, each containing multiple surveys conducted at multiple timeframes (e.g., 3 surveys per day on 3 consecutive days per month during 3 consecutive months of the year for 3 consecutive years), and which addresses the previously stated concern that existing within-person research typically conflates variability over various within-person timeframes. A second variation is "event sampling," which involves asking respondents to complete surveys only when specific events occur (e.g., Conway et al. 2009), and which could (depending on the research question) eliminate unnecessary surveys.

Analyzing the data obtained via aforementioned study designs involves using multilevel models to disaggregate within-person effects from between-person effects. Popular data-analytic techniques include multilevel random coefficient modeling (Raudenbush & Bryk 2002) and latent growth modeling (Bollen & Curran 2006; for a review, see Ployhart & Vandenberg 2010). In addition, depending on the research question, other data analytic techniques could be appropriate. For example, spectral analysis (e.g., Hamaker et al. 2015) could be used to test research questions involving performance cycles. As another example, research questions involving the within-person structure of performance items could use chain P-technique factor analysis (Cattell 1963; for an illustration using performance data, see Dalal et al. 2009), dynamic factor analysis (Nesselroade et al. 2002), or multilevel factor analysis (Reise et al. 2005). Researchers using experience sampling methods are also encouraged to refer to Hofmans et al.'s (2019) review for additional data-analytic techniques. Finally, research questions involving discontinuous growth models (e.g., a precipitous decline in team performance when switching to a new and unfamiliar project) could follow Bliese and colleagues' (Bliese & Lang 2016, Bliese et al. 2017) guidelines to model the changes in performance as a result of discontinuities in the antecedent variables.

SUGGESTIONS FOR PRACTICE

Short-timeframe within-person performance variability has important practical implications. In this section (see also Table 3), we discuss the implications for both employees and organizations.

Table 3: Practical implications arising from a within-person perspective on job performance

Practical implication domain	Suggestions for practice	Suggested readings
Implications for employees		
Affect	Employees could structure their daily activities to benefit from their mood cycles by considering when to engage in specific activities. For example, a "morning person" might choose to handle mindless administrative emailing tasks during the afternoon dip.	Golder & Macy (2011), Pink (2018)
Behavior	Employees could understand their own "if [situation], then [behavior]" signatures and use this self-knowledge to break undesirable habits and form desirable ones. Repeated enactments of desired behaviors become habitual and ultimately alter one's personality.	Roberts et al. (2006, 2017), Tasselli et al. 2018, Wood & Rünger (2016)
	Employees could utilize ecological momentary interventions and just-in-time adaptive interventions to manage their emotions and, subsequently, enact positive behavior (e.g., OCB) and refrain from negative behavior (e.g., CWB).	Heron & Smyth (2010), Nahum-Shani et al. (2018)
Impression management	Employees could understand how supervisors evaluate short-timeframe performance fluctuations and manage their own performance levels accordingly. Specifically, focusing on avoiding very low performance levels rather than achieving very high performance levels can result in more positive performance evaluations from supervisors.	Ariely & Carmon (2000), Kahneman (1999, 2000), Lee & Dalal (2011)
Implications for organizations		
Personnel selection	Organizations could utilize assessment tools (e.g., Multiple Speed Assessments) that are geared toward understanding job applicants' within-person variability in traits.	Herde & Lievens (2018), Lievens et al. (2018)
	Organizations could determine whether high versus low levels of performance variability are desired for specific positions and situations.	Dalal et al. (2014), Lang & Bliese (2009)
Performance management	Organizations could supplement (if not move away from) annual performance appraisals with weekly check-ins and/or nearly continuous supervisor feedback.	Aguinis (2019), Buckingham & Goodall (2015), Pulakos et al. (2015), Schwab (2018)

Abbreviations: CWB, counterproductive work behavior; OCB, organizational citizenship behavior.

Implications for Employees

Our review of short-timeframe variations in job performance, personality, and affect invokes various opportunities for employees to manage their within-person fluctuations and "make it work" for themselves. In the affect domain, employees can learn to structure their daily activities to benefit from their mood cycles (e.g., Golder & Macy 2011) instead of being held hostage to them. Basically, this might mean that employees consider when to engage in specific activities (Pink 2018).

Relatedly, in the personality domain, there exist opportunities for employees to recognize and understand their own "if [situation], then [behavior]" linkages—and to use this self-knowledge to break undesirable habits and form desirable ones (Wood & Rünger 2016). Specifically, repeated enactments of desired behaviors become habitual and ultimately alter one's personality (Roberts et al. 2006, Tasselli et al. 2018). As shown by recent meta-analytic evidence (Roberts et al. 2017), such short-timeframe change for specific personality traits is within the reach of employees.

Furthermore, assessing fluctuations in behavior, personality, and affect via mobile technology opens a window of opportunity for real-time approaches such as ecological momentary interventions (Heron & Smyth 2010) and just-in-time adaptive interventions (Nahum-Shani et al. 2018). In the medical domain, ecological momentary interventions complement periodic medical appointments by providing treatments to people in their everyday lives and natural environment. For example, someone in a workplace smoking cessation program might receive multiple daily hints for dealing with a desire to smoke or vape. Just-in-time adaptive interventions go a step further by collecting information from people at various times during the day either unobtrusively (e.g., by monitoring their behavior) or via prompts (e.g., about a smoking urge). Interventions to promote healthy behavior or avoid adverse health outcomes are then triggered by the information collected. Importantly, these interventions can be customized to person, time, and place. Although thus far most of these interventions have been explored in behavioral health and psychosocial settings, they can fruitfully be extended to job performance. For example, the aforementioned DynAffect model suggests that

employees with low attractor strength might benefit even more than other employees from interventions that occur immediately after an affective event and that are designed to help them to reappraise the event more favorably and thereby to avoid enacting CWB.

Finally, there are implications for impression management. In particular, insight into how supervisors evaluate short-timeframe variations in employee performance may enable employees to make better impressions by managing their peak/trough and most recent levels of performance. For example, capitalizing on research showing that raters' judgments are more affected by performance troughs than by performance peaks (Lee & Dalal 2011), employees (i.e., ratees) may realize that it is more important to focus energy on avoiding very low performance than on achieving very high performance.

Implications for Organizations

Short-timeframe performance variability also has numerous implications for organizations. In the interest of space, we focus on implications in two major areas: personnel selection and performance management.

Personnel selection. Short-timeframe variabilities in job performance and especially in its individual difference antecedents have implications for personnel selection. One implication deals with the need to assess such short-timeframe variations by either developing new selection procedures or adjusting existing ones. In employee selection, it is difficult to ask candidates to complete a diary (as in the experience sampling method) or to return on several occasions for repeated assessments. Recently, however, Lievens et al. (2018) showed how a situational judgment test can be designed to present a large set of situations to candidates and to obtain an index of their within-person variability on specific personality traits. Results showed that this within-person variability index predicted employees' actual personality state fluctuations captured via an experience sampling design two years later. Multiple Speed Assessments (Herde & Lievens 2018) represent another novel selection strategy for obtaining insight into how people adapt their behavior across various situations. In such assessments, candidates perform in several (more than 10) short (e.g., 3-minute) role-plays designed to manipulate various job-relevant situational features.

Another implication relates to the challenge of determining whether short-timeframe fluctuations (in job performance, personality, and affect) are "good" or "bad" for the organization. In other words, is within-person consistency to be preferred because it indicates dependability (versus capriciousness or erraticism)? Or is within-person variability to be preferred because it indicates flexibility (versus rigidity)? Clearly, the implications of personality and affect consistency for employee selection are complex. Arguably, the goal is to select employees who consistently perform well across situations and time—that is, who have a high mean level of performance and low variability around that high mean level. In other words, employees should consistently enact behaviors of high value to the organization. However, when the situation changes, the specific behaviors that have high value to the organization might also change. Therefore, consistently high performance may not always involve consistent behavior of a particular type. Personality and affect facilitate behavioral consistency rather than the real target, performance consistency. In other words, although the benefit of personality and affect consistency—in conjunction with desirable mean levels of personality and affect (e.g., high conscientiousness and low negative affect)—is likely to be high for behavior that is almost always desirable or undesirable (e.g., OCB or CWB), it is likely to be task-dependent (see, e.g., Lang & Bliese's 2009 conceptualization of adaptive performance) for behavior that can vary over time in desirability.

Performance management. Research on short-timeframe variations in job performance also has obvious implications for performance management. In recent years, several organizations (e.g., Adobe, Deloitte, Ideo) have moved away from the traditional annual performance appraisals (Buckingham & Goodall 2015, Pulakos et al. 2015, Schwab 2018). Cited reasons relate to the administrative overload, the biased nature of annual performance appraisals, and the general ineffectiveness of annual appraisals for developmental purposes (Pulakos et al. 2015). Instead, these organizations have implemented a performance management system as a "continuous process of identifying, measuring, and developing the performance of individuals and teams and aligning performance with the strategic goals of the organization" (Aguinis 2019, p. 4). For instance, supervisor-subordinate check-ins might occur weekly or might take the form of informal discussions about performance issues on an ongoing basis to foster just-in-time feedback. Other examples consist of using technology and personnel records to collect as much performance data as possible (while keeping employee privacy in mind), which can then be augmented with critical incident data recorded soon after occurrence.

Although many of these performance management practices originated in organizations due to dissatisfaction with the traditional annual performance appraisal, the current paper's emphasis on short-timeframe variations in performance provides the needed theoretical and empirical justification. To manage performance variability, performance feedback could ideally be given on a nearly continuous/real-time basis. This is different from the traditional performance

appraisal habit of belatedly reacting to performance variability. As one benefit of providing feedback on a much more frequent basis, this feedback will be less distorted by fallible memory and use of heuristics (e.g., the peak-end rule; Ariely & Carmon 2000, Fredrickson 2000). Another benefit is that personnel decisions can be made according to various parameters of the density distribution in performance. For instance, a merit raise can be based on the performance mean score over the whole year, whereas a judgment of the likely range of future performance can be based on peak and trough scores over the year.

CONCLUSION

Job performance researchers and practitioners have belatedly come to the realization that performance fluctuates appreciably over even small timeframes such as minutes, hours, days, and weeks. Efforts are now underway to predict and harness this variability. At the same time, exciting theoretical developments are occurring vis-à-vis the motivational (e.g., personality and affect) antecedents of job performance, allowing for an understanding of individual differences based in short-timeframe within-person variability (i.e., stability in variability). We fully expect that the coming years will see job performance researchers using these novel theoretical approaches and novel individual differences operationalizations to test novel performance-related predictions using novel research designs and to ultimately develop novel just-in-time adaptive interventions that facilitate individual and organizational functioning. We hope that this article serves as a catalyst for these efforts.

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