Journal of Applied Psychology
2018, Vol. 103, No. 1, 14–36

0021-9010/18/$12.00 http://dx.doi.org/10.1037/apl0000267

A Cross-Level Investigation of Informal Field-Based Learning and Performance Improvements

Mikhail A. Wolfson
University of Connecticut

Scott I. Tannenbaum
The Group for Organizational Effectiveness (gOE), Albany, New York

John E. Mathieu
University of Connecticut

M. Travis Maynard
Colorado State University

Organizations often operate in complex and dynamic environments which place a premium on employees' ongoing learning and acquisition of new competencies. Additionally, the majority of learning in organizations does not take place in formal training settings, but we know relatively little about how informal field-based learning (IFBL) behaviors relate to changes in job performance. In this study, we first clarified the construct of IFBL as a subset of informal learning. Second, on the basis of this clarified construct definition, we developed a measure of IFBL behaviors and demonstrated its psychometric properties using (a) a sample of subject matter experts who made item content validity judgments and (b) both an Amazon Mechanical Turk sample ($N = 400$) and a sample of 1,707 healthcare employees. Third, we advanced a grounded theory of IFBL in healthcare, and related it to individuals' regulatory foci and contextual moderators of IFBL behaviors-job performance relationships using a cross-level design and lagged nonmethod bound measures. Specifically, using a sample of 407 healthcare workers from 49 hospital units, our results suggested that promotion-focused individuals, especially in well-staffed units, readily engage in IFBL behaviors. Additionally, we found that the IFBL-changes in job performance relationship was strengthened to the extent that individuals worked in units with relatively nonpunitive climates. Interestingly, staffing levels had a weakening moderating effect on the positive IFBL-performance improvements relationship. Detailed follow-up analyses revealed that the peculiar effect was attributable to differential relationships from IFBL subdimensions. Implications for future theory building, research, and practice are discussed.

Keywords: informal learning, staffing, nonpunitive climate, job performance

Organizations often operate in complex and dynamic environments which place a premium on employees' ongoing learning and their acquisition of new competencies (Kukenberger, Mathieu, & Ruddy, 2015). To promote such learning, billions of dollars are spent on formal training (Miller, Mandzuk, Frankel, McDonald, & Bellow, 2013), and there is ample evidence that, when properly conducted, such training can be quite effective (Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012). However, it is equally clear that the majority of learning in organizations takes place outside of formal training settings (Koopmans, Doornbos, & Eekelen, 2006; Marsick & Watkins, 1990; Tannenbaum, 1997). Traditional training alone cannot adequately prepare employees for all possible work scenarios and is typically not designed to equip individuals for ongoing learning (Blume, Ford, Baldwin, & Huang, 2010). Indeed, some estimates of the percent of organizational learning that takes place informally range from 70% (Lombardo & Eichinger, 1996) to over 90% (Flynn, Eddy, & Tannenbaum, 2006; Tannenbaum, 1997). Whatever the exact percentage may be, clearly a significant portion of what employees need to know to perform their jobs effectively is learned informally on-the-job—what we refer to here as *informal field-based learning* (IFBL).

Although it is widely accepted that employees must learn while in the field and doing their job, we know relatively little about the drivers of such learning. An extensive body of research has helped to clarify the conditions under which formal training is likely to be more effective (Colquitt, LePine, & Noe, 2000), but the same cannot be said about the research on IFBL, which has been described as underresearched (e.g., Eraut, 2004), limited, largely

This article was published Online First September 21, 2017.

Mikhail A. Wolfson, Management Department, University of Connecticut; Scott I. Tannenbaum, The Group for Organizational Effectiveness (gOE), Albany, New York; John E. Mathieu, Management Department, University of Connecticut; M. Travis Maynard, Management Department, Colorado State University.

This study was partially funded by the U.S. Army Research Institute (Grant W5J9CQ-12-C-0048) awarded to the Scott I. Tannenbaum and John E. Mathieu. The views, opinions, and/or findings contained in this paper are those of the authors and should not be construed as an official Department of the Army position, policy, or decision. An earlier version of this article was presented at the 2015 Society for Industrial and Organizational Psychology Conference in Philadelphia, Pennsylvania.

Correspondence concerning this article should be addressed to Mikhail A. Wolfson, Management Department, School of Business, University of Connecticut, 2100 Hillside Road, Unit 1041 Storrs, CT 06269-1041. E-mail: mikhail.wolfson@uconn.edu

anecdotal (Noe, Tews, & Marand, 2013), and in need of studies that examine its antecedents and consequences (Tannenbaum, Beard, McNall, & Salas, 2010).

Accordingly, we have five goals for this article. First, we clarify the construct of IFBL and differentiate it from related constructs. Second, we develop a new measure of IFBL behaviors and demonstrate its psychometric properties using a sample of healthcare employees. Third, we advance a grounded theory of IFBL in a healthcare environment, and relate it to both individuals' promotion focus and contextual moderators of IFBL behaviors—job performance relationships using a cross-level design and lagged nonmethod bound measures. In a recent commentary, George (2014) wrote that context needs to be brought to the center stage, and that researchers need to answer questions such as "How does the context shape boundary conditions or assumptions of the theories being examined?" and "Why is this context appropriate to test your theory?" (p. 2). Herein, we examine employees within a healthcare context, utilize industry standard measures to index contextual features, and draw on prior research to the extent that their findings relate to the featured healthcare constructs. Notably, although our theory is developed for this sample population (given some of the unique aspects of healthcare such as staffing shortages and work pressures), the implications may not be limited to this environment (see George, 2014). Fourth, we test associated hypotheses using data from a second sample of 407 employees from 49 hospital units, using a cross-level model and lagged outcomes measures. Finally, we conclude with implications for future theory building, research, and practice.

Theoretical Background

Tannenbaum et al. (2010) advance an integrated theoretical model of informal learning behaviors in organization. They submitted that

> . . . there is consistent support for the idea that informal learning occurs within the context of performing one's job or work activities when natural events provide opportunities to learn. However, what can be learned from experience is influenced both by the context in which the event occurs and "what the individual brings to it". (Tannenbaum et al., 2010, pp. 309–310)

We advance such a model including both individual and contextual influences on informal learning behaviors—performance relationships. However, before turning to our hypothesized model, it is important to clarify what is meant by informal learning.

Learning is defined as "the process of employees enhancing their human capital through acquiring knowledge, skills, abilities, and other characteristics" (Noe, Clarke, & Klein's, 2014, p. 247). In terms of formal learning environments, generally speaking, training programs are designed for individuals to acquire and apply a defined domain of knowledge, skills, abilities and other characteristics (KSAOs). These KSAOs are identified from targeted training needs analyses that may include organizational, task, and person analyses. Informal learning, however, is different and is thought to derive from employees' natural experiences on the job that enhance their KSAOs in some manner. In contrast to formal learning, there is no designated KSAO domain for informal learning. The informal learning experience is not uniform across individuals; different people may learn different things from the same experience. Consequently, to date, the informal learning construct has often been described in vague terms with definitions so diffuse that they fail to provide clear conceptual boundaries (Noe, Tews, & Dachner, 2010). Our review of the literature reveals a proliferation of terms associated with the idea that employees learn important job-related information outside of formal training sessions. Such terms include on-the-job training (Rothwell & Kazanas, 1994), continuous learning (London & Smither, 1999), action learning (Yorks, O'Neil, & Marsick, 1999), self-regulated learning (Sitzman & Ely, 2011), self-directed learning (Clardy, 2000), social learning (Bandura, 1962), experiential learning (Kolb, 1984), workplace learning (Dretske, 1981) and incidental learning (Watkins & Marsick, 1992). Given this disarray, several authors have advanced more focused multidimensional definitions of informal learning.

Noe et al. (2013) advanced a multidimensional reconceptualization of informal learning and suggested it can occur through active behaviors or passive behaviors and through feedback and reflection in context. Specifically, they submit that informal learning can derive from (a) oneself (e.g., reflecting, experimenting), (b) others (e.g., interacting with one's supervisor or peers), and (c) noninterpersonal sources (e.g., reading or searching the Internet for job relevant information).

In their meta-analysis, Cerasoli, Alliger, Donsbach, Mathieu, Tannenbaum, and Orvis (2017) grappled with the definition of informal learning. They submitted that given the ambiguity of the construct, it is important to explicitly state how informal learning is related to, but distinct from, other existing constructs. They proposed that "broadly speaking, informal learning behaviors are noncurricular and they are highly experiential; they occur in the workplace outside of formal learning contexts, via observing, asking questions, practice, and so forth" (Cerasoli et al., 2017, p. 5).

Tannenbaum et al. (2010) proposed a conceptualization of informal learning as having three common characteristics, arguing that it (a) reflects at least some intent for development, growth, learning, or improvement; (b) involves some action and doing; and (c) does not occur in a formal learning setting. They proposed several types of informal learning behaviors including the following: (a) *experience and action*, which refers to engaging in an action or an experience that involves the individual actively doing something; (b) *feedback*, which refers to receiving feedback related to an event or action that can come from the task itself or from others (i.e., it can be directed toward the learner or occur vicariously); and (c) *reflection*, which refers to engaging in thoughtful consideration to seek understanding about one's own experiences (Tannenbaum et al., 2010).

From just this brief review of the literature, it is clear that informal learning has been defined and indexed in a wide variety of ways. In Table 1, we detail various types of informal learning as they relate to a three-dimensional taxonomy. Our focus for this investigation is on IFBL as a subset within the overall informal learning construct domain as detailed in the following text. The first point of differentiation in our taxonomy is whether learning occurs in formal or informal settings. Formal settings refer to environments where the expressed purpose is to convey new knowledge such as classroom training (Cerasoli et al., 2017; Noe et al., 2014). Thus, on the formal side of this distinction there is formal training and development, whereas on the informal side, there is informal learning and incidental learning. Notably, there

Table 1
Types of Learning

Type	Definition	Informal/formal	Intentional/incidintal	Self/other-directed
Formal training and development	Programs, courses and events developed by organizations to help employees acquire KSAOs (Noe, Clarke, & Klein, 2014)	Formal	**Intentional**	Other-directed
On-the-job training	Instruction in work setting and during work (Rothwell & Kazanas, 1994)	Both	**Intentional**	Other-directed
Continuous learning	Changing behavior based on deepening and broadening of skills, knowledge, and worldviews (Sessa, & London, 2006)	Both	**Intentional**	Both
Action learning	Development, to improve observable behavior in problem field (Yorks, O'Neil, & Marsick, 1999)	Both	**Intentional**	Both
Self-regulated learning	Affective, cognitive, and behavioral processes during learning, to reach a desired goal (Sitzmann & Ely, 2011)	Both	**Intentional**	**Self-directed**
Self-directed learning	Intentional learning that occurs formally or informally, online, or in the context of social learning (Clardy, 2000)	Both	**Intentional**	**Self-directed**
Social learning	Occurs through observation, imitation, and reinforcement (Bandura, 1962)	Both	**Intentional**	Both
Experiential learning	Engaging in challenging experiences, reflection, and subjective reasoning to deduce new knowledge. (Kolb, 1984)	Both	Both	**Self-directed**
Workplace learning	Learning acquired in midst of action and dedicated to task at hand (Dretske, 1981)	Both	Both	Both
Informal learning	Intentional or incidental learning, that is not highly structured, and volitional (Marsick, Volpe, & Watkins, 1999)	**Informal**	Both	**Self-directed**
Incidental learning	A subset of informal learning that is defined as a by-product of some other activity. (Watkins & Marsick, 1992)	**Informal**	Incidental	**Self-directed**
IFBL	Intentional behaviors aimed at learning new, work-oriented, and organizationally valued content in a field setting	**Informal**	**Intentional**	**Self-directed**

Note. IFBL = informal field-based learning. Bold text indicates subdimensions of learning types that match the subdimensions of IFBL.

are many other types of learning including on-the-job training, continuous, action, self-regulated, self-directed, social, experiential, and workplace learning, that may occur in either formal or informal settings.

Our second dimension differentiates between learning that is intentional versus incidental. Intentional learning refers to active and conscious actions by an individual to acquire new knowledge and skills, whereas incidental learning refers to learning that occurs without intent and may even occur without conscious awareness (Cerasoli et al., 2017). On the intentional side of the dimension there are formal training and development, on-the-job training, as well as continuous, action, self-regulated, self-directed, and social-learning. There may be several types of learning (e.g., experiential, workplace, and informal) that could be either intentional or incidental.

Finally, we distinguish between *self-directed* and *other-directed learning*. In self-directed learning, the individual is responsible for acquiring new knowledge and skills him or herself. In other-directed learning, some other party explicitly shares the responsibility for the focal person's learning, such as a designated trainer or mentor (Cerasoli et al., 2017; Noe et al., 2010). Along the self-directed dimensions there is self-regulated, self-directed, experiential, informal, and incidental learning. In comparison, along the other-directed dimension there is formal training and development, and on-the-job training. Once again, some of the types of learning (i.e., continuous, action, social, and workplace) may occur in either a self-directed, or other-directed manner.

In sum, as detailed in Table 1, there is a large domain of related constructs that have been referred to as informal learning. This construct proliferation leads to ambiguity and confusion (Shaffer, DeGeest, & Li, 2016). Our intention is not to add to such proliferation, but rather, to focus on a narrower subdomain of informal learning. Specifically, we define IFBL as engaging in intentional self-directed behaviors aimed at learning new, work-oriented, and organizationally valued content outside of a formal learning program. Our conception includes three types of intentional behaviors: (1) *experimentation/new experiences* (e.g., seeking new assignments, doing a task differently), (2) *feedback/reflection* (e.g., actively seeking feedback and advice; debriefing work experiences), and (3) *vicarious learning behaviors* (e.g., intentionally observing others and talking with them about their work). These three dimensions are well rooted in the literature, as informal learning has been found to emanate from experimenting or performing new duties (cf., Gijbels, Raemdonck, & Vervecken, 2010), seeking feedback and reflecting on experience (cf., Choi & Jacobs, 2011), and through vicariously learning by watching others (Choi & Jacobs, 2011; Noe et al., 2013).

Our focus is specifically on these three dimensions of informal learning because they are consistent with and help operationalize our overall definition of the informal learning construct, and are amenable to interventions in organizational contexts (i.e., they involve tangible intentional actions with associated skills that can be taught and encouraged). We restrict our IFBL definition to experiences gained in individuals' job context (however one's job context would otherwise be defined). Other forms of learning are no doubt valuable and important. For example, searching for and absorbing information from books, magazines, videos, and so forth outside of the job context (e.g., Internet searches) may be quite informative. However, the IFBL construct loses focus and specificity if it can occur anywhere, and there are ethical and practical concerns with organizations targeting nonwork behaviors and experiences. By excluding behaviors such as Internet searches outside the job context, incidental learning, and learning guided by others from our definition of IFBL, we bound our construct of interest, provide greater precision, and can offer more actionable conclusions.

Hypotheses

The IFBL-Performance Relationship

Employability in today's demanding and fast-paced business environment requires employees to refine and enhance their skill sets throughout their careers (Molloy & Noe, 2010). In their theoretical framework of informal learning, Tannenbaum et al. (2010) suggested individuals' performance as a key individual outcome of the informal learning process. For example, Maurer and Tarulli (1994) argued that "employee participation in learning and development activity is being recognized as a critical route toward organizational competitiveness and excellence" but, for organizations to reap these benefits, employees need to be motivated to engage in these voluntary development activities (p. 3). Noe et al. (2010) submitted that informal learning may promote meaningfulness as individuals seek out opportunities to best meet their own development needs. In other words, IFBL may afford the opportunity to better align learning opportunities with individuals' personal developmental needs than would a traditional formal training program. Furthermore, as individuals may be able to identify gaps in their own KSAOs, engaging in IFBL may afford them the opportunity to focus on these skills. In fact, research has shown that experts attain higher performance through years of self-directed behaviors and trial-and-error experiential learning (Ericsson & Charness, 1994). Additionally, the process of actively engaging a problem has been linked with better long-term performance (Bell & Kozlowski, 2008). More specifically in the informal learning literature, engagement in such behaviors has been linked to job performance (Spreitzer, McCall, & Mahoney, 1997) and project manager effectiveness (Wasiyo, 2009).

The implicit assumption has been that engaging in IFBL behaviors will be beneficial for employees and, as such, will correlate positively with important outcomes. When learners actively seek out and engage in solving a challenging problem, they produce better results in the long run (Bell & Kozlowski, 2008; Freeman et al., 2007). One way that experts develop deep expertise over time is through ongoing trial-and-error and experiential learning of cue-outcome relationships (Ericsson & Charness, 1994). Cerasoli et al.'s (2017) meta-analysis reported positive correlations of informal learning with assorted work attitudes ($\rho = .28$, 13 studies) and with job performance ($\rho = .42$, 9 studies). These results are encouraging, although Cerasoli et al. (2017) also found significant variability of effects sizes in both instances suggesting the presence of between study moderators. Moreover, the authors noted that none of the informal learning—work attitudes relationships accumulated in their meta-analysis were from predictive designs, and the two variables were measured from the same source in all instances. Of the effect sizes with job performance, 84% came from concurrent designs using the same source of measurement for both variables, with the remaining 16% associating informal learning with later measured indices of performance from a different source. No studies to date have modeled the relationships between informal learning and changes in job performance. Thus, there are design weaknesses and potential method effects in the extant literature. Nevertheless, we anticipate that IFBL behaviors will exhibit a positive linear relationship with changes in job performance.

> *Hypothesis 1:* Engaging in IFBL behaviors has a positive relationship with changes in job performance.

Influences on IFBL

The Tannenbaum et al. (2010) theory argues that informal learning behaviors "do not occur in isolation and therefore must be understood as part of a larger context or organizational and individual characteristics that can encourage or impede the informal learning process" (p. 304). Similarly, Cerasoli et al. (2017) submitted that "both context (on the job, but not within a situation specifically designed and structured for learning) and the activities of the learner are key defining characteristics of informal learning" (p. 2). Individual traits or predispositions typically have limited predictive validity unless considered in context (Bandura, 1999; Haney & Zimbardo, 2009). For example, Maurer and Tarulli (1994) considered personal factors such as self-efficacy and perceived need for improvement, and found modest correlations between them and current and anticipated participation in developmental activities. However, the relationships were stronger when considered in concert with perceived environmental supports and compatible organizational policies. It follows that similar mechanisms may drive individuals to engage in IFBL behaviors. Cerasoli et al. (2017) found, on average, positive correlations among individuals' informal learning with several individual predispositions (e.g., self-efficacy, Big 5 personality variables) and individuals' job attitudes and performance. However, they also observed significant variability in effect sizes, which suggests the presence of potentially meaningful contextual moderators.

Teunissen (2015) submitted that the nature of work in healthcare continuously evolves due to patients' demands, technological advances and financial pressures, necessitating employees' learning and development. Yet healthcare also has a slew of policies and procedures designed to limit the range of actions taken by healthcare professionals given the potentially grave consequences of errors. Consequently, these pressures make healthcare contexts powerful and rich learning environments and simultaneously frustratingly resistant to change. Teunissen (2015), however, advanced a theory of learning in healthcare that considers how individuals' predispositions and situations generate personal experiences which collectively yield learning.

Accordingly, we feature individual and contextual influences on IFBL—performance relations in this study as shown in Figure 1. We considered situational variables as moderators that either strengthen or weaken IFBL relations. The variables that we include were selected on the basis of Tannenbaum et al.'s (2010) theoretical framework, as well as previous findings from the extant literature and Cerasoli et al.'s 2017 meta-analysis. We also draw upon Teunissen's (2015) views concerning learning opportunities in healthcare, and initial qualitative grounding efforts with our healthcare setting. The rationale for each hypothesis is detailed in the following text.

Individual antecedents. The list of individuals' personality traits, predispositions, and attitudes that might facilitate IFBL behaviors is long and vast. Tannenbaum et al. (2010) suggested that personality characteristics, learner motivation, self-awareness, feedback orientation, and self-efficacy may all influence the effectiveness of informal learning. For instance, building on work on continuous learning, Maurer and Weiss (2010) discussed how individuals would need to possess characteristics such as a developmental orientation to engage in, and benefit from, voluntary developmental opportunities. Previous theory and research have illustrated significant relationships between informal learning and individual predispositions such as learning goal orientations (Choi & Jacobs, 2011) and Big 5 dimensions of personality (Noe, Tews, & Marand, 2013). Generally speaking, however, the factors from the Tannenbaum et al. framework as well as those suggested by the aforementioned researchers can be subsumed in individuals' regulatory foci (Lanaj, Chang, & Johnson, 2012). Regulatory focus theory (Higgins, 1997) describes how people self-regulate through two coexisting systems that cater to different needs during goal pursuits: (1) promotion-focused and (2) prevention-focused strategies. *Promotion-focused strategies* are concerned with engaging in activities that enable goal attainment, whereas *prevention-focused strategies* are concerned with avoiding activities or obstacles that would impede goal attainment. Lanaj et al. (2012) found support for the role of regulatory focus as a mediator of more distal effects of personality such as conscientiousness, extraversion, and neuroticism (Hoyle, 2010; McCrae & Lockenhoff, 2010) on job performance.

Johnson, Smith, Wallace, Hill, and Baron (2015) argued that individuals "using a promotion focus strive for goals through self-growth and pursuit of their ideal selves . . . they actively pursue goals by trying out numerous behaviors to see what works" (p. 1503). Gorman et al. (2012) argued that promotion-focus is related to learning goal orientation as it also concerns goal achievement in growth and mastery situations. Additionally, they found support for the notion that promotion focus is distinguishable from related concepts such as learning- and performance-goal

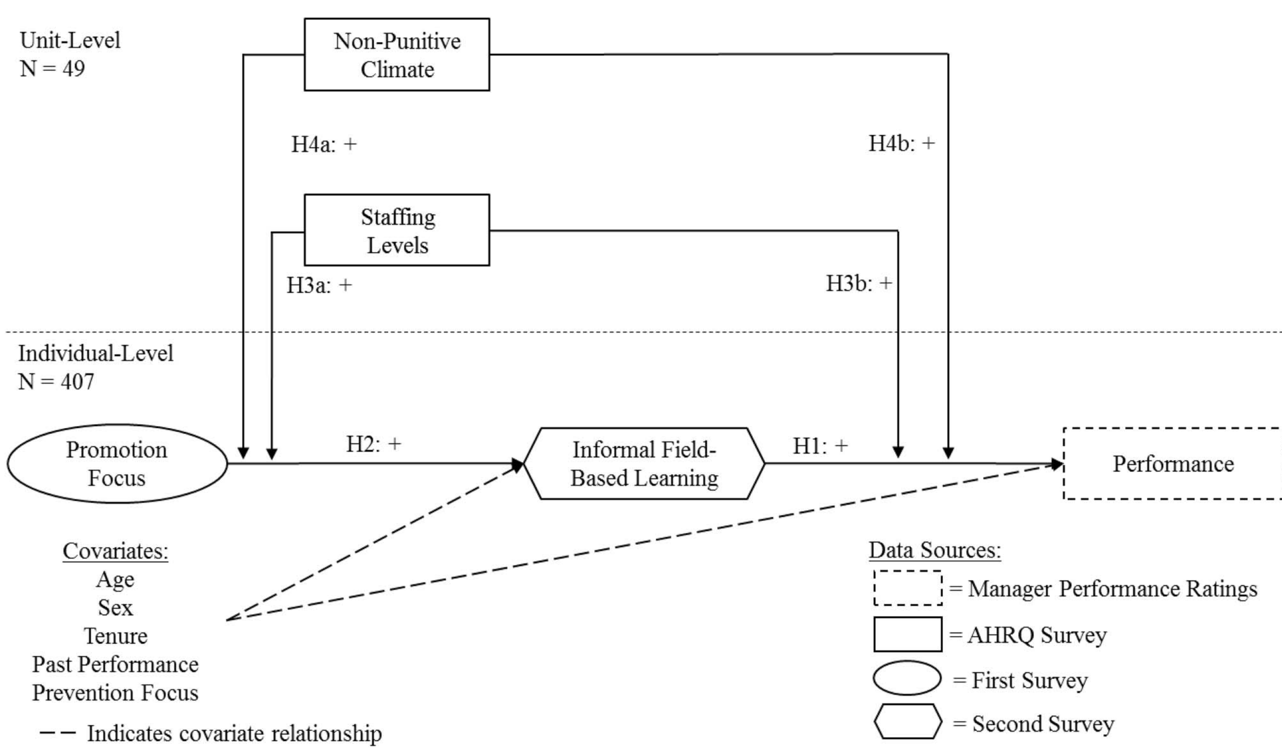

Figure 1. Hypothesized relationships.

orientations, and furthermore found learning goal orientation to be an antecedent of promotion-focus ($\rho = .38$).

Given that IFBL involves behaviors that are informal, intentional, and self-directed toward bettering ones' knowledge and skills, it would be particularly well-aligned with a *promotion regulatory focus*. Promotion-focused employees may be more open to new ideas and have an exploratory approach to the world around them, and would consequently exhibit adaptive behaviors (Friedman & Förster, 2001). Furthermore, Lanaj et al. (2012) suggested that promotion-focused employees may strive to engage in adaptive performance behaviors such as learning new skills or ways of performing their jobs. In contrast, engaging in IFBL behaviors may be seen as a deviation from job norms and task requirements which is inconsistent with a prevention focus which acts to avoid obstacles in pursuit of end-states and focuses on meeting minimal standards of performance (Higgins, 1997). In other words, we see no basis to anticipate a significant relationship between individuals' prevention focus and their IFBL behaviors. Nevertheless, inclusion of individuals' prevention focus in our study helps to illustrate differential influences associated with IFBL. Therefore, although we include both regulatory foci in our model, we only hypothesize a relationship for promotion focus. Given that IFBL describes intentional and self-directed actions designed to develop one's KSAOs, it aligns well with individuals' promotion focus. In contrast, we believe that there is little reason to expect a significant relationship between individuals' prevention focus and IFBL.

> *Hypothesis 2:* Individuals' promotion focus has a positive relationship with IFBL behaviors.

Contextual influences. Tannenbaum et al. (2010) argued that some organizational environments provide greater opportunities and encouragement to engage in IFBL behaviors. For example, Kukenberger et al. (2015) recently illustrated that contextual factors such as group processes and states can have significant influences on individuals' informal learning. Health care settings provide a particularly relevant setting for examining IFBL behaviors. On one hand, pressures to be more efficient and to learn valuable skills on the job are at a premium in hospital settings. On the other hand, the importance of adhering to standardized procedures and the consequences of errors are very acute in hospital contexts. Accordingly, hospital settings may impart particularly complex influences on employees' likelihood to engage in IFBL behaviors and their relationship with tangible outcomes.

We seek to identify unit-level task and social relevant cues that may promote or inhibit individuals' propensities to engage in IFBL behaviors such as learning through experimentation, seeking feedback and conducting reflections, as well as vicarious learning. Not all environments offer rich learning opportunities. Moreover, engaging in IFBL behaviors such as observing or talking with an expert may be informative, but such behaviors may also simultaneously pose some risks. Cerasoli et al. (2017) argued that "engaging in ILBs [informal learning behaviors] might present a distraction in some instances, or be perceived as unprofessional behaviors by others" (p. 22). For example, asking for feedback and guidance may be perceived as projecting weakness and could lead to negative assessments (Ashford, Blatt, & Walle, 2003). Likewise, actively experimenting with new work methods takes time and may lead to mistakes or negative outcomes. Such errors may be particularly costly in high stakes environments, such as hospitals. For example, Steven, Magnusson, Smith, and Pearson (2014) reported that nurses in training learned by observing staff who acted as role models. However, questioning job practices or otherwise challenging how things were done proved problematic, because students needed to fit in or risk being failed in their practicum. In short, the promotion focus—IFBL behaviors relationship, as well as the potential for IFBL behaviors to enhance or detract from job performance are likely influenced by various situational characteristics.

Several studies have concluded that organizational and unit factors are significantly related to employees' learning in healthcare environments (e.g., Bump et al., 2015; Goh, Chan, & Kuziemsky, 2013; Mwachofi, Walston, & Al-Omar, 2011). The Agency for Healthcare Research and Quality (AHRQ) is "the lead federal agency charged with improving the safety and quality of America's healthcare system" (see www.ahrq.gov). AHRQ has developed and tested numerous measures of organizational and unit factors related to patient safety climate and outcomes (cf. Sorra, Gray, Streagle, Famolaro, Yount, & Behm, 2016). We focus on the impact of two such factors here: (1) staffing levels and (2) nonpunitive climate. We selected these factors because they have been shown to be particularly salient for learning in healthcare environments (cf. Anderson & Kodate, 2015; Goh et al., 2013; Van der Haar, Segars, & Jehn, 2013).

With the recent adoption of the Affordable Care Act and other changes in healthcare, there are immense pressures and ambiguity concerning hospital staffing levels (Schuman, Chapman, & Alexander, 2014). Hospitals simply need to accomplish more, and more complex work, with leaner staffs than they had to in the past. Consequently, employees are stretched and there is little spare time available. But individuals need ample opportunity to observe, experiment, and reflect upon their work experiences if IFBL is to occur. Tannenbaum and colleagues (2010) also noted that

> . . . organizations employ lean staffing levels and operate with larger spans of control than in the past. As a result, individuals have less "free" time to learn, and supervisors have less time to support on-the-job learning . . . yet, sufficient time is critical for informal learning. (p. 313)

The presence of an adequately staffed unit can be closely tied to the presence of time for learning, as well as the availability of learning opportunities, as there may be additional slack and chances for observation and vicarious learning that may not come at the cost of accomplishing work tasks. When a unit is understaffed, the opportunity to translate and apply new ideas may be limited, as the focus may be primarily on getting work done quickly (Tucker, Edmondson, & Spear, 2001) with reduced monitoring (Elfering, Semmer, & Grebner, 2006) and limited provision of feedback. In contrast, in a well-staffed unit, teamwork tends to be higher (Kalisch, Tschannen, & Lee, 2011; Sorra et al., 2016) and team members can cover and fill in for one another, providing ample "slack" to try newly learned ideas and concepts. Employees in a well-staffed unit should have more time to provide each other with feedback and guidance, such as helping a coworker who is trying out a newly acquired skill or idea. Although promotion-focused individuals are expected to more readily engage in IFBL behaviors, having the resources around them in the form of better staffing should further bolster their readiness to engage in IFBL. Furthermore, the benefit of engaging in IFBL behaviors may not be immediate, and in a short-staffed environment, engaging in IFBL may be seen as a detraction from getting work done. Consequently, individuals who would engage in IFBL in understaffed units may not have enough resources around them to offset potential losses to productivity, whereas individuals engaging in IFBL in well-staffed units may recognize the benefits of IFBL in terms of improved performance. Therefore, we propose the following hypotheses:

> *Hypothesis 3a:* Staffing level moderates the positive relationship between promotion focus and IFBL behaviors such that the relationship becomes stronger as staffing level increase.

> *Hypothesis 3b:* Staffing level moderates the positive IFBL behaviors—change in performance relationship such that the relationship becomes stronger as staffing level increases.

Edmondson (1999) has argued that climates that are safe for interpersonal risk taking are a catalyst for informal learning. A *nonpunitive climate* is characterized by a shared belief that individuals can openly discuss medical errors and identify potential hazards (Kim, An, Kim, & Yoon, 2007). Although a nonpunitive climate is inherently similar to psychological safety, it is distinguishable in that it emphasizes a lack of retribution for mistakes. We chose to use nonpunitive climate as it is more specific to the medical context of our study and is the industry standard measure from the AHRQ. Applying newly learned ideas and concepts is inherently risky, so individuals need to be confident that mistakes stemming from trying new work practices will not be punished (Carmeli & Gittell, 2009; Steven et al., 2014). Noe et al. (2010) argued that having a nonpunitive climate facilitates learners' willingness to try new things, take risks, and explore new ways to work without fear of negative repercussions for their actions. Likewise, a nonpunitive climate provides opportunities for experimentation and feedback seeking without fear of recrimination. Tannenbaum et al. (2010) argued that organizational climate as well as support and encouragement may be key organizational or situational characteristics that could lead to or accentuate the value of informal learning. Although their conceptualization of organizational climate and support and encouragement were specifically informal learning focused, the ideas of a supportive organizational climate are abundantly present in a nonpunitive or psychologically safe climate. As a nonpunitive climate would allow for open communication and the opportunity for interpersonal risk taking, these climates may inherently promote informal learning for individuals with a predisposition to engage in it.

Nonpunitive climates are especially important in healthcare environments. Goh et al. (2013) suggested that "[a] patient safety culture, fostered by healthcare leaders, should include an organizational culture that encourages collaborative learning, replaces the blame culture, prioritizes patient safety and rewards individuals who identify serious mistakes" (p. 420). On one hand, mistakes in a hospital can have dire consequences for patients and employees, and medical mistakes are among the costliest hospital expenses. Therefore, there is great pressure to minimize mistakes and squash the reporting of problems. On the other hand, sharing lessons learned, providing feedback, and developing realistic assessments of risk are vitally important for quality care (e.g., Orlander, Barber, & Fincke, 2002). Thus, though there needs to be a delicate balance in hospitals, the presence of nonpunitive climates within employees' units should strengthen IFBL behaviors—change in performance relationships, by creating a climate where IFBL behaviors can be viewed as positive aspects rather than a distraction from work duties.

Edmondson and Lei (2014) noted that psychological safety, a concept similar to nonpunitive climate, "may play a more important role as a moderator . . . [and] alone may not lead to learning and performance but rather requires the presence of conditions that call for learning and communication" (pp. 34–36). Individuals may engage in IFBL behaviors but then be reluctant to apply what they have learned unless they feel safe doing so, inhibiting the performance improvements that often accrue through innovative problem-solving and error-based learning. A nonpunitive climate should increase promotion-focused employees' willingness to engage in IFBL behaviors and ultimately use what they learn from IFBL behaviors, making performance improvements more likely. Therefore, we propose the following hypotheses:

> *Hypothesis 4a:* Nonpunitive climate moderates the positive promotion focus—IFBL behaviors relationship such that the relationship is becomes stronger as nonpunitive climate increases.

> *Hypothesis 4b:* Nonpunitive climate moderates the positive IFBL behaviors—change in performance relationship such that the relationship is becomes stronger as nonpunitive climate increases.

In sum, the purpose of this investigation is to examine factors associated with IFBL—performance relationships. In the first study, we develop and provide psychometric evidence supporting the use of an IFBL survey instrument. Then, in the second study, we test our hypothesized relationships using a cross-level temporally lagged design and data collected from multiple sources.

Study 1—Construct Validation of IFBL

In Study 1, we validate the construct of IFBL using three samples. We first describe the item generation process for the IFBL measure and then use a sample of individuals to conduct content validity judgments and subsequent item reduction. Next, we conduct our initial construct validation in a diverse sample of workers and demonstrate convergent validity between our scale and a series of other commonly used informal learning scales. Finally, we demonstrate reliability of our IFBL scale with an employee healthcare sample.

Item Generation

Given our particular focus, we developed multiitem scales targeting the three specific subdimensions of informal learning aligned with our IFBL construct. Based on our understanding of the literature and our a priori articulated dimensions of IFBL, the second and third authors drafted an initial set of approximately 20 items for potential use. We then considered them in the context of our IFBL definition, and deleted, revised, and edited the items until we agreed that they fit our construct domain. This process went through several iterations until we had a consensus on the 11 items.

Sample 1

We followed the Hinkin and Tracey (1999) method for demonstrating content validity (Colquitt, Baer, Long, & Halvorsen-Ganepola, 2014). We administered a content validity survey to 32 participants, which included PhDs, PhD students, and advanced undergraduates, and asked them to indicate the extent to which items were consistent with each of the three dimensions of IFBL using a 5-point scale: 1 = *not at all* to 5 = *completely*. The results of a series of repeated measures analysis of variance (one per item) revealed that two of the items were not classified significantly ($p > .05$) more often as associated with their intended dimension. The remaining nine items (listed in Table 2) were each rated as more significantly ($p < .05$) related to their respective predetermined subscales than the other two subscales.

Sample 2

Respondents. Next, we conducted our initial construct validation using a diverse sample of 400 individuals on the Amazon Mechanical Turk (MTurk) platform (e.g., Cheung, Burns, Sinclair, & Sliter, 2016) who answered survey items regarding our and other measures of informal learning in the workplace. This sample was 55.3% female, their average age was 37.26 ($SD = 9.9$) and their average organizational tenure was about 6.0 years ($SD = 6.4$). The sample was 79.5% White, 8.3% African American, 5.3% Hispanic or Latino, and 5% Asian, with the remaining 1.9% distributed across other categories. The sample was representative of over 20 different industries, of which the highest percentages were educational services (18%) followed by healthcare and social assistance (10.8%) and a variety of others ranging from agriculture, forestry, fishing and hunting, to finance and insurance.

IFBL measure. All IFBL items were preceded with the following stem: "Over the last 9 months, how much new learning, knowledge, skill, competencies or expertise have you gained through each of the following actions?" and responded to using a 5-point scale with the following anchors: 1 = *no learning*, 2 = *a little learning*, 3 = *a moderate amount of learning*, 4 = *a lot of learning*, 5 = *a great deal of learning*. The resulting internal consistency estimates for the three subscales were (1) feedback and reflection-based learning ($\alpha = .75$), (2) vicarious learning ($\alpha = .72$), and (3) learning through experimentation and new experiences ($\alpha = .74$).

Confirmatory factor analyses (CFA). To test the psychometric properties of this measure, we fit a three-factor CFA to the nine item responses using MPlus 7.2 (Muthén & Muthén, 2004). To gauge model fit, we report the comparative fit index (CFI; Bentler, 1990) and the standardized root mean squared residual (SRMSR; Hu & Bentler, 1999). Following recommendations from Mathieu and Taylor (2006), we consider models with CFI values < .90 and SRMSR values > .10 as deficient, those with CFI > .90 to < .95 and SRMSR > .08 to < .10 ranges as acceptable, and ones with CFI > .95 and SRMSR < .08 ranges as excellent. The three factor model item loadings are shown in Table 2 and exhibited acceptable fit indices, $\chi^2(24) = 78.348$, $p < .001$; CFI = .955; SRMR = .034. The three-factor model also fit significantly better, $\Delta\chi^2(3) = 82.604$, $p < .001$, than a single factor model, $\chi^2(27) = 160.952$, $p < .001$; CFI = .890; SRMR = .052. However, the correlations among the latent variables in the three-factor model were quite high (i.e., feedback—vicarious, $r = .85$; feedback—experimentation, $r = .74$; and vicarious—experimentation, $r = .77$, $ps < .001$). We therefore fit a higher order CFA model by mapping the three subdimensions to a single higher level IFBL factor. This model yielded the same fit indices as the three-dimensional single-level CFA because it has the same number of degrees of freedom; but importantly, all three second-order factor loadings were positive and significant (i.e., λs: feedback = .91, vicarious = .94, and experimentation = .82, $ps < .001$), and a composite of the first-order factors was quite reliable ($\alpha = .86$).[1]

Convergent validities. In addition to responding to IFBL items, the MTurk participants responded to a series of survey items from widely used informal learning scales. We administered the 10-item Noe et al. (2013) informal learning scale ($\alpha = .81$), which significantly correlated with our nine-item informal learning, $r = .67$, $p < .001$. Additionally, we administered seven-item Morrison (1995) scale on information seeking ($\alpha = .82$), Lohman's (2005) eight-item informal workplace learning scale ($\alpha = .81$) and Choi and Jacobs (2011) 11-item scale ($\alpha = .84$), all of which significantly correlated with our IFBL scale ($rs = .67, .67, 63$, $ps < .001$; respectively). The significant correlations between our IFBL scale with these other well-established scales demonstrate the convergent validity of our measure. Notably, we conceptualize IFBL as a subset of the larger informal learning domain, and thus we see our scale as capturing a focused subset of the informal learning space, rather than being a replacement for the aforementioned scales.

Sample 3

Setting and respondents. Given that our substantive hypotheses are going to be tested in a healthcare setting, we leveraged another healthcare sample to evaluate our IFBL measure in that setting. This research was conducted with a consortium of five hospitals in the mid-Atlantic region of the United States as part of a larger program of research. Organizational records indicate that over 18,000 employees work at these facilities, and we gathered data using multiple sources. This study was approved by the participating hospital's IRB. The IRB approval letter from the hospital was shared with the Editor; however, due to the sensitive nature of the patient population, we have elected not to reveal the hospital's name. With IRB approval, we accessed the hospitals' Human Resource (HR) records to gather employees' demographics as well as performance evaluations over time. We measured individuals' regulatory focus with a survey that we administered to over 4,000 employees. We indexed the hospitals' work contexts using employees' ($N = 3{,}148$) responses to an industry standard survey developed by the AHRQ (Sorra et al., 2016). This survey was periodically administered by these hospitals for feedback and development purposes. Approximately 18 months after the

[1] We also administered this measure to two additional samples of hospital employees and found acceptable internal consistencies for the three first-order factors and for the overall scale. CFA analyses of those data were consistent with the ones reported here. Further details are available from the corresponding author.

Table 2
Confirmatory Factor Analysis Results for Informal Field-Based Learning Scale

	Latent factors								
	Sample 2 (N = 400)			Sample 3 (N = 1,707)			Sample 4 (N = 407)		
IFBL subdimensions and items	1	2	3	1	2	3	1	2	3
Feedback/Reflection-Based Learning									
1. Actively seeking feedback from others	.722			.786			.778		
2. Seeking and receiving coaching or advice from job experts	.918			.918			.927		
3. Debriefing or discussing on-the-job experiences	.796			.804			.851		
Vicarious Learning									
4. Intentionally observing someone do his or her job		.769			.853			.806	
5. Asking questions of an expert		.870			.827			.750	
6. Having someone show you how to do something.		.751			.887			.915	
Learning Through Experimentation/New Experiences									
7. Performing a task in a new and different way			.906			.926			.940
8. Actively seeking and experiencing new assignments, situations, or tasks.			.935			.874			.838
9. "Trial and error" to uncover a new or better solution.			.821			.710			.746

Note. Standardized loading depicted. All values are $p < .001$. 1, 2, and 3, indicate the latent factors for each sample.

AHRQ survey, we administered a second survey to a cross section of 3,541 employees which included a measure of IFBL behaviors. Data from some of the research participants have been used in other unrelated investigations and were excluded here (e.g., other aspects of the AHRQ survey).

We used data from 1,707 employees who answered the survey containing the IFBL measure. This sample was 83.2% females, their average age was 42.15 (SD = 11.6) and their average organizational tenure was about 7.4 years (SD = 8.4). The sample was 57.5% White, 16.5% African American, 9.4% Asian, with the remaining 16.6% widely distributed over other categories. Over 200 job titles were represented in this sample, with the highest percentages being nurses (37.8%), followed by technicians (9.8%) and a wide variety of other jobs ranging from pharmacist to receptionist. This distribution is not only representative of the hospitals that we sampled here, but also the consortium in general.

IFBL measure and CFA. We used the same nine item measure of IFBL behaviors that we developed in Sample 1. The measure includes three subscales: (1) Feedback and Reflection Based Learning (α = .84), (2) Vicarious Learning (α = .83), and (3) Learning through Experimentation and New Experiences (α = .81). To test the psychometric properties of this measure, we fit a three-factor confirmatory factor analysis (CFA) to the nine item responses using MPlus 7.2 (Muthén & Muthén, 2004). The three-factor model item loadings are shown in Table 2 and exhibited acceptable fit indices, $\chi^2(24) = 273.75$, $p < .001$; CFI = .972; SRMR = .026. The three-factor model also fit significantly better, $\Delta\chi^2(3) = 516.77$, $p < .001$, than a single factor model, $\chi^2(27) = 790.52$, $p < .001$; CFI = .914; SRMR = .044. The correlations among the latent variables were quite high (i.e., feedback—vicarious, r = .85; feedback—experimentation, r = .82; and vicarious—experimentation, r = .87; ps < .001), and evidenced significant second-order factor loadings (λs: feedback = .89, vicarious = .96, and experimentation = .90; ps < .001), and a composite of the first-order factors was quite reliable (α = .91).

Study 2

Our substantive hypotheses were tested using a second sample from our healthcare setting. Specifically, we identified 407 employees from 49 work units for which we had complete data available for testing our hypotheses. No participants from Sample 3 were included in this sample. A priori power analyses suggested that a sample of > 300 would provide sufficient power (i.e., > .90) for our analyses (see Mathieu, Aguinis, Culpepper, & Chen, 2012). Comparisons of our two healthcare sample demographic distributions against HR records for employees throughout the consortium suggest that they are representative of the larger population of employees.

Sample and Procedures

For this sample, we selected individuals who had responded to both surveys that we administered, had performance evaluations available in HR archives from both before and after they completed the IFBL measure (i.e., second survey), and who were members of hospital units for which we had three of more responses to the AHRQ survey. This resulted in a completely separate sample of 407 employees of which 82% were women and their average age was 46.2 (SD = 10.8) years. The sample was 60% White, 18% African American, 8% Asian, and the remaining 14% were widely distributed over other categories. Over 100 job titles were represented in this sample, with the highest percentage being nurses (18.4%), followed by technical specialists (e.g., lab or radiological technicians, 13.3%), general technicians (7.9%), and otherwise similar to Sample 3. These percentages were comparable to the employee populations across the five hospitals.[2] We z-score

[2] Given that our sample comes from five different hospitals we initially nested units in their respective hospitals and ran a three-level hierarchical linear model (HLM3) with performance as the outcome and saw that there was no significant ($p > .05$) variance attributable to the hospital level. Consequently, we proceeded with our analyses using two-level hierarchical linear modeling (HLM2).

our variables at their respective levels of analysis to facilitate interpretation, effectively grand-mean centering our lower level predictors.

Work Context Measures

The AHRQ survey contains 42 Likert-type items that are responded to using 5-point anchors that range from (1) *strongly disagree* to (5) *strongly agree*. The AHRQ has several a priori dimensions that are designed to index patient safety culture and management practices. We focused on two factors that were hypothesized to relate to employees' IFBL as detailed in the following text.

Anonymous respondents ($N = 3{,}148$) completed the AHRQ survey. Notably, individuals included in Samples 3 or 4 may have responded to this survey, although we have no way of knowing given that it was completed anonymously. Our focal IFBL sample was drawn from 49 hospital units for which 1,683 responses to the AHRQ survey were available. The number of respondents per unit ranged from three to 108 with a mean response rate of 89% ($SD =$ 13%) for nonpunitive climate and 90% ($SD = 11\%$) for staffing levels. Notably, response bias was probed in sensitivity analyses presented in Appendix A and appeared not to be a major factor in driving the findings. Employees were asked to indicate their "work area/unit" and then to keep it in mind when answering the survey. Thus, our measures represent referent-shift scales that must evidence sufficient within-unit agreement to justify aggregation (Chen, Mathieu, & Bliese, 2005). Accordingly, we computed interrater agreement $r_{wg(j)}$ following James, Demaree, and Wolf's (1984) recommendations, and consider median values $> .70$ as sufficient to support aggregation. Additionally, we calculated intraclass correlations (ICCs): ICC(1) represents the percentage of members' response variance attributable to unit membership, whereas ICC(2) is a reliability index of mean scores. Although ICCs provide information about the relative within versus between unit variance in members' responses, they are a form of interrater reliability and are not equivalent to, and should not be confused with, measures of internal consistency. Therefore, we also calculated the unit-level internal consistencies using the average item response per unit as the inputs. Both work context scales evidenced sufficient within-unit agreement and psychometric properties to warrant use as unit-level indices of work context. We formed scale scores by averaging participants' responses, per scale, within each unit. Note that because these survey responses were anonymous, we could not associate them directly with our sample respondents at the individual level of analysis. However, they do serve as an important separate source of information about the unit contexts of our focal sample.

Staffing levels. We indexed staffing levels using five items (median $r_{wg(j)} = .85$, mean $r_{wg(j)} = .82$, ICC[1] = .11, ICC[2] = .81), $F(48, 1508) = 5.39$, $p < .001$; $\alpha = .88$. Example items include "We have enough staff to handle the workload" and "We use more agency/temporary staff than is best for patient care" (reverse coded).

Nonpunitive climate. We assessed nonpunitive climate using six items (median $r_{wg(j)} = .89$, mean $r_{wg(j)} = .85$, ICC[1] = .08, ICC[2] = .74), $F(48, 1506) = 3.82$, $p < .001$; $\alpha = .85$. Example items include "Staff feel free to question the decisions or actions of those with more authority" and "Staff are afraid to ask questions when something does not seem right" (reverse coded).

Individual-Level Measures

Regulatory focus. We assessed regulatory focus using six items from Wallace and Chen (2006); three items each for promotion and prevention focus. Individuals were asked to "Indicate how often you focus on these thoughts and activities when you are working." Items for promotion focus were "Getting my work assignments done no matter what," "Completing work tasks in a short amount of time," and "Accomplishing as many work tasks as possible" ($\alpha = .79$). Items for prevention focus were "Following hospital rules and regulations," "Completing work duties correctly," and "Fulfilling my work obligations properly" ($\alpha = .88$).

IFBL. We used the same nine-item measure of IFBL behaviors that we developed in Sample 1. The measure includes three subscales: (1) Feedback and Reflection-Based Learning ($\alpha = .84$), (2) Vicarious Learning ($\alpha = .81$), and (3) Learning through Experimentation and New Experiences ($\alpha = .81$). To test the psychometric properties of this measure, we again fit a three-factor CFA to the nine item responses using MPlus 7.2 (Muthén & Muthén, 2004). The three-factor model item loadings are shown in Table 2 and again exhibited acceptable fit indices, $\chi^2(24) = 109.82$, $p < .001$; CFI = .958; SRMR = .032. The three-factor model also fit significantly better, $\Delta\chi^2(3) = 120.85$, $p < .001$, than a single factor model, $\chi^2(27) = 230.67$, $p < .001$; CFI = .900; SRMR = .048, evidenced high latent variable correlations (i.e., feedback—vicarious, $r = .82$; feedback—experimentation, $r = .79$; and vicarious—experimentation, $r = .92$; $ps < .001$) and second-order factor loadings (i.e., λs: feedback = .84, vicarious = .98, and experimentation = .94; $ps < .001$). Therefore, we formed an overall IFBL measure by averaging the three second-order factors ($\alpha = .91$).

Performance. Individuals' performances were indexed using performance evaluations conducted on the employee's hiring date anniversaries by their immediate supervisor. We selected their most recent performance evaluation conducted prior to the measurement of IFBL in the second survey administration (Pre-IFBL), and their most recent performance evaluation conducted after the IFBL measurement (Post-IFBL). Given the timing of data collections, the first evaluation occurred, on average, 16.55 months ($SD = 12.81$) before the second survey, and the second evaluation occurred, on average, 8.80 months ($SD = 3.58$) after the second survey.[3]

The performance evaluations used a balanced-scorecard type approach (Kaplan & Norton, 1992) and included weighted ratings on multiple items from two broad categories: (1) generic system wide factors (e.g., trust, integrity, quality, respect: worth 40% of the total) and (2) job-specific standards (worth 60% of the total). Job analyses were used to determine specific standards per job families in the hospitals. Scale anchors for all competency items were 1 = *unsatisfactory*, 2 = *provisional*, 3 = *competent*, 4 = *commendable*, and 5 = *distinguished*. The average score for each facet was weighted by the assigned value for that factor. Those

[3] Notably, we tested whether the time duration between measures had any significant interactive effects on the relationships reported herein and they did not. Further details are available from the corresponding author.

scores were then summed for an overall performance rating. Ratings were used for both employee development, as well as for evaluative and merit purposes.

In our analyses, we partial out Pre-IFBL performance from Post-IFBL performance such that varying levels of IFBL were being associated with changes in job performance. In other words, partialing out the earlier job performance measures accounts for the stability of performance over time, leaving residual variance which represents changes in employees' rank order of performance. Consequently, other predictors of the latter job performance are related to change over time. Notably, this design also affords us the opportunity to model potential endogeneity influences, as we include the Pre-IFBL performance measure as a predictor of IFBL. If our IFBL behaviors → Post-IFBL performance relationship was subject to endogeneity (potential reverse causation) influences, it should be evident in the Pre-IFBL performance → IFBL behaviors analysis (for more detailed information about this design and analysis, see Cohen, Cohen, West, & Aiken, 2003, pp. 569–573).

Results

Table 3 reports descriptive statistics and correlations among all variables in the model. Given the multilevel design, we used a three-stage model-building approach to test the hypothesized relationships using two-level hierarchical linear modeling (HLM) techniques (Raudenbush, Bryk, & Congdon, 2004). We first fit a baseline, or null, model to determine the percentage of outcome variance that resides within and between units. Notably, we include employees' demographics as covariates to control for potential spurious relationships. Although not of particular substantive interest, Cerasoli et al. (2017) found several correlations between demographics and informal learning. In the second stage, we included both lower and higher level linear effects. The inclusion of Pre-IFBL performance at this stage isolates change variance in the Post-IFBL performance criterion. In the third stage, we introduced the cross-level moderating effects. We first present results predicting changes in job performance, followed by those predicting engagement in IFBL behaviors.

Regions of significance. For the subsequent interactions, we conducted regions of significance tests (Preacher, Curran, & Bauer, 2006) to illustrate the nature of the interaction effect. In short, regions of significance demonstrate at what levels of a moderator *Z*, the conditional *X*–*Y* relationship is significant. Traditionally scholars explored the significance of interactions via a simple slopes approach which explores the significance of interaction effects at one standard deviation above and below the mean of *Z*. However, as Gardner, Harris, Li, Kirkman, and Mathieu, 2017) pointed out, "there is nothing sacred about one standard deviation above or below the mean of the moderator, and the combinations of the complete range of *X* and *Z* values are what give rise to the interactive effect" (p. 17). By employing a regions of significance approach, we can show precisely at what levels of the moderator the *X*–*Y* relationship is significant, which may or may not include one standard deviation above or below the mean.

Job performance. The baseline model using performance as the outcome indicated that there was significant ($p < .05$) variance attributable to units (7%) with the remaining (93%) residing within units. As summarized in Table 4, after accounting for the effects of our covariates, regressing Post-IFBL performance onto IFBL (β = .07, standard error [*SE*] = .04, *ns*) did not evidence a significant unconditional linear effect failing to support Hypothesis 1.[4] Neither staffing ($\gamma = -.03$, *SE* = .06, *ns*) nor nonpunitive climate ($\gamma = .01$, *SE* = .06, *ns*) exhibited significant cross-level direct effects. However, both the IFBL by staffing interaction (Hypothesis 3b: $\gamma = -.11$, *SE* = .04, $p < .05$) and the IFBL by nonpunitive climate interaction (Hypothesis 4b: $\gamma = .15$, *SE* = .04, $p < .001$) were significant. Additionally, neither promotion nor prevention focus had a significant direct relationship with performance change as shown in Appendix B. All totaled, the predictors accounted for 22.5% of the total variance in performance (Snijders & Bosker, 1999). Notably, although the unconditional linear relationship between IFBL and Post-IFBL performance was not significant, failing to support Hypothesis 1, the cross-level interactions on the IFBL—performance relationship reveal a more nuanced relationship.

We plotted the interactions involving IFBL behaviors—Post-IFBL performance relationship by depicting their relations at mean and plus or minus one standard deviation of the contextual moderators. Additionally, we conducted regions of significance tests (Preacher, Curran, & Bauer, 2006) to illustrate the nature of the interaction effect. The shaded area in Figures 2 through 5 represent the observed range of our data, whereas the cross-hashed subareas represent the regions of significance within the range of our data. Interestingly, although the region of significance for IFBL—performance is limited to a positive relationship in Figure 2, contrary to our Hypothesis 3b, the effects became more positive as staffing levels decrease (otherwise known as a *weakening effect*; Gardner et al., 2017), thus failing to provide support for Hypothesis 3b. In other words, the positive relationship between IFBL and performance was limited to the lower 76% of the distribution of staffing levels and was stronger to the extent that staffing levels were relatively lower.

In terms of nonpunitive climate moderation, we anticipated that a positive IFBL—performance relationship would be accentuated to the extent that nonpunitive climate was higher. As shown in Figure 3, the positive IFBL—Post-IFBL performance relationship was indeed evident within the top 51% of the distribution of nonpunitive unit climates. Unexpectedly, however, the interaction exhibited a reversal form and IFBL—performance was significantly negative within the lowest 8% of the distribution of nonpunitive climate. Therefore, Hypothesis 4b was partially supported.

IFBL. The baseline model using IFBL behaviors as the criterion revealed significant variance attributable to units (5%) with the remaining (95%) residing within units. As summarized in Table 5, after accounting for the effects of our covariates, regressing IFBL onto promotion focus (Hypothesis 2: $\beta = .17$, *SE* = .06, $p < .001$), prevention focus ($\beta = -.06$, *SE* = .04, *ns*), staffing ($\gamma = -.08$, *SE* = .08, *ns*), nonpunitive climate ($\gamma = .09$, *SE* = .06, *ns*) which provides support for Hypothesis 2. Moreover, the IFBL by staffing interaction was significant (Hypothesis 3a: $\gamma = .14$, *SE* = .06, $p < .05$), whereas the IFBL by nonpunitive climate interaction was not (Hypothesis 4a: $\gamma = -.00$, *SE* = .06, *ns*) providing support for Hypothesis 3a, but not Hypothesis 4a. Figure

[4] We tested whether slopes vary randomly across units in terms of IFBL, and there was no evidence of significant slope variability.

Table 3
Correlations and Descriptive Statistics for Sample 2 Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
					Individual-level variables							
1. Age	46.26	10.81	—									
2. Sex (1 = female)	.82	.38	.15	—								
3. Tenure (in years)	10.28	8.43	.48***	.03	—							
4. Prevention focus	4.79	.44	–.02	–.09	–.01	(.88)						
5. Promotion focus	4.24	.73	–.04	–.20***	.01	.40***	(.79)					
6. IFBL	3.39	.83	–.06	–.13**	–.05	–.01	.15**	(.91)				
7. Pre-IFBL performance	3.75	.75	.06	–.04	.17**	–.01	–.09	.04	—			
8. Post-IFBL performance	3.60	.63	.17***	–.18***	.18***	–.04	.05	.10*	.42***	—		
					Unit-level variables							
9. Staffing[a]	3.59	.33	–.05	–.04	–.06	.02	–.01	–.01	.05	.00	(.88)	.36*[b]
10. Nonpunitive climate[a]	3.46	.27	–.09	.03	–.09	.02	–.05	.05	–.01	–.04	.47***	(.85)

Note. $N = 407$ individuals in 49 units. Diagonal entries are scale alphas where appropriate (shown in parentheses). IFBL = informal field-based learning.
[a] Unit-level scores were assigned to individuals which means that the standard errors are biased and significance levels should be interpreted cautiously. [b] Unit-level correlation between staffing and nonpunitive climate.
* $p < .05$. ** $p < .01$. *** $p < .001$.

4 depicts the promotion focus by staffing level moderation. As anticipated, the positive promotion focus—IFBL behaviors relationship was accentuated as staffing levels increased, with the effect being significant for the top 67% of well-staffed units, consistent with Hypothesis 3a. Collectively, these predictors accounted for 3.6% of the variance in IFBL (Snijders & Bosker, 1999). As anticipated, prevention focus exhibited no significant relationships with IFBL in this study. Notably, there was also no indication of endogeneity as Pre-IFBL performance relationship with IFBL was not significant ($\beta = .04$, $SE = .05$, *ns*).

Exploratory analysis. To further explore potential relationships in our study and to get a more nuanced understanding of the countervailing unit staffing moderations, we reran our analyses using the three subdimensions of IFBL separately. As illustrated in Figure 5, we found that staffing levels accentuated the positive effect of promotion focus on engaging in both vicarious learning ($\gamma = .14$, $SE = .06$, $p < .05$) and in experimentation ($\gamma = .15$, $SE = .05$, $p < .01$), for the top 71% and 80% of well-staffed units respectively, but not in feedback ($\gamma = .08$, $SE = .05$, *ns*). In other words, promotion-focused individuals more readily engaged in vicarious learning and experimentation, and were more likely to do so in the context of a well-staffed unit. As for the IFBL subdimensions—Post-IFBL performance relationships, staffing levels had a detrimental effect on the vicarious learning relationship for the top 43% of well-staffed units ($\gamma = -.17$, $SE = .07$, $p < .05$), yet had a positive amplifying effect on the experimentation relationship for the top 2% of well-staffed units ($\gamma = .14$, $SE = .07$ $p < .05$). In other words, individuals working in well-staffed units who engaged in vicarious learning saw detrimental changes to their performance evaluations, whereas individuals engaging in experimentation saw positive changes to their performance evaluations. Lastly, the reversal moderating effect of nonpunitive climate on the IFBL—Post-IFBL performance relationship was driven by the vicarious

Table 4
Hierarchical Linear Modeling Analyses of Predictors of Performance

Predictor	Null model	Covariates	Level 1 linear effects	Level 2 linear effects	Cross-level interactions
Intercept	–.04 (.07)	–.23 (.24)	–.26 (.24)	–.26 (.24)	–.30 (.25)
		Level 1			
Age		.01 (.00)*	.01 (.00)**	.01 (.00)*	.01 (.00)**
Sex (0 = male, 1 = female)		–.39 (.12)***	–.37 (.11)**	–.37 (.11)***	–.37 (.11)***
Tenure		.05 (.06)	.05 (.06)	.05 (.06)	.04 (.06)
Previous performance		.39 (.05)***	.38 (.05)***	.38 (.05)***	.38 (.05)***
IFBL			.07 (.04)	.07 (.04)	.07 (.03)*
		Level 2			
Staffing				–.03 (.06)	–.06 (.06)
Nonpunitive climate				.01 (.06)	.02 (.06)
Moderators of IFBL slope					
Staffing					–.11 (.04)*
Nonpunitive climate					.15 (.04)***

Note. $N = 407$ employees in 49 work units. Table values are hierarchical linear modeling parameter estimates with standard errors in parentheses. IFBL = informal field-based learning.
* $p < .05$. ** $p < .01$. *** $p < .001$.

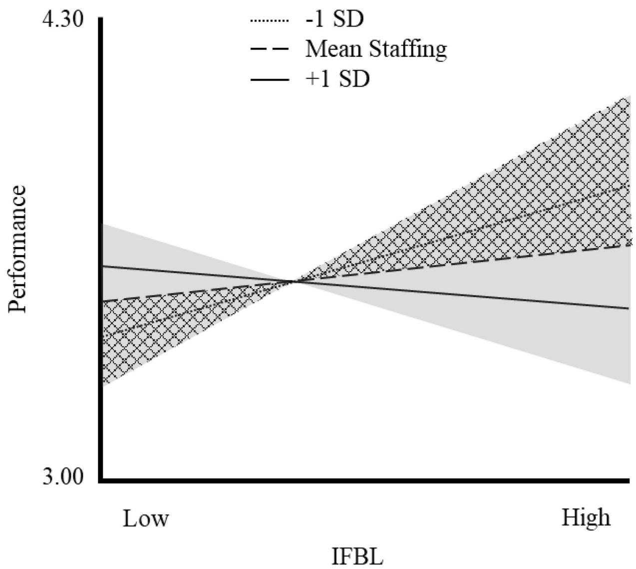

Figure 2. Staffing levels by informal field-based learning (IFBL) interaction as related to post-IFBL performance. Shaded area in the figure represents the range of the observed sample values. Cross-hashed subareas represents the region of significance with α = .05.

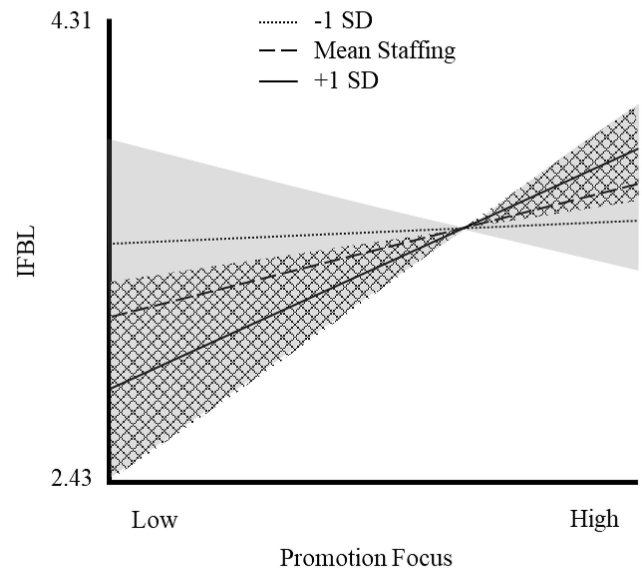

Figure 4. Staffing levels by promotion focus interaction as related informal field-based learning (IFBL). Shaded area in the figure represents the range of the observed sample values. Cross-hashed subareas represents the region of significance with α = .05.

learning subdimension ($\gamma = .19$, $SE = .05$, $p < .001$) and was positive for the top 16%, and negative for the bottom 41% of units with a nonpunitive climate.

In sum, our exploratory results show that the curious effect of staffing on the IFBL –performance relationship was attributable to vicarious learning. Interestingly, it seems that while promotion-focused individuals were more likely to engage in vicarious learning in well-staffed units, they were simultaneously evaluated as worse performers as a result of engaging in those same behaviors in those circumstances. However, engaging in experimentation in well-staffed and/or vicarious learning in nonpunitive units was associated with positive changes in performance.

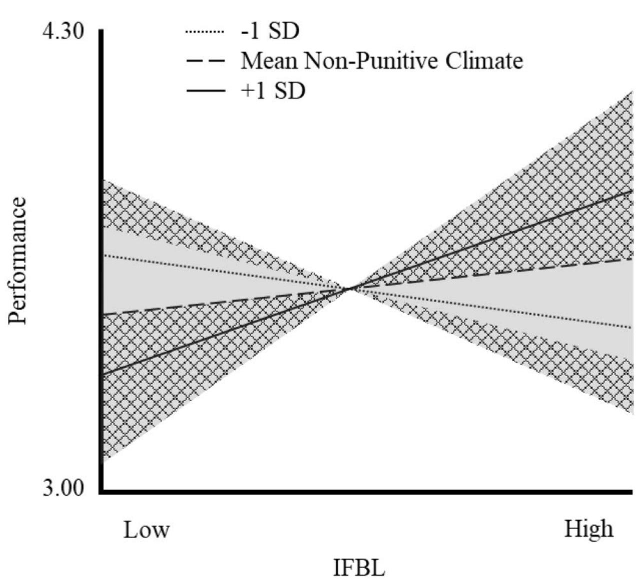

Figure 3. Nonpunitive climate by informal field-based learning (IFBL) interaction as related to post-IFBL performance. Shaded area in the figure represents the range of the observed sample values. Cross-hashed subareas represents the region of significance with α = .05.

Indirect effects analyses. Although we did not formally advance such a hypothesis (see Matheiu & Taylor, 2006), the structure of our model implicitly suggests that promotion focus may have an indirect effect on performance change through IFBL. Evaluating the unconditional effects applying the Selig and Preacher (2008) approach with 20,000 bootstrapping samples and using with results from the Level 2 linear effects models from Table 4 and Table 5 without the interactions, there was no significant effect with the 95% confidence interval ranging between −.001 and .03. However, these results are in fact conditional on three cross-level interactions. Notably, the region of significance for the promotion focus relationship with IFBL was limited to the top 67% of staffing levels. Meanwhile we found two significant moderations of the IFBL—performance change relationship: (1) a negative interaction for staffing levels which was significant for the bottom 76% of staffing units and (2) a disordinal one for nonpunitive climate that was positive for the top 51% and negative for the bottom 8% of nonpunitive climate. Notably, staffing level as a moderator has a strengthening effect on the promotion focus to IFBL relationship, and a weakening effect associated with the IFBL—performance relationship. Taken collectively, the potential region of significance for an indirect effect of promotion focus on performance via IFBL is limited to 22 participants from four units (5.4% of our sample) and is not significant. Therefore, the countervailing interaction effects would negate any conditional, or unconditional, indirect effects emanating from promotion focus through IFBL to performance.

Table 5
Hierarchical Linear Modeling Analyses of Predictors of Informal Field-Based Learning

Predictor	Null model	Covariates	Level 1 linear effects	Level 2 linear effects	Cross-level interactions
Intercept	–.04 (.06)	.39 (.33)	.29 (.32)	.28 (.32)	.30 (.31)
Level 1					
Age		–.00 (.01)	–.00 (.01)	–.00 (.01)	–.00 (.00)
Sex (0 = male, 1 = female)		–.29 (.12)*	–.22 (.12)	–.22 (.12)	–.20 (.12)
Tenure		–.04 (.05)	–.05 (.05)	–.05 (.05)	–.05 (.05)
Previous performance		.04 (.06)	.05 (.05)	.06 (.05)	.04 (.05)
Prevention focus		–.01 (.04)	–.08 (.05)	–.08 (.04)	–.06 (.04)
Promotion focus			.16 (.06)**	.17 (.05)**	.17 (.05)***
Level 2					
Staffing				–.08 (.09)	–.08 (.08)
Nonpunitive climate				.09 (.06)	.09 (.06)
Moderators of promotion focus slope					
Staffing					.14 (.06)*
Nonpunitive climate					.00 (.06)

Note. $N = 407$ employees in 49 work units. Table values are hierarchical linear modeling parameter estimates with standard errors in parentheses.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

There is widespread recognition that IFBL accounts for a larger proportion of employee development than does formal structured training, yet far less research has examined IFBL. Our goals for this study were intended to help to fill that void. To ensure conceptual clarity, first we focused on and defined a particular form of informal learning and specified three dimensions of IFBL behaviors: (1) learning through experimentation and new experiences, (2) feedback and reflection, and (3) vicarious learning. On the basis of that specification, we developed a self-report measure of IFBL behaviors and examined its psychometric qualities, yielding a usable scale for this and future research efforts.

We then developed a contextualized theory of IFBL designed for a healthcare environment. We specified antecedent relations, and IFBL behaviors—change in performance relationships, as moderated by salient healthcare contextual factors. We then tested whether IFBL behaviors result in performance improvements using a significantly stronger research design than those employed in prior studies. Unlike previous research, this study was not method bound; data were collected from four different sources (archival records, aggregated data about work unit attributes from coworkers, manager performance ratings, and two different surveys of employee self-reports). The study also employed a temporally lagged cross-level design indexing both individuals' previous performance and features of their work units several months before self-reports of their regulatory foci and IFBL behaviors, which in turn were used to predict later job performance levels. We hypothesized and found nuanced relationships between promotion focus and IFBL behaviors, as well as between IFBL behaviors and performance improvements. We showed that at high levels, nonpunitive climate has an amplifying effect on the IFBL—changes in job performance relationship, whereas it reverses at low levels and demonstrates a negative relationship. Our exploratory analyses revealed that this reversal was attributable to the vicarious learning subdimension. In effect, these findings suggest that engaging in vicarious learning is welcome in nonpunitive climates, but is perhaps interpreted as lazy or shirking behavior in punitive climates. In any event, these findings underscore the fact that IFBL behaviors are not universally valued.

Elsewhere, staffing levels significantly moderated both promotion focus—IFBL and IFBL—changes in performance relationships, although the effects were countervailing. Our exploratory analyses suggested that the promotion focus—IFBL moderation was attributable to parallel influences of the vicarious learning and experimentation subdimensions. Alternatively, the IFBL—performance moderation was positively moderated by staffing levels for experimentation, yet negatively for vicarious learning. Again, it may simply be that vicarious learning behaviors were likened to shirking in this context, and perhaps more evident in well-staffed units. Interestingly, Schippers, West, and Dawson (2015) found that high pressure environments may lead to beneficial team outcomes in the presence of positive team processes such as team reflexivity. Perhaps in the case of IFBL, the added pressure of staffing shortages may accentuate rather than inhibit the positive effects of IFBL on performance.

Theoretical Implications

From a theoretical perspective, our study illustrates that IFBL is significantly related to changes in job performance but only in specific instances, namely the relationship is positive in the presence of a highly nonpunitive climate, as well as in the presence of poorly staffed units. These results are consistent with Cerasoli et al.'s (2017) meta-analysis that reported significant between-study variability suggesting the presence of moderators. Our findings suggest that promotion-focused individuals are generally more likely to engage in IFBL behaviors, and will do so more readily in well-staffed units. Interestingly, staffing seems to exhibit countervailing effects, as on one hand it promotes engagement in IFBL behaviors, whereas on the other hand, it seems to simultaneously negate the impact of IFBL behaviors on job performance. Notably,

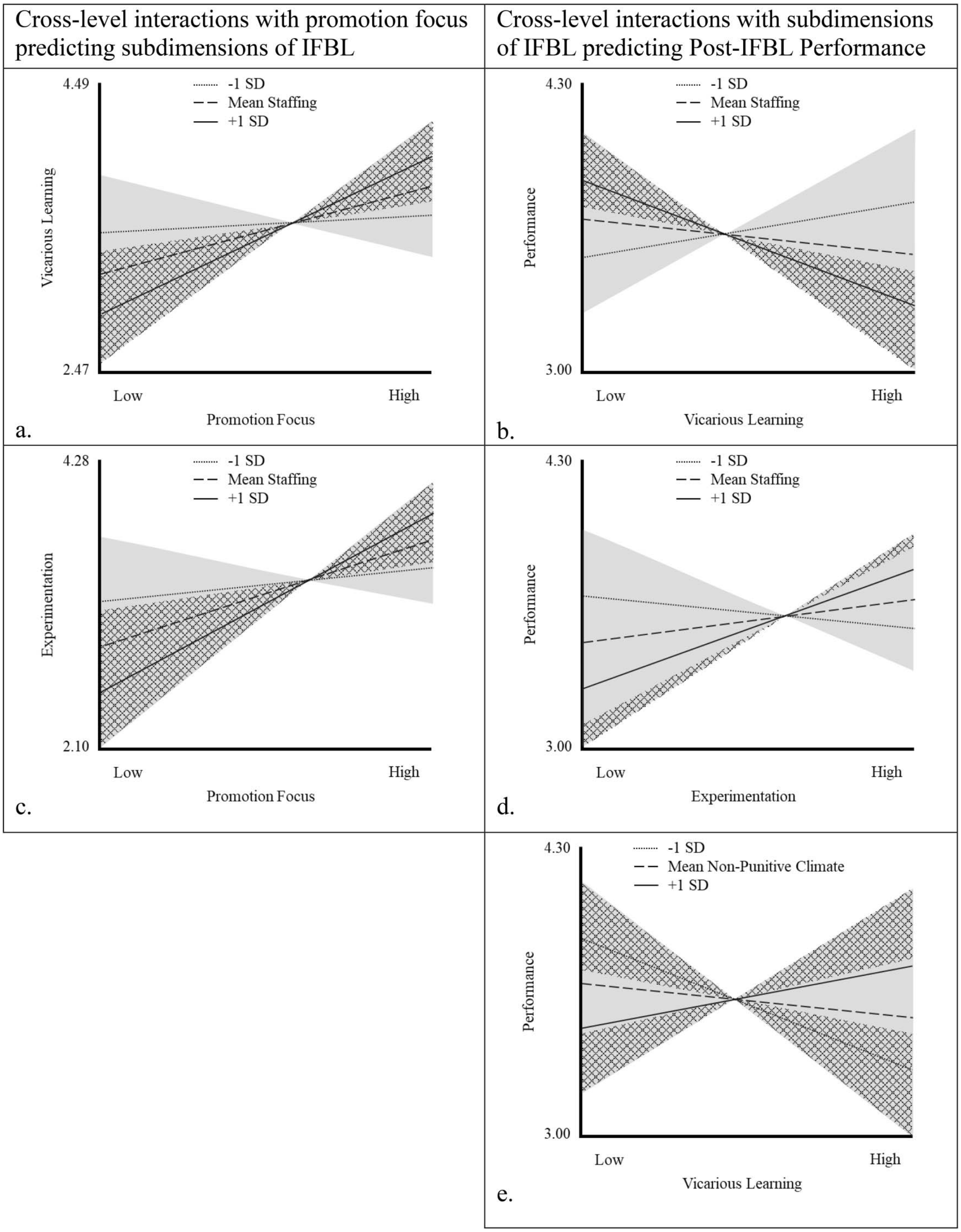

Figure 5. Exploratory interactions with subdimensions of informal field-based learning (IFBL). Shaded area in the figure represents the range of the observed sample values. Cross-hashed subareas represents the region of significance with α = .05.

though the staffing levels moderation had an unanticipated effect on the IFBL—changes in performance relationship, the regions of significance indicated that the relationship was significantly positive in mean to lower than mean staffed levels, and not statistically different from zero in above average staffed units. Perhaps having the presence of more coworkers in the unit acts as a resource for individuals to engage in IFBL behaviors through either observing their coworkers or seeking out feedback. However, engaging in vicarious learning in well-staffed units was related negatively to performance improvements. Well-staffed units have more stable staffing patterns that are in many ways beneficial but that may lead to maintenance of the status quo and limits in learning and innovation (Sorra et al., 2016). Notably, as anticipated, prevention focus exhibited no significant relationships associated with IFBL.

Employees who worked in units with a nonpunitive climate benefited from engaging in IFBL behaviors. Both cross-level moderations exhibited a disordinal form which suggests that engaging in IFBL behaviors in the absence of a suitable context would actually be associated with detrimental changes in performance, whereas, engaging in IFBL behaviors in a suitable environment would be advantageous. Moreover, staffing levels generated countervailing forces, positively moderating the promotion focus—IFBL relationship, yet negatively moderating the IFBL—performance relationship. Detailed follow-up analyses suggested that perplexing influence of staffing levels was attributable to the vicarious learning subdimension of IFBL, perhaps highlighting a discrepancy in watchers versus doers in terms of performance evaluation. In other words, where certain behaviors such as experimentation may be seen as work and evaluated positively, vicarious learning may be perceived as loafing. Apparently adequate staffing levels may liberate promotion-focused people to engage in vicarious learning, but those same behaviors may be perceived as free-riding by managers who evaluate employees' performance. Given the unanticipated nature of these findings, as revealed in exploratory analyses, these results warrant replication tests in future investigations.

Practical Implications

Our study has several practical implications. Under certain circumstances, organizations can benefit from employees engaging in ongoing learning in the field. Therefore, organizations would benefit from better understanding the types of IFBL behaviors in which their employees engage, and the IFBL behavior measure that we developed could provide a useful diagnostic tool. Our moderator analyses suggest that it may be incorrect to assume that simply encouraging employees to experiment, observe, and reflect at work will be enough to ensure that such behaviors will consistently yield improved performance. In particular, vicarious learning behaviors may not be seen as enhancing performance levels when staffing levels are tight. Nevertheless, it is likely that some employees would benefit more from targeted interventions designed to help them learn when and how to engage in constructive IFBL activities. Ironically, perhaps more formal interventions such as training and coaching activities could increase employee readiness to engage in effective IFBL behaviors when subsequent opportunities naturally arise (e.g., training in effective observation, listening, and feedback-seeking skills; providing tips about useful types of learning opportunities they may experience). Moreover, organizational development efforts may be needed in some instances to address work context obstacles and to create conditions under which IFBL behaviors will be most beneficial. For example, establishing a nonpunitive climate is likely to encourage employees to both engage in greater IFBL and for their learning behaviors to result in better performance. When field-based learning is critical for organizational success, staffing units with promotion-focused individuals and ensuring a nonpunitive and collaborative environment could accelerate constructive learning.

The practical implications of staffing levels are more complex. Well-staffed units may enable promotion-focused individuals to engage in more vicarious learning and experimentation behaviors and thereby benefit performance. However, behaviors that are associated with observing others in well-staffed units—"passively" watching rather than "actively" doing—may be perceived as a neglect of work duties, and as such, may be assessed negatively in subsequent performance reviews. In terms of individuals engaging in experimentation, having ample coworkers and a nonpunitive climate would allow for individuals to see benefits in terms of positive changes in performance. However, in terms of vicarious learning, individuals need to be aware that while some IFBL behaviors may be perceived positively, whereas others may have a detrimental effect when they occur in particular contexts.

Strengths, Limitations, and Future Research

Some noted strengths of this study were that we employed a temporally lagged, multilevel design with minimal method variance concerns. Moreover, by accounting for prior job performance levels, we focused on resultant changes in a theoretically relevant and organizationally valued criterion, job performance. Moreover, this study leveraged a diverse sample including participants from over 100 job types. In addition to these strengths, the current study also has a few limitations. First, the participants of the focal study were all sampled from a single industry in one region of the United States, so generalizability to other contexts needs to be tested. Second, we chose to focus on individual and contextual moderator variables that were particularly salient within healthcare settings, and we used a standard industry survey to index work features. Whereas that helped to ground our investigation in the sample context, it may also limit the generalizability of our findings to other settings.

The healthcare context is a dynamic and complex environment (D'Innocenzo, Luciano, Mathieu, Maynard, & Chen, 2016; Purdy, Spence Laschinger, Finegan, Kerr, & Olivera, 2010) where there can be particularly grave consequences of errors (Katz-Navon, Naveh, & Stern, 2009). Additionally, a search of Occupational Information Network (see www.onetonline.org) for the various job titles in our samples revealed that the healthcare context is characterized as requiring frequent communication within close physical proximity, regular work with groups or teams, and an emphasis on criticality and frequency of decision making. Based on the work context features mentioned above, we would expect our results to be relevant for other dynamic and complex environments in which individuals work in teams to make frequent and impactful decisions which may have serious consequences (e.g., public safety environments). In fact, our search revealed that other jobs that have those features include public safety (e.g., police and fire fighters), construction, manufacturing, pilots, flight attendants, power plant managers, air traffic controllers, radio operators, and correctional officers, as well as many others.

As a third potential limitation, we used organizational performance evaluations as our baseline criterion measures. On the one hand, this was a well-developed system that included both weighted universal and job-specific factors in a balance scorecard design. This strategy ensured that our findings represented performance as valued in this context. On the other hand, performance ratings gathered for nonresearch purposes can be contaminated by a variety of influences and have relatively restricted range, so future research using ratings gathered specifically for research purposes might yield stronger or different effects (cf., Harris, Smith, & Champagne, 1995). Furthermore, to the extent that method effects might be evident, the magnitude of linear relationships could be inflated, but cross-level relationships would be less prone to such influences (Ostroff, Kinicki, & Clark, 2002). Furthermore, given that interactions cannot be produced by method effects (Evans, 1985), our primary contributions would not be as susceptible to such threats. Finally, despite the strengths of our design, it was not a truly longitudinal study whereby predictors and criteria are each measured three or more times, and their potential reciprocal relationships modeled (see Ployhart & Vandenberg, 2010). Future research would certainly benefit from stronger research designs, especially ones that introduce interventions aimed at fostering IFBL.

Our findings support the contention that IFBL behaviors can be positive but are not universally efficacious for boosting performance. Furthermore, future research should consider the role of additional characteristics that were suggested by Tannenbaum et al. (2010) to relate to informal learning at both organizational (e.g., climate, time, support and encouragement) and individual levels (e.g., learner motivation, personality characteristics, and self-efficacy). We focused on promotion focus, and although Lanaj et al. (2012) discuss it as a more proximal mediator of the more distal effects of personality variables and goal orientations, there may be value in expanding the scope of individual differences (e.g., conscientiousness and learning goal orientation). Future research should additionally expand the scope of moderators under consideration, including a further examination of the conditions under which specific IFBL behaviors are most beneficial. There is also the need to examine whether organizational interventions, either to change work conditions or prepare employees, can enhance IFBL behaviors and thereby performance. Finally, although our focus has been on changes in current performance, it may also be the case that engaging in IFBL can better prepare employees for future jobs. In other words, IFBL may offer its greatest benefit in terms of generating new opportunities for individuals, and in terms of increasing overall human capital in an organization. These topics, too, warrant further investigation.

In summary, we clarified the construct of IFBL and developed a new measure of it. We also advanced and tested hypotheses concerning direct and moderated relationships between IFBL behaviors and job performance in a healthcare setting. Our findings suggest that promotion-focused employees more readily engage in IFBL behaviors, which can indeed lead to performance enhancements, but not universally. We look forward to future research that further elaborates how best to promote IFBL, and clarifies when increasing IFBL will pay the largest dividends for employees and organizations alike.

References

Anderson, J. E., & Kodate, N. (2015). Learning from patient safety incidents in incident review meetings: Organisational factors and indicators of analytic process effectiveness. *Safety Science, 80,* 105–114. http://dx.doi.org/10.1016/j.ssci.2015.07.012

Ashford, S. J., Blatt, R., & Walle, D. V. (2003). Reflections on the looking glass: A review of research on feedback-seeking behavior in organizations. *Journal of Management, 29,* 773–799. http://dx.doi.org/10.1016/S0149-2063(03)00079-5

Bandura, A. (1962). Social learning through imitation. In M. R. Jones (Ed.), *Nebraska symposium on motivation* (pp. 211–274). Oxford, England: University of Nebraska Press.

Bandura, A. (1999). A social cognitive theory of personality. In L. Pervin & O. John (Eds.), *Handbook of personality* (2nd ed., pp. 154–196). New York, NY: Guilford Press Publications.

Bell, B. S., & Kozlowski, S. W. (2008). Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability. *Journal of Applied Psychology, 93,* 296–316. http://dx.doi.org/10.1037/0021-9010.93.2.296

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107,* 238–246. http://dx.doi.org/10.1037/0033-2909.107.2.238

Biemann, T., & Heidemeier, H. (2012). Does excluding some groups from research designs improve statistical power? *Small Group Research, 43,* 387–409. http://dx.doi.org/10.1177/1046496412443088

Blume, B. D., Ford, J. K., Baldwin, T. T., & Huang, J. L. (2010). Transfer of training: A meta-analytic review. *Journal of Management, 36,* 1065–1105. http://dx.doi.org/10.1177/0149206309352880

Bump, G. M., Calabria, J., Gosman, G., Eckart, C., Metro, D. G., Jasti, H., . . . Buchert, A. (2015). Evaluating the clinical learning environment: Resident and fellow perceptions of patient safety culture. *Journal of Graduate Medical Education, 7,* 109–112. http://dx.doi.org/10.4300/JGME-D-14-00280.1

Carmeli, A., & Gittell, J. H. (2009). High-quality relationships, psychological safety, and learning from failures in work organizations. *Journal of Organizational Behavior, 30,* 709–729. http://dx.doi.org/10.1002/job.565

Cerasoli, C. P., Alliger, G. M., Donsbach, J. S., Mathieu, J. E., Tannenbaum, S. I., & Orvis, K. A. (2017). Antecedents and outcomes of informal learning behaviors: A meta-analysis. *Journal of Business and Psychology*. Advance online publication. http://dx.doi.org/10.1007/s10869-017-9492-y

Chen, G., Mathieu, J. E., & Bliese, P. D. (2005). A framework for conducting multilevel construct validation. In F. J. Yammarino & F. Dansereau (Eds.), *Research in multilevel issues: Multilevel issues in organizational behavior and processes* (Vol. 3, pp. 273–303). Oxford, United Kingdom: Elsevier. http://dx.doi.org/10.1016/S1475-9144(04)03013-9

Cheung, J. H., Burns, D. K., Sinclair, R. R., & Sliter, M. (2016). Amazon Mechanical Turk in organizational psychology: An evaluation and practical recommendations. *Journal of Business and Psychology, 32,* 347–361. http://dx.doi.org/10.1007/s10869-016-9458-5

Choi, W., & Jacobs, R. L. (2011). Influences of formal learning, personal learning orientation, and supportive learning environment on informal learning. *Human Resource Development Quarterly, 22,* 239–257. http://dx.doi.org/10.1002/hrdq.20078

Clardy, A. (2000). Learning on their own: Vocationally oriented self-directed learning projects. *Human Resource Development Quarterly, 11,* 105–125. http://dx.doi.org/10.1002/1532-1096(200022)11:2<105::AID-HRDQ2>3.0.CO;2-5

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Colquitt, J. A., Baer, M. D., Long, D. M., & Halvorsen-Ganepola, M. D. (2014). Scale indicators of social exchange relationships: A comparison of relative content validity. *Journal of Applied Psychology, 99,* 599–618. http://dx.doi.org/10.1037/a0036374

Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85,* 678–707. http://dx.doi.org/10.1037/0021-9010.85.5.678

D'Innocenzo, L., Luciano, M. M., Mathieu, J. E., Maynard, M. T., & Chen, G. (2016). Empowered to perform: A multilevel investigation of the influence of empowerment on performance in hospital units. *Academy of Management Journal, 59,* 1290–1307. http://dx.doi.org/10.5465/amj.2013.1073

Dretske, F. (1981). *Knowledge and the flow of information*. Cambridge, MA: MIT Press.

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44,* 350–383. http://dx.doi.org/10.2307/2666999

Edmondson, A. C., & Lei, Z. (2014). Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior, 1,* 23–43. http://dx.doi.org/10.1146/annurev-orgpsych-031413-091305

Elfering, A., Semmer, N. K., & Grebner, S. (2006). Work stress and patient safety: Observer-rated work stressors as predictors of characteristics of safety-related events reported by young nurses. *Ergonomics, 49,* 457–469. http://dx.doi.org/10.1080/00140130600568451

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26,* 247–273. http://dx.doi.org/10.1080/158037042000225245

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist, 49,* 725–747. http://dx.doi.org/10.1037/0003-066X.49.8.725

Evans, M. G. (1985). A Monte Carlo study of the effects of correlated method variance in moderated multiple regression analysis. *Organizational Behavior and Human Decision Processes, 36,* 305–323. http://dx.doi.org/10.1016/0749-5978(85)90002-0

Flynn, D., Eddy, E. R., & Tannenbaum, S. I. (2006). The impact of national culture on the continuous learning environment: Exploratory findings from multiple countries. *Journal of East-West Business, 12,* 85–107. http://dx.doi.org/10.1300/J097v12n02_05

Freeman, S., O'Connor, E., Parks, J. W., Cunningham, M., Hurley, D., Haak, D., . . . Wenderoth, M. P. (2007). Prescribed active learning increases performance in introductory biology. *CBE Life Sciences Education, 6,* 132–139. http://dx.doi.org/10.1187/cbe.06-09-0194

Friedman, R. S., & Förster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology, 81,* 1001–1013. http://dx.doi.org/10.1037/0022-3514.81.6.1001

Gardner, R. G., Harris, T. B., Li, N., Kirkman, B. L., & Mathieu, J. E. (2017). Understanding "It depends" in organizational research: A theory-based taxonomy, review, and future research agenda concerning interactive and quadratic relationships. *Organizational Research Methods*. Advance online publication. http://dx.doi.org/10.1177/1094428117708856

George, G. (2014). Rethinking management scholarship. *Academy of Management Journal, 57,* 1–6. http://dx.doi.org/10.5465/amj.2014.4001

Gijbels, D., Raemdonck, I., & Vervecken, D. (2010). Influencing work-related learning: The role of job characteristics and self-directed learning orientation in part-time vocational education. *Vocations and Learning, 3,* 239–255. http://dx.doi.org/10.1007/s12186-010-9041-6

Goh, S. C., Chan, C., & Kuziemsky, C. (2013). Teamwork, organizational learning, patient safety and job outcomes. *International Journal of Health Care Quality Assurance, 26,* 420–432. http://dx.doi.org/10.1108/IJHCQA-05-2011-0032

Gorman, C. A., Meriac, J. P., Overstreet, B. L., Apodaca, S., McIntyre, A. L., Park, P., & Godbey, J. N. (2012). A meta-analysis of the regulatory focus nomological network: Work-related antecedents and consequences. *Journal of Vocational Behavior, 80,* 160–172. http://dx.doi.org/10.1016/j.jvb.2011.07.005

Haney, C., & Zimbardo, P. G. (2009). Persistent dispositionalism in interactionist clothing: Fundamental attribution error in explaining prison abuse. *Personality and Social Psychology Bulletin, 35,* 807–814. http://dx.doi.org/10.1177/0146167208322864

Harris, M. M., Smith, D. E., & Champagne, D. (1995). A Field study of performance appraisal purpose: Research versus administrative-based ratings. *Personnel Psychology, 48,* 151–160. http://dx.doi.org/10.1111/j.1744-6570.1995.tb01751.x

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52,* 1280–1300. http://dx.doi.org/10.1037/0003-066X.52.12.1280

Hinkin, T. R., & Tracey, J. B. (1999). An analysis of variance approach to content validation. *Organizational Research Methods, 2,* 175–186. http://dx.doi.org/10.1177/109442819922004

Hirschfeld, R. R., Cole, M. S., Bernerth, J. B., & Rizzuto, T. E. (2013). Voluntary survey completion among team members: Implications of noncompliance and missing data for multilevel research. *Journal of Applied Psychology, 98,* 454–468. http://dx.doi.org/10.1037/a0031909

Hoyle, R. H. (2010). *Handbook of personality and self-regulation*. Malden, MA: Wiley-Blackwell. http://dx.doi.org/10.1002/9781444318111

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1–55. http://dx.doi.org/10.1080/10705519909540118

James, L. R. (2008). On the path to mediation. *Organizational Research Methods, 11,* 359–363. http://dx.doi.org/10.1177/1094428108 0110020801

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology, 69,* 85–98. http://dx.doi.org/10.1037/0021-9010.69.1.85

James, L. R., Mulaik, S. A., & Brett, J. M. (2006). A tale of two methods. *Organizational Research Methods, 9,* 233–244. http://dx.doi.org/10.1177/1094428105285144

Johnson, P. D., Smith, M. B., Wallace, J. C., Hill, A. D., & Baron, R. A. (2015). A review of multilevel regulatory focus in organizations. *Journal of Management, 41,* 1501–1529. http://dx.doi.org/10.1177/0149206315575552

Kalisch, B. J., Tschannen, D., & Lee, K. H. (2011). Do staffing levels predict missed nursing care? *International Journal for Quality in Health Care, 23,* 302–308. http://dx.doi.org/10.1093/intqhc/mzr009

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard—Measures that drive performance. *Harvard Business Review, 70,* 71–79.

Katz-Navon, T., Naveh, E., & Stern, Z. (2009). Active learning: When is more better? The case of resident physicians' medical errors. *Journal of Applied Psychology, 94,* 1200–1209. http://dx.doi.org/10.1037/a0015979

Kim, J., An, K., Kim, M. K., & Yoon, S. H. (2007). Nurses' perception of error reporting and patient safety culture in Korea. *Western Journal of Nursing Research, 29,* 827–844. http://dx.doi.org/10.1177/0193945906297370

Kolb, D. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice Hall.

Koopmans, H., Doornbos, A. J., & Eekelen, I. M. V. (2006). Learning in interactive work situations: It takes two to tango; why not invite both partners to dance? *Human Resource Development Quarterly, 17,* 135–158. http://dx.doi.org/10.1002/hrdq.1166

Kukenberger, M. R., Mathieu, J. E., & Ruddy, T. M. (2015). Cross-level tests of empowerment and process influences on members' informal learning and team commitment. *Journal of Management, 41,* 987–1016. http://dx.doi.org/10.1177/0149206312443559

Lanaj, K., Chang, C. H., & Johnson, R. E. (2012). Regulatory focus and work-related outcomes: A review and meta-analysis. *Psychological Bulletin, 138,* 998–1034. http://dx.doi.org/10.1037/a0027723

Lohman, M. C. (2005). A survey of factors influencing the engagement of two professional groups in informal workplace learning activities. *Human Resource Development Quarterly, 16,* 501–527. http://dx.doi.org/10.1002/hrdq.1153

Lombardo, M. M., & Eichinger, R. W. (1996). *Career architect development planner*. Minneapolis, MN: Lominger.

London, M., & Smither, J. W. (1999). Career-related continuous learning: Defining the construct and mapping the process. *Research in Personnel and Human Resources Management, 17,* 81–121.

Maloney, M. M., Johnson, S. G., & Zellmer-Bruhn, M. E. (2010). Assessing group-level constructs under missing data conditions: A Monte Carlo simulation. *Small Group Research, 41,* 281–307. http://dx.doi.org/10.1177/1046496410363829

Marsick, V. J., Volpe, M., & Watkins, K. E. (1999). Theory and practice of informal learning in the knowledge era. *Advances in Developing Human Resources, 1,* 80–95. http://dx.doi.org/10.1177/152342239900100309

Marsick, V. J., & Watkins, K. (1990). *Informal and incidental learning in the workplace*. London, England: Routledge.

Mathieu, J. E., Aguinis, H., Culpepper, S. A., & Chen, G. (2012). Understanding and estimating the power to detect cross-level interaction effects in multilevel modeling. *Journal of Applied Psychology, 97,* 951–966. http://dx.doi.org/10.1037/a0028380

Mathieu, J. E., & Taylor, S. R. (2006). Clarifying conditions and decision points for mediational type inferences in organizational behavior. *Journal of Organizational Behavior, 27,* 1031–1056. http://dx.doi.org/10.1002/job.406

Maurer, T. J., & Tarulli, B. A. (1994). Investigation of perceived environment, perceived outcome, and person variables in relationship to voluntary development activity by employees. *Journal of Applied Psychology, 79,* 3–14. http://dx.doi.org/10.1037/0021-9010.79.1.3

Maurer, T. J., & Weiss, E. M. (2010). Continuous learning skill demands: Associations with managerial job content, age, and experience. *Journal of Business and Psychology, 25,* 1–13. http://dx.doi.org/10.1007/s10869-009-9126-0

McCrae, R. R., & Löckenhoff, C. E. (2010). Self-regulation and the five-factor model of personality traits. *Handbook of personality and self-regulation,* 145–168. http://dx.doi.org/10.1002/9781444318111.ch7

Miller, L., Mandzuk, C., Frankel, D., McDonald, A., & Bellow, B. (2013). *2013 State of the Industry*. Alexandria, VA: American Society for Training & Development.

Molloy, J. C., & Noe, R. A. (2010). "Learning" a living: Continuous Learning for Survival in Today's Talent Market. In S. W. J. Kozlowski & E. Salas (Eds.), *Learning, training, and development in organizations* (pp. 333–362). New York, NY: Taylor & Francis Group.

Morrison, E. W. (1995). Information usefulness and acquisition during organizational encounter. *Management Communication Quarterly, 9,* 131–155. http://dx.doi.org/10.1177/0893318995009002001

Muthén, L. K., & Muthén, B. O. (2004). *Mplus user's guide*. Los Angeles, CA: Authors.

Mwachofi, A., Walston, S. L., & Al-Omar, B. A. (2011). Factors affecting nurses' perceptions of patient safety. *International Journal of Health Care Quality Assurance, 24,* 274–283. http://dx.doi.org/10.1108/09526861111125589

Newman, D. A. (2003). Longitudinal modeling with randomly and systematically missing data: A simulation of ad hoc, maximum likelihood, and multiple imputation techniques. *Organizational Research Methods, 6,* 328–362. http://dx.doi.org/10.1177/1094428103254673

Newman, D. A. (2009). Missing data techniques and low response rates. In C. E. Lance & R. J. Vandenberg (Eds.), *Statistical and methodological myths and urban legends* (pp. 7–36). New York, NY: Routledge.

Noe, R. A., Clarke, A. D., & Klein, H. J. (2014). Learning in the twenty-first-century workplace. *Annual Review of Organizational Psychology and Organizational Behavior, 1,* 245–275. http://dx.doi.org/10.1146/annurev-orgpsych-031413-091321

Noe, R. A., Tews, M. J., & Dachner, A. (2010). Learner engagement: A new perspective for enhancing our understanding of learner motivation and workplace learning. *The Academy of Management Annals, 4,* 279–315. http://dx.doi.org/10.1080/19416520.2010.493286

Noe, R. A., Tews, M. J., & Marand, A. D. (2013). Individual differences and informal learning in the workplace. *Journal of Vocational Behavior, 83,* 327–335. http://dx.doi.org/10.1016/j.jvb.2013.06.009

Orlander, J. D., Barber, T. W., & Fincke, B. G. (2002). The morbidity and mortality conference: The delicate nature of learning from error. *Academic Medicine, 77,* 1001–1006. http://dx.doi.org/10.1097/00001888-200210000-00011

Ostroff, C., Kinicki, A. J., & Clark, M. A. (2002). Substantive and operational issues of response bias across levels of analysis: An example of climate-satisfaction relationships. *Journal of Applied Psychology, 87,* 355–368. http://dx.doi.org/10.1037/0021-9010.87.2.355

Ployhart, R. E., & Vandenberg, R. J. (2010). Longitudinal research: The theory, design, and analysis of change. *Journal of Management, 36,* 94–120. http://dx.doi.org/10.1177/0149206309352110

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics, 31,* 437–448. http://dx.doi.org/10.3102/10769986031004437

Purdy, N., Spence Laschinger, H. K., Finegan, J., Kerr, M., & Olivera, F. (2010). Effects of work environments on nurse and patient outcomes. *Journal of Nursing Management, 18,* 901–913. http://dx.doi.org/10.1111/j.1365-2834.2010.01172.x

Raudenbush, S. W., Bryk, A. S., & Congdon, R. (2004). HLM 6 for Windows [Computer software]. Lincolnwood, IL: Scientific Software International.

Rothwell, W. J., & Kazanas, H. C. (1994). *Improving on-the-job training*. San Francisco, CA: Jossey-Bass.

Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological Science in the Public Interest, 13,* 74–101. http://dx.doi.org/10.1177/1529100612436661

Schippers, M. C., West, M. A., & Dawson, J. F. (2015). Team reflexivity and innovation: The moderating role of team context. *Journal of Management, 41,* 769–788. http://dx.doi.org/10.1177/0149206312441210

Schuman, I., Chapman, R., & Alexander, M. (2014). *The ACA and staffing: One size does not fit all*. Retrieved from https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/aca-staffing.aspx

Selig, J. P., & Preacher, K. J. (2008, June). Monte Carlo method for assessing mediation: An interactive tool for creating confidence intervals for indirect effects [Computer software]. Available at http://quantpsy.org/medmc/medmc.htm

Sessa, V. I., & London, M. (2006). *Continuous learning in organizations. Individual, group, and organizational perspectives*. Hillsdale, NJ: Lawrence Erlbaum.

Shaffer, J. A., DeGeest, D., & Li, A. (2016). Tackling the problem of construct proliferation: A guide to assessing the discriminant validity of conceptually related constructs. *Organizational Research Methods, 19,* 80–110. http://dx.doi.org/10.1177/1094428115598239

Sitzmann, T., & Ely, K. (2011). A meta-analysis of self-regulated learning in work-related training and educational attainment: What we know and where we need to go. *Psychological Bulletin, 137,* 421–442. http://dx.doi.org/10.1037/a0022777

Snijders, T. B., & Bosker, R. R. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London, UK: SAGE.

Sorra, J., Gray, L., Streagle, S., Famolaro, T., Yount, N., & Behm, J. (2016). *AHRQ Hospital Survey on Patient Safety Culture: User's guide*. Rockville, MD: Westat.

Spreitzer, G. M., McCall, M. W., & Mahoney, J. D. (1997). Early identification of international executive potential. *Journal of Applied Psychology, 82,* 6–29. http://dx.doi.org/10.1037/0021-9010.82.1.6

Stanley, D. J., Allen, N. J., Williams, H. M., & Ross, S. J. (2011). Examining workgroup diversity effects: Does playing by the (group-retention) rules help or hinder? *Behavior Research Methods, 43,* 508–521. http://dx.doi.org/10.3758/s13428-010-0053-9

Steven, A., Magnusson, C., Smith, P., & Pearson, P. H. (2014). Patient safety in nursing education: Contexts, tensions and feeling safe to learn. *Nurse Education Today, 34,* 277–284. http://dx.doi.org/10.1016/j.nedt.2013.04.025

Tannenbaum, S. I. (1997). Enhancing continuous learning: Diagnostic findings from multiple companies. *Human Resource Management, 36,* 437–452. http://dx.doi.org/10.1002/(SICI)1099-050X(199724)36:4<437::AID-HRM7>3.0.CO;2-W

Tannenbaum, S. I., Beard, R. L., McNall, L. A., & Salas, E. (2010). Informal learning and development in organizations. In S. W. J. Kozlowski & E. Salas (Eds.), *Learning, training, and development in organizations,* 303–332. New York, NY: Routledge/Taylor & Francis Group.

Teunissen, P. W. (2015). Experience, trajectories, and reifications: An emerging framework of practice-based learning in healthcare workplaces. *Advances in Health Sciences Education: Theory and Practice, 20,* 843–856. http://dx.doi.org/10.1007/s10459-014-9556-y

Tucker, A., Edmondson, A., & Spear, S. (2001, July 31). Why your organization isn't learning all it should. *Harvard Business Week*. Retrieved from http://hbswk.hbs.edu/archive/2397.html

Van der Haar, S., Segers, M., & Jehn, K. A. (2013). Towards a contextualized model of team learning processes and outcomes. *Educational Research Review, 10,* 1–12. http://dx.doi.org/10.1016/j.edurev.2013.04.001

Wallace, C., & Chen, G. (2006). A Multilevel Integration of Personality, Climate, Self-regulation, and Performance. *Personnel Psychology, 59,* 529–557. http://dx.doi.org/10.1111/j.1744-6570.2006.00046.x

Wasiyo, K. (2009). *Proactive knowledge accessibility and causal clarity: Key factors in improving project management and cross-project learning* (Doctoral dissertation). New York, NY: Teachers College, Columbia University.

Watkins, K. E., & Marsick, V. J. (1992). Towards a theory of informal and incidental learning in organizations. *International Journal of Lifelong Education, 11,* 287–300. http://dx.doi.org/10.1080/0260137920110403

Yorks, L., O'Neil, J., & Marsick, V. J. (1999). *Action learning: Successful strategies for individual, team, and organizational development*. Thousand Oaks, CA: SAGE.

Appendix A

Results of Sensitivity Analyses for Units With Missing Responses

An anonymous reviewer expressed a concern that including units with lower response rates may somehow bias our results and "recommended conducting sensitivity analyses (removing units with below a 50% response rate) to provide further confidence in [our] findings." Although we do not endorse such steps (see more in the following text), we conducted such sensitivity analyses by comparing our final model results for our full sample with models containing only units with response rates greater than or equal 50% and then greater than or equal to 75%. We present the results of these models for our final model from our previous Tables 4 and 5 in Tables A1 and A2 below with the relevant model results bolded.

For comparability purposes, we correlated the parameter estimates from the full sample results with those from the $>$ 50% responses rates, and with those from the $>$ 75% response rates. The corresponding correlations were .998, $p < .001$ and .97, $p < .001$, respectively. Moreover, paired *t*-test comparisons between the parameter estimates were nonsignificant $t = -.40$, *ns* and $t = –1.50$, *ns*. In other words, the different analyses yield the same pattern and magnitude of effects. The only change of substance that occurs when eliminating "low" response rate units is that significance of the conditional IFBL—performance linear relationship in the model containing the interactions (a parameter estimate difference of .04) and the significance of the staffing moderation of the promotion focus—IFBL moderation when imposing an extreme $>$ 75% response rate restriction (a parameter estimate difference of .01). Of course, eliminating units undermines power, restricts the variance of observed scores, and yields a less stable model.

Notwithstanding the preceding text, we feel compelled to address this assumption that low response rates somehow bias results and one should restrict their analyses (or give greater credence) to groups with higher response rates. We find it ironic that because of a concern about missing data, the recommendation is to throw out more data. Moreover, we have heard this so called "50%–60%–70% response rate rule" many times, yet it comes without citations or basis. At issue is that one needs to have a "theory about nonrespondents" and use whatever information is available to inform that theory. In order for a low response rate to represent a threat to validity when using consensus or referent-shift measures, one must assume that nonrespondents differ systematically from respondents in any given group. For instance, Hirschfeld, Cole, Bernerth, and Rizzuto (2013) surmised that, perhaps, people who feel more negatively about their team are less likely to respond. Alternatively, marketing research would suggest that especially satisfied or unhappy customers are more likely to complete ratings than people with less extreme reactions. In any case, several authors have argued against the practice of dropping low responding groups. For example, Hirschfeld et al. (2013) examined this issue and concluded that

(*Appendices continue*)

> [t]he multivariate findings revealed that a greater within-team participation rate was indeed related to a higher team-level (mean) score on team mental efficacy (across all four missing-data techniques) and less dispersion among team member judgments about internal cohesion (when the two modern methods were used). In addition, *results show that a commonly used approach of retaining only those teams with high participation rates produces inflated standardized effect size (i.e., R^2) estimates and decreased statistical power.* (p. 454; emphasis added)

They go on to conclude the following:

> As has been discussed here and elsewhere (e.g., Stanley et al., 2011), the practice of "filtering out" teams with a relatively low participation rate essentially creates a quasi-artificial sample consisting of teams that are homogenous on the construct(s) of interest. *Our findings reveal that this commonly applied practice can have inadvertent ramifications for model specification, standardized effect size, and the interpretability of results. As anticipated, results affirm that excluding teams on the basis of a minimum percentage of respondents per team results in diminished statistical power and distorted criterion variance (model R^2) explained.* (p. 465; emphasis added)

Elsewhere, Biemann and Heidemeier (2012, p. 387) considered the issue in terms of power implications concluding that

> [t]his article aims to contribute to a controversy over whether excluding some small or incomplete groups from a sample improves statistical power in group research designs (designs that relate group-level characteristics to group-level outcome measures). In a series of simulation studies, we examined the tradeoff between lower reliability and smaller sample size that occurs when very small groups, or incomplete groups are excluded. . . . *The results provided evidence that excluding groups is mostly ill-advised and may fail to improve the conclusions that researchers draw from their results.* (p. 387; emphasis added)

Biemann and Heidemeier's findings are consistent with those of Maloney, Johnson, and Zellmer-Bruhn (2010) who conducted extensive monte-carlo analyses of missing response data in group research. They offered the following summary analysis:

> The somewhat surprising result of this analysis is that the lowest possible cutoff rule (i.e., including teams even if there is only one respondent) is unambiguously better in terms of finding a statistically significant relationship between two variables. *When choosing whether to drop groups from the analysis because of low within-group response rate, the negative effect of lower measurement reliability from including low-response groups is outweighed by the positive effect of a larger sample size.* (p. 294; emphasis added)

Maloney et al. (2010) go on to clearly recommend the following:

> *Use all the data. Given the assumptions we used, our Monte Carlo simulation clearly shows that better results are obtained in analyses that use all the data.* Data-handling routines that exclude any teams are less likely to find significant relationships between constructs. Admittedly, the recommendation to use teams even if there is only one respondent goes against the conventional wisdom and standard practice in teams research. However, similar conclusions have been reached by researchers in related fields. For example, Newman (2003) demonstrates that listwise deletion of individuals in longitudinal modeling significantly underperforms other techniques that use all available data. Similarly, Allen et al. (2007) demonstrate that analysis of the effects of dissimilarity in teams is biased if low-response teams are excluded from the analysis. Newman (2009) *suggests that "using all the available data" is "the fundamental principle of missing data analysis."* (pp. 11, 296; emphasis added)

Indeed, Stanley, Allen, Williams, and Ross (2011) even examined this issue when it comes to group composition and predictions from diversity indices, presumably variables that would be most susceptible to such problems. They concluded the following:

> We conducted two sets of experiments using computer simulations to determine the usefulness of group-retention rules. *We found that group retention rules are not a substitute for a high response rate and may decrease the accuracy of observed relations, and consequently, we advise against their use in diversity research.* (p. 508; emphasis added)

In sum, the literature on this issue is pretty clear cut. To date, there has been no research that we know of advocating and justifying excluding (or giving greater credence) groups on the basis of some response rate or minimum number of responses.

(*Appendices continue*)

Table A1
Hierarchical Linear Modeling Analyses of Predictors of Performance

Predictor	Full sample	Response rate ≥50%	Response rate ≥75%
	Level 1 (N = 407)	Level 1 (N = 403)	Level 1 (N = 369)
	Level 2 (N = 49)	Level 2 (N = 48)	Level 2 (N = 45)
Intercept	–.30 (.25)	–.31 (.25)	–.20 (.27)
	Level 1		
Age	.01 (.00)**	.01 (.00)**	.01 (.00)*
Sex (0 = male, 1 = female)	–.37 (.11)***	–.37 (.11)***	–.38 (.11)***
Tenure	.04 (.06)	.05 (.06)	.08 (.06)
Previous performance	.38 (.05)***	.37 (.05)***	.37 (.06)***
IFBL	**.07 (.03)***	**.07 (.03)**†	**.03 (.03)**
	Level 2		
Staffing	–.06 (.06)	–.07 (.07)	–.07 (.07)
Nonpunitive climate	.02 (.06)	.03 (.07)	.05 (.08)
Moderators of IFBL slope			
Staffing	**–.11 (.04)***	**–.11 (.05)***	**–.14 (.05)****
Nonpunitive climate	**.15 (.04)*****	**.15 (.05)****	**.18 (.04)*****

Note. N = 407 employees in 49 work units. Table values are hierarchical linear modeling parameter estimates with standard errors in parentheses. IFBL = informal field-based learning. Bold text represents results of hypotheses tests.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table A2
Hierarchical Linear Modeling Analyses of Predictors of IFBL

Predictor	Full sample	Response rate ≥50%	Response rate ≥75%
	Level 1 (N = 407)	Level 1 (N = 403)	Level 1 (N = 369)
	Level 2 (N = 49)	Level 2 (N = 48)	Level 2 (N = 45)
Intercept	.30 (.31)	.33 (.31)	.43 (.32)
	Level 1		
Age	–.00 (.00)	–.00 (.01)	–.01 (.01)
Sex (0 = male, 1 = female)	–.20 (.12)	–.20 (.12)	–.24 (.12)*
Tenure	–.05 (.05)	–.05 (.05)	–.02 (.05)
Previous performance	.04 (.05)	.04 (.05)	.04 (.06)
Prevention focus	–.06 (.04)	–.05 (.04)	–.04 (.04)
Promotion focus	**.17 (.05)*****	**.16 (.05)****	**.15 (.06)****
	Level 2		
Staffing	–.08 (.08)	–.08 (.09)	–.03 (.08)
Nonpunitive climate	.09 (.06)	.09 (.06)	.10 (.07)
Moderators of promotion focus slope			
Staffing	**.14 (.06)***	**.12 (.06)***	**.13 (.07)**†
Nonpunitive climate	**.00 (.06)**	**.02 (.06)**	**.02 (.07)**

Note. N = 407 employees in 49 work units. Table values are hierarchical linear modeling parameter estimates with standard errors in parentheses. Bold text represents results of hypotheses tests.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

(*Appendices continue*)

Appendix B

Effects of Controlling for Promotion and Prevention in Predicting Changes in Performance

Although we did not hypothesize any direct relationships between neither promotion-focus nor prevention-focus and performance, an anonymous reviewer wanted to see the results with them included which we present in Table B1. Including promotion-focus and prevention-focus in the prediction of performance had no influence on the substantive conclusions that we can draw from these data, and neither evidenced a significant direct effect. The conditional linear effect from IFBL to performance did, however, reduce to a nonsignificant level (i.e., from $\beta = .07$, $SE = .03$, $p < .05$ to $\beta = .05$, $SE = .03$, *ns*) with these two direct effects included; but the point is moot given the presence of the double moderation. That said, we do not endorse these analyses for testing our hypotheses given that partialling out the direct effects changes the base model and is not appropriate when one does not anticipate them. In other words, as James and colleagues (see also, Mathieu & Taylor, 2006) have detailed, there is an important theoretical (and analytic) difference between the two models. Specifically, James et al. (2006) submitted the following:

> The critical difference between the SEM [structural equation modeling] approach [not including unanticipated direct effects] and the B-K [Baron and Kenny] approach [starting with a saturated model—i.e., including direct effects] is the choice of focal or baseline model for mediation. As noted above, the SEM approach follows the parsimony principle by employing the complete mediation model. The B-K approach adopts the partial mediation model as its focal paradigm. The B-K approach adopts the partial mediation model because it is presumed to be the primary explanatory model in psychology (i.e., a majority of mediated relationships in psychology are assumed to follow the partial mediation paradigm). (p. 238)

James et al. go on to say that "Thus, attempts to use $\beta_{ym.x}$ [that from a saturated model] to estimate the M to Y relation in complete mediation models may result in an intractable solution" (p. 241). They further recommended, strongly, that scholars should also test alternative models being clear to specify what they hypothesized and not. James (2008) and Mathieu and Taylor (2006) echoed those recommendations. Accordingly, we support the above analyses as ancillary tests of alternative models, but not as tests of our hypothesized relations.

Table B1
Effects of Controlling for Promotion and Prevention in Predicting Changes in Performance

Predictor	Final model from Table 4	Final model from Table 4 with regulatory focus included
Intercept	–.30 (.25)	–.34 (.26)
	Level 1	
Age	.01 (.00)**	.01 (.00)**
Sex (0 = male, 1 = female)	–.37 (.11)***	–.35 (.11)**
Tenure	.04 (.06)	.04 (.06)
Previous performance	.38 (.05)***	.39 (.05)***
Prevention focus		**–.08 (.04)**
Promotion focus		**.08 (.06)**
IFBL (Hypothesis 1)	**.07 (.03)***	**.05 (.03)**
	Level 2	
Staffing	–.07 (.06)	–.07 (.06)
Nonpunitive climate	.02 (.06)	.03 (.06)
Moderators of IFBL slope		
Staffing (Hypothesis 3b)	**–.11 (.04)****	**–.12 (.04)****
Nonpunitive climate (Hypothesis 4b)	**.14 (.04)*****	**.15 (.04)*****

Note. $N = 407$ employees in 49 work units. Table values are hierarchical linear modeling parameter estimates with standard errors in parentheses. IFBL = informal field-based learning. Bold text represents results of hypotheses tests.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Received December 11, 2016
Revision received August 17, 2017
Accepted August 18, 2017 ■

Correction to Mitchel et al. (2017)

In the article "Cheating Under Pressure: A Self-Protection Model of Workplace Cheating Behavior," by Marie S. Mitchell, Michael D. Baer, Maureen L. Ambrose, Robert Folger, and Noel F. Palmer (*Journal of Applied Psychology*, Advance online publication. August 14, 2017. http://dx.doi.org/10.1037/apl0000254), the fit statistics in Study 3 were reported in error. The fit of the measurement model is: $\chi^2(362) = 563.66$, $p < .001$; CFI = .94; SRMR = .05; RMSEA = .04. The fit of the SEM model is: $\chi^2(362) = 563.66$, $p < .001$; CFI = .94; SRMR = .05; RMSEA = .04.

http://dx.doi.org/10.1037/apl0000275