What is Informal Learning and What are its Antecedents? An Integrative and Meta-Analytic Review

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14. ABSTRACT: Workplace learning is critical to organizations. Hundreds of studies and over a dozen meta-analyses have explored the nature and effectiveness of formal learning in the workplace. Several review chapters and texts have integrated formal learning research findings to aid practitioners and future research. However, not all learning occurs formally. There is a growing consensus that the bulk of learning takes place experientially and informally, with estimates that 70% to 90% of all organizational learning occurs outside of formal training. Given that there has been little systematic treatment of informal learning, we provide a review and synthesis of the literature with two goals. First, we provide an intuitive framework to conceptualize the broader organizational learning domain, using it to position and define informal learning. Second, we utilize an interactionist perspective to explore environmental and personal factors that either enhance or deter informal learning. We then present a series of meta-analyses of existing data to highlight what is known and uncover what is unknown about antecedents of informal learning. We conclude with an agenda for further theorizing and research to promote the understanding and application of informal learning principles in organizations.

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EXECUTIVE SUMMARY

Research Requirement:

Workplace learning is critical to organizations. Hundreds of studies and over a dozen meta-analyses have explored the nature and effectiveness of formal learning in the workplace. Several review chapters and texts have integrated formal learning research findings to aid practitioners and future research. However, not all learning occurs formally. There is a growing consensus that the bulk of learning takes place experientially and informally, with estimates that 70% to 90% of all organizational learning occurs beyond formal training. Unfortunately, theory and research surrounding informal learning remains fragmented. Given that there has been little systematic treatment of informal learning, a review and synthesis of the literature is provided with two goals. First, an intuitive framework is provided to conceptualize the broader organizational learning domain, using it to position and define informal learning. Second, an interactionist perspective is utilized to explore environmental and personal factors that either enhance or deter informal learning. A series of meta-analyses of existing data are then presented to highlight what is known and uncover what is unknown about antecedents of informal learning. An agenda is provided for further theorizing and research to promote the understanding and application of informal learning principles in organizations.

Procedure:

A qualitative review and synthesized definition of the broad learning space and informal learning as a construct is presented. A framework is offered which suggests that organizational learning can vary along three continuous dimensions: 1) formal versus informal; 2) intentional versus incidental; and 3) past- versus future-oriented. Applying this framework, the construct domain of informal learning in organizations is articulated. Second, an interactionist theory is advanced to categorize factors that should facilitate informal learning and submit that both personal and situation factors can enhance or deter informal learning. A meta-analysis, a statistical aggregation of all available quantitative empirical research, is conducted to uncover what is known about antecedents of informal learning. The paper concludes with a discussion of the meta-analytic findings in the context of the larger theoretical framework and outline an agenda for future theory development, research, and application of informal learning principles in organizations.

Findings:

Informal learning is defined in this paper as the non-curricular development of knowledge, skills, and wisdom. It is predominantly self-directed, intentional, and field-based. Informal learning is not lecture-based, discrete, or linear. Quantitative results show that situation factors including job/task characteristics (e.g., demands and resources), support (e.g., managerial), and opportunities for learning foster informal learning. Similarly, informal learning is fostered by person factors including individual drivers (e.g., positive work attitude), capability, and to a

lesser degree, demographics. In general, the findings highlight a number of factors that foster informal learning and indicate where additional research is needed.

Utilization and dissemination of findings:

The qualitative work completed provides a framework for practitioners and researchers to move forward with a common perspective on informal learning. The quantitative work completed confirms the importance of key personal and situational factors as antecedents of informal learning. Future research is needed to better understand how personal and situational factors act together to influence informal learning and thus reveal ways of accelerating informal learning in a given context.

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INTRODUCTION

Employee learning is the lifeblood of modern organizations (Bartlett & Ghoshal, 1998). Organizations have traditionally relied on formal training programs as a means to bolster employee learning. The general premise underlying these programs is that adherence to a discrete, formal curriculum will boost employee learning. Dozens of primary studies and several meta-analyses have demonstrated that formal programs can indeed boost learning, knowledge/skill transfer, and performance. The effect of formal programs has been well documented through meta-analytic research for individuals (Colquitt, LePine, & Noe, 2000) and teams (Salas et al., 2008); for young and old learners (Callahan, Kiker, & Cross, 2003); across a variety of program types (Arthur Jr, Bennett Jr, Edens, & Bell, 2003); and for various program aims (Keith & Frese, 2008; Morris & Robie, 2001). In short, there is little doubt surrounding the efficacy and utility of formal training as a means to boost employee learning.

Yet, not all workplace learning takes place formally. Formal training may be critical and foundational, but research reveals that it is not enough. Traditional training cannot adequately prepare people for all possible scenarios, and is typically not designed to equip individuals for on-going learning (Blume, Ford, Baldwin, & Huang, 2010). Instead, employees often acquire new knowledge and skill on an ongoing basis through informal, non-curricular means (Tannenbaum, Beard, McNall, & Salas, 2010). Many have suggested that the majority of learning and development during one's career occurs as a result of experience (Center-for-Workforce-Development, 1998; McCauley & Brutus, 1998; Morrison, White, & Van Velsor, 1992), not in formalized training settings (Chao, 1997). In fact, over recent years, it has become increasingly apparent that the majority of learning takes place on-the-job, outside formal curricula. Current estimates of the percent of organizational learning that takes place informally range from 70% (Lombardo & Eichinger, 1996) to 80% (Koopmans, Doornbos, & Eekelen, 2006; Marsick & Watkins, 1990), and even over 90% (Flynn, Eddy, & Tannenbaum, 2006; Tannenbaum, 1997).[1] Nonetheless, despite the importance of experiences, simply having an experience does not mean that a person will learn from it (Quinones, Ford, & Teachout, 1995; Tesluk & Jacobs, 1998), and not everyone is inherently good at maximizing learning from their field-based experiences (Maurer & Weiss, 2010).

In short, there is a vital need to better understand how individuals learn informally on the job and develop mechanisms that support and facilitate that learning. In contrast to research that examines the types of formal learning exemplified earlier, there exists no comprehensive theory, meta-analysis, or program of research that has systematically explored the effectiveness, antecedents, or boundary conditions of informal learning. Given the importance of learning to organizational effectiveness, and that perhaps 80% of learning occurs informally, a literature review demonstrating the domain of informal learning is necessary. In the following sections, we

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[1] Importantly, although our focus is in organizational settings, we note these estimates span a number of disciplines and literatures.

pursue two general aims: 1) to understand the construct of informal learning, and 2) to explore its facilitating factors. First, to provide a framework for understanding, we suggest that organizational learning, in general, can vary along three continuous dimensions: 1) formal versus informal; 2) intentional versus incidental; and 3) past- versus future-oriented. Using this broad framework, we articulate the construct domain of informal learning in organizations. Second, we advance an interactionist theory as a way to categorize factors that should facilitate informal learning. As part of this, we argue that both personal and situational factors can encourage or deter informal learning. We then conduct and report a series of meta-analyses that highlight what is known about antecedents of informal learning. Finally, we discuss the meta-analytic findings in the context of the larger theoretical framework and outline an agenda for future theory development, research, and application of informal learning principles in organizations.

Construct Domain of Informal Learning

Despite the importance of informal learning, there is some ambiguity as to its definition and where it is situated in the larger learning domain. As some have suggested (e.g., Schauble, Leinhurdt, & Martin, 1997), this may be due to a lack of an overarching framework to conceptualize the domain and categorize various forms of learning (e.g., lecture, debriefing, adventure learning, mentoring). Driven by the calls of Marsick (2009) and le Clus (2011), and drawing upon the categories proposed by Eraut (2004) and Skule (2004), we suggest that, for most purposes, the broader organizational learning space can be conceptualized along three dimensions: 1) formal vs. informal; 2) intentional versus incidental; and 3) past- versus future-oriented. In the following pages, we elaborate upon this three-axis framework and use it to discuss the relative position of informal learning and related constructs in the greater organizational learning domain. This framework is depicted graphically in Figure 1.

Although "informal learning has been emphasized in past studies, research on workplace learning has lacked a consensually accepted definition of this notion" (Matsuo & Nakahara, 2013, p. 196). Because most researchers have proceeded in isolation from one another, there is some divergence in the facets or components of informal learning that deserve discussion. In part, this is because informal learning has been described in a variety of ways (see Tannenbaum, Beard, McNall, & Salas, 2010). To follow, we apply the three-axis framework of the greater organizational learning space from Figure 1 to discuss and delineate the components of the definition of informal learning. A graphical depiction of our conceptualization of informal learning can be found in Figure 2.

The first dimension of the learning space is the distinction between formal and informal learning. There seems to be consensus on some points surrounding this distinction. At a broad level, informal learning describes anything other than formal learning. Sambrook (2005) suggests that informal learning takes place *in* work via observation, asking questions, practice, and so forth, rather than in a training class or program while *at* work. In contrast, formal learning derives from organizationally designed and sanctioned programs, and requires the directive of another entity as to the content, format, and/or objectives to be learned. In addition, formal learning is discrete, proceeds in a linear fashion, and typically has supporting curricula that establishes learning objectives. By comparison then, informal learning can be said to be characterized by the absence of an external directive as to what or how to learn. Further, informal learning is self-initiated, individually controlled, and occurs outside of formal programs
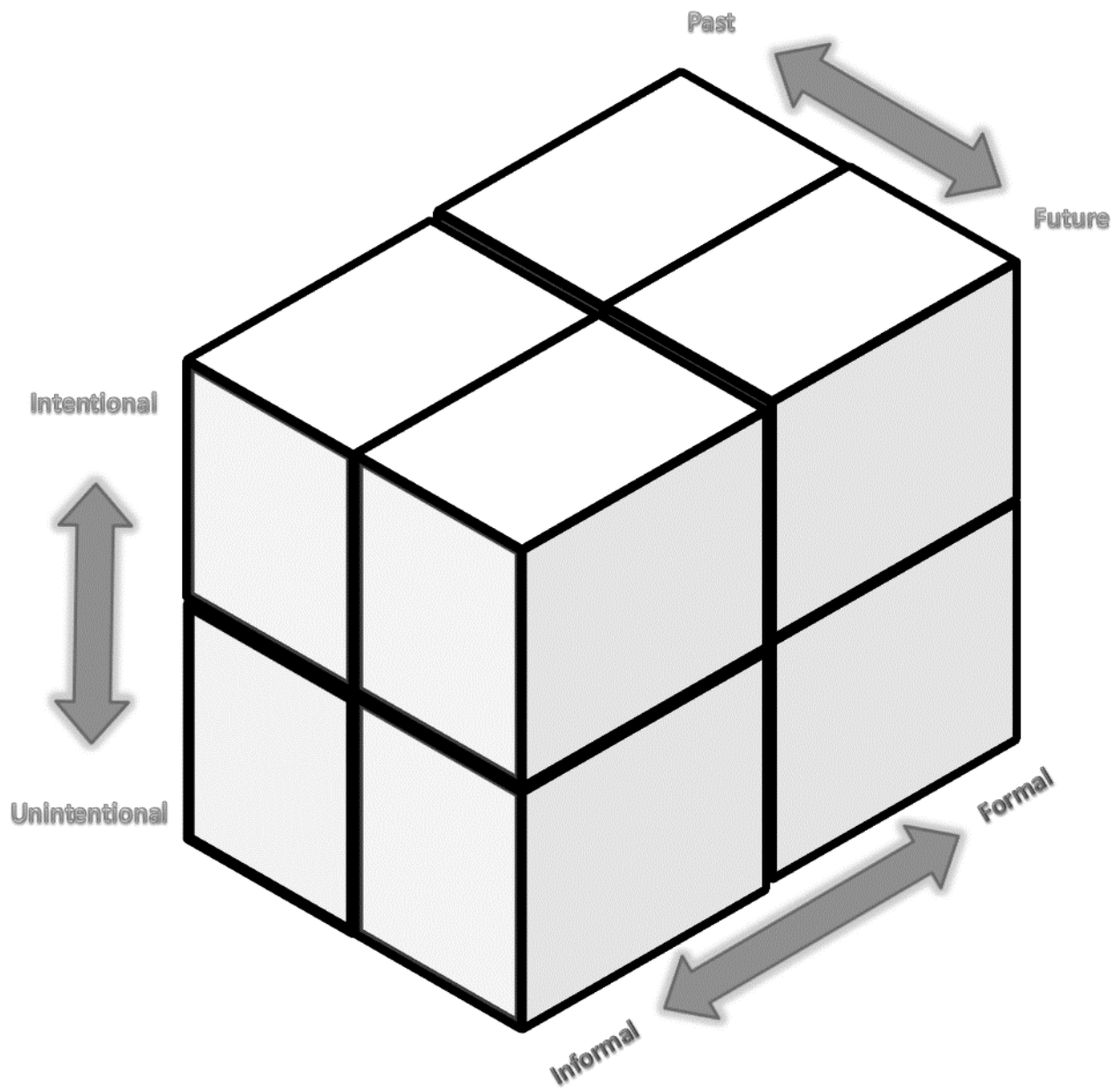
Figure 1. The Three Axis Continuum of the Broader Organizational Learning Space
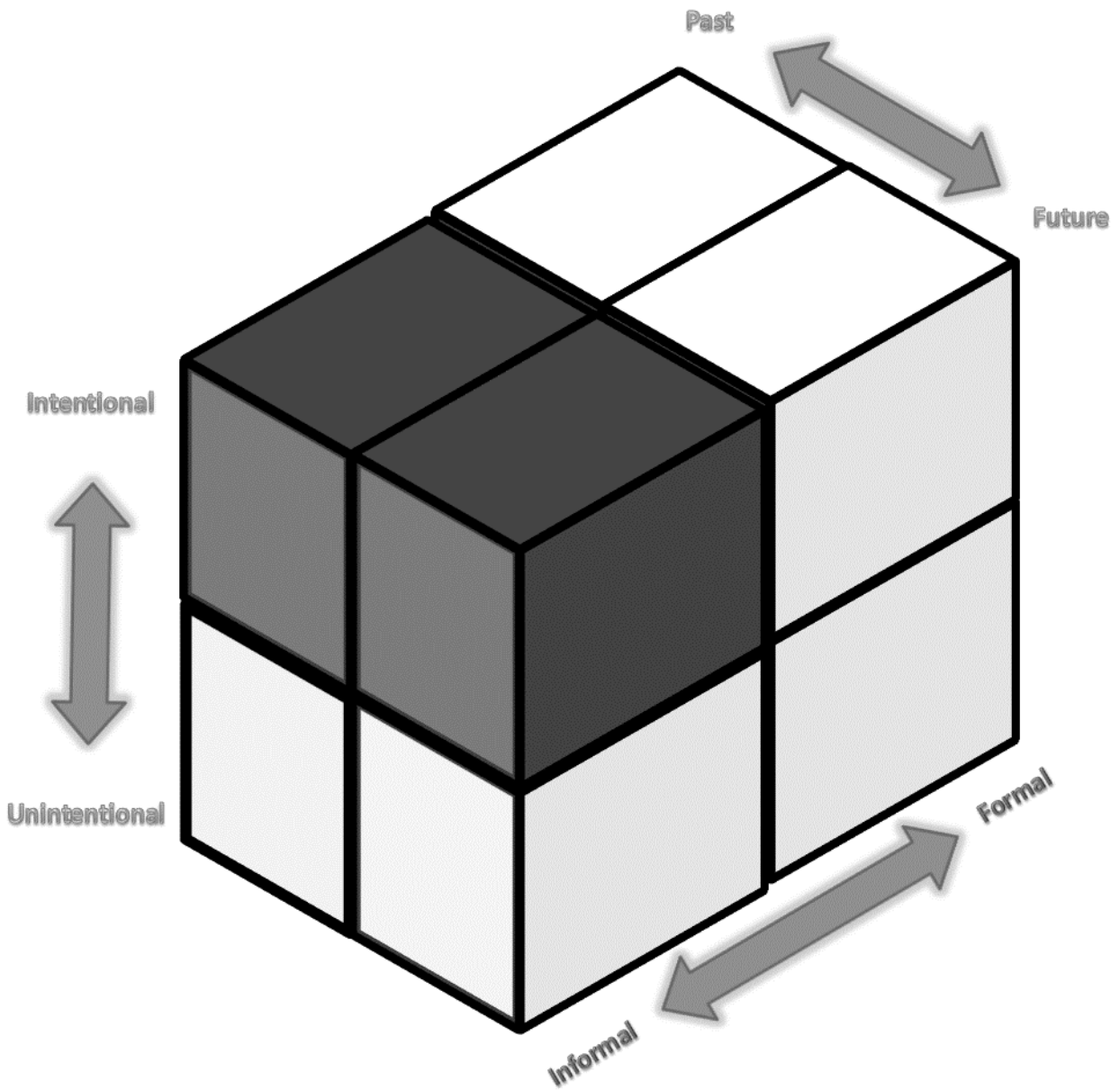
Figure 2. The Portion of the Broader Learning Space Defined as Primarily Informal Learning

(Stamps, 1998). Noe, Tews, and McConnell-Dachner (2010) voice similar thoughts, arguing that, at its core, informal learning is learner initiated and beyond the directives of a formal program.

However, the formal-informal distinction requires further scrutiny because there exists some divergence as to what is considered "beyond" formal learning programs. Several take the perspective that informal learning does not occur in a formal learning setting such as in a classroom or via mentorship (Bear et al., 2008; Noe, et al., 2010; Tannenbaum, et al., 2010). However, others take a more general perspective by drawing the boundary not around the physical setting, but around the program of learning (or lack thereof). Koopmans, et al. (2006) note that "adult learning—and perhaps learning in general—is clearly situated within the activity in which it takes place" (p. 137). Their intended implication is that informal learning can occur *within the confines* of, but *not as a part of*, formal learning. Thus, informal learning might occur in the classroom as an unintended, non-curricular byproduct of the formal lesson. Others suggest informal learning can occur during team meetings, customer interactions, supervision, mentoring, shift changes, person–to–person communications, job exploration, reviewing documentation, and simply executing one's job (Ellinger, 2005; Marsick & Volpe, 1999). Informal learning can occur just about anywhere at any time, such that "neither the size or complexity of the work context nor the magnitude of the changes taking place in the environment make a substantial difference in terms of informal learning" (Marsick, Volpe, & Watkins, 1999, p. 80). We suggest the problem is that the formal-informal distinction implies or imposes something of a false dichotomy where a true continuum exists. More simply put, it may be more reasonable to assume that learning can range in various degrees from formal to informal.

Degree of intentionality represents another distinguishing feature for forms of learning. We suggest organizational learning can be classified by the degree to which it occurs either purely by accident (unintentionally) or through conscious deliberation (intentionally). Some have suggested that informal learning occurs mostly at the unintentional side of the continuum. Ellinger (2005) has argued that informal learning takes place when the learner does not set out to purposefully learn something. Similarly, Gola (2009) suggests informal learning is often implicit or incidental in nature, and even unconscious, emotional, and random. Even more strongly, some suggest that "most informal learning is tacit, taken for granted, and accomplished through social modeling… [it] often occurs in a haphazard fashion. It is a very human endeavor, and thus it is often idiosyncratic (Marsick & Volpe, 1999, pp. 7-8)" and therefore resides mostly at the incidental side of this continuum. In contrast, others suggest that informal learning occurs mostly at the intentional side of the continuum. Noe, et al. (2010) argue that informal learning involves action and doing (that is, it requires an agent rather than occurring passively). Similarly, Tannenbaum, et al. (2010) suggest that informal learning is necessarily an active, intentional process: "…the intent to learn or improve is what differentiates informal learning from incidental [unintentional] learning…the learning process has to be driven by the individual" (p. 306). We adopt the latter point of view, that informal learning is largely an intentional activity. We acknowledge that learning can occur unintentionally it is not unreasonable to consider unintentional/incidental learning to be a form of informal learning. However, in defining the construct of informal learning we have chosen to ascribe to it a high degree of intentionality, primarily because intentional phenomena can be more readily understood, studied, and fostered in organizational settings.

The third broader continuum of organizational learning concerns the reference point or source of the lesson learned – past-, current-, or future-focused. Because informal learning "takes place in action" (Marsick & Volpe, 1999, p. 8), experience serves as the source of reflection or insight. Informal learning can be *past-focused*, (e.g., when reflecting upon or discussing prior events), *present-focused* (e.g., when learning occurs in real-time or "in the moment"), or *future-oriented* (e.g., when a future event is envisioned and analyzed before it occurs, such as rehearsal and planning).

Some suggest that informal learning is rooted in employees' interpretations and understanding of previous work experiences and events, the implication being that informal learning is only or mostly derived from prior interactions and their consequences. We suggest that this may be too restrictive a view, as informal learning can have multiple foci. For example, debriefings typically glean lessons-learned by focusing on recent performance episodes. But, they also foster new learning through consideration of targeted plans for future events (Tannenbaum, Beard, & Cerasoli, 2013). Similarly, feedback surrounding a past event aids learning and future performance, but in theory, even more so when the "feedback" is future-oriented or anticipatory (Kluger & DeNisi, 1996). We also take this multiple-viewpoints perspective because learning is often cyclical (Argyris & Schon, 1974) and self-reinforcing (Bandura, 1976). Formal learning begets informal, as "most often a formal education improves the ability to assimilate informal learning at the workplace" (Svensson, Ellstrom, & Aberg, 2004, p. 480). Similarly, "formal education needs to be backed up by informal learning in order to be effective" (Svensson, et al., 2004, p. 481).

In sum, we have established a three-axis framework of the broader learning space as a way to conceptualize, delineate, and define the boundaries of informal learning. For the most part, informal learning is self-guided, occurring independently from formally-directed learning requirements. It often proceeds in a non-linear fashion, without a clearly set beginning or end, and with varying levels of intensity over time. Informal learning is intentional and occurs outside the classroom, although we acknowledge that incidental learning is also important and some informal learning occurs "around" formal learning environments. Informal learning is based on experience in the field, typically involving reflection upon previous experiences, but in-the-moment learning and anticipating future events can also be part of informal learning. For our purposes, we offer an integrative definition that is consistent with others who have reviewed this literature (e.g., Tannenbaum, et al., 2010). We define informal learning as follows:

> Informal learning is the non-curricular development of knowledge, skills, and wisdom. It is predominantly self-directed, intentional, and field-based. Informal learning is not lecture-based, discrete, or linear.

As mentioned, Figure 2 graphically illustrates this constrained definition of informal learning within our three-axis construct space.

Theoretical Antecedents of Informal Learning

There has been a large amount of research relevant to informal learning and our effort above provides a much needed step toward a uniform definition and conceptualization that draws the vast literature together. However, to date, there is limited theoretical development in terms of

the underlying mechanisms related to informal learning. For example, Berg and Chyung (2008) lament that "more research should be conducted to investigate the effects of personal characteristics on specific informal learning activities" (p. 231).

We suggest preliminary efforts to understand the antecedents of informal learning should begin with an organizing framework. One such framework that repeatedly surfaces is a familiar one. In their book about informal learning, Marsick, et al. (1999, p. 81) submitted that "all of the research described in the book appears to support Kurt Lewin's premise… that individual behavior is a function of the interaction between people and their environment." Noe, et al. (2010) advance a similar model detailing both personal and situational antecedents of employees' learning engagement. In sum, there is a growing consensus that informal learning is perhaps best understood from an *interactionist* framework. Based on the long accepted axiom in psychology that behavior (B) is a function of the Person (P) and the Situation (S), (B = f(P,S)), the interactionist model (Bowers, 1973; Chen & Kanfer, 2006; Endler & Magnusson, 1976; Pervin, 1989) emphasizes the importance of both person (or "individual") and situation factors. Marsick (2009) articulates well this position as:

> Informal learning is thus best situated in workplaces where individuals can make a difference in what and how they learn; and where attention is paid to environmental culture and structure, often embodied in the workplace's leader(s). Individuals can and do influence their environments, and as Hoekstra, et al. reinforce, their beliefs mediate their actions. At the same time, people are constrained or supported by resources (time, materials, funding, guidance, support, and thought leadership) that, in turn, are often dispensed in ways that are consistent with the mindsets of leaders who greatly shape culture. (p. 271)

Accordingly, we outline a model of informal learning that considers both personal and situational antecedents. In turn, we consider those antecedents at different levels of specificity, akin to unpacking higher-order constructs into their constituent parts or sub-dimensions. We then summarize the extant literature using meta-analyses along these different levels of specificity. This higher-order construct explication, which begins with person and situation factors at the highest level, is detailed in Table 1 and discussed below.

PERSONAL ANTECEDENTS

Researchers have made progress on understanding the personal characteristics associated with informal learning (Maurer & Lippstreu, 2010; Molloy & Noe, 2010). The conclusion from this body of work is that different people approach learning from experience in different ways. Some individuals are better at learning from job experiences than are others (McCauley & Brutus, 1998), and not everyone prefers or engages in the same kinds of informal learning behaviors (e.g., Richter, Kunter, Klusmann, Lüdtke, & Baumert, 2011). Moreover, as suggested by the principle of trait activation, some people are more likely to be influenced or constrained by various situational factors they experience (Tett & Guterman, 2000).

The extant literature suggests a long list of individual characteristics that impact how people learn from experience (Boyce, Zaccaro, & Wisecarver, 2010; Maurer & Lippstreu, 2010; McCauley & Brutus, 1998). These factors can be discussed at different levels of specificity.

Table 1. *Theoretical Antecedents of Informal Learning at Three Levels of Specificity*

Level 1 Antecedent	Level 2 Antecedent	Level 3 Antecedent
Personal	Engagement Motives	• Positive general work attitudes (e.g., job satisfaction, organizational commitment, perceived job insecurity, engagement) • Positive personality/predisposition factors (e.g., conscientiousness, curiosity, adaptability) • Positive general learning-related motives (e.g., perceived need for informal learning, learning goal orientation)
	Work-Related Capabilities	• Competencies/KSA • Experience (e.g., current and past experience with informal learning/learning, job experience)
	Demographics	• Age • Education • Gender • Income • Tenure/Rank • Marital status (Single vs. Married)
Situational	Job/Task Characteristics	• Demands • Resources • Time • Control/autonomy
	Support	• Informal organizational support (e.g., climate, social capital, culture, norms, perceived organizational support) • Formal organizational support (e.g., rewards, processes, systems) • People support (e.g., supervisors, peers, role models, partners)
	Opportunities for Learning	• Potential for new learning • Type of organization/business sector • Organizational structure

Note: Level 1 antecedents are higher-order constructs whereas Level 3 represents the lowest-order (most specific) constructs.

However, both previous reviews and theories have clustered such factors into three macro domains (cf. Noe, et al., 2010; Tannenbaum, et al., 2010): 1) engagement motives, 2) work-related capabilities, and 3) assorted demographics. Below we review representative works from the different clusters and how various factors relate to informal learning.

Engagement Motives

Engagement motives refer to individual predispositions that motivate individuals to participate in informal learning activities (Noe, et al., 2010). Engagement motives include more specific sub-dimensions including: 1) positive general work attitudes, 2) positive personality/predisposition factors, and 3) positive general learning-related motives.

Positive general work attitudes refer to the summary of cognitive and affective evaluation of one's organization, job, or task. These broad evaluations of the work and surrounding environment are important because they have been found to drive performance on formally assigned tasks. For example, those with higher levels of job satisfaction demonstrate higher levels of performance (Judge, Thoresen, Bono, & Patton, 2001). Perhaps more important, positive general work attitudes drive engagement in critical voluntary behaviors such as team work, participation in optional training events, and various types of contextual performance. For example, those with higher engagement in their work have not only higher job performance, but higher levels of the non-mandated contextual behaviors (Christian, Garza, & Slaughter, 2011) that parallel informal learning. In addition to job satisfaction and engagement, we would include other constructs that capture a broad cognitive and/or affective evaluation of work. Based on related research (e.g., Meyer, Stanley, Herscovitch, & Topolnytsky, 2002), this might include constructs such as contentment with work, perceived job security, degree of work involvement, career orientation, and organizational commitment.

Positive personality/predisposition factors are semi-stable trait-like factors. For the most part, this category comprises personality variables. Personality variables such as the "Big Five" are popular individual differences that scholars have investigated as related to informal learning constructs. For example, Noe, Tews, and Marand (2013) investigated the relationship between measures of the Big Five and managers' informal learning. They found that each of the Big Five was significantly related to informal learning, with Extraversion, Openness to Experience, and Agreeableness exhibiting the highest positive correlations. Whereas a case can certainly be made that Emotional Stability and Conscientiousness are positively related to informal learning (Simmering, Colquitt, Noe, & Porter, 2003), Extraversion, Openness and Agreeableness together seem to empirically describe individuals who will willingly look for and embrace opportunities for learning (Noe, et al., 2013; Simmering, et al., 2003). This category would also include other semi-stable, trait-like meta-constructs, such as adaptability (Mumford, Baughman, Threlfall, Uhlman, & Costanza, 1993) and curiosity (Reio & Wiswell, 2000).

In addition to general work attitudes and dispositional factors, the literature also suggests that *positive general learning-related motives* will impact individuals' engagement in informal learning. These antecedents refer to enduring positive attitudes or predispositions toward learning. This includes variables such as motivation to learn, learning goal orientation, and self-efficacy (Choi & Jacobs, 2011). Learning goal orientation is defined as an individual's intention to engage in challenging activities, an eagerness to improve oneself, and a tendency to use one's

past performance as a standard for evaluating current performance (Button, Mathieu, & Zajac, 1996). Previous research is consistent with the assumption that individuals with this predisposition would naturally be inclined to engage in informal learning (Boyce, et al., 2010; Brett & VandeWalle, 1999; Choi & Jacobs, 2011; Klein, Noe, & Wang, 2006). Research has also found significant correlations between trainees' motivation to learn, defined as the specific desire of an individual to learn the content of a program (Noe & Schmitt, 1986), with informal learning and related constructs (Choi & Jacobs, 2011; Lohman, 2005; Moon & Na, 2009). Self-efficacy, defined as an individual's beliefs about his or her capabilities to organize and execute courses of action required to achieve certain levels of proficiency or performance (Bandura, 1994), has been related positively to intentions and participation in self-development activities (Maurer & Palmer, 1999; Molloy & Noe, 2010; Noe & Wilk, 1993) and informal learning (Noe, et al., 2013).

Collectively, these three factors (positive general work attitudes, positive personality/ predisposition, positive learning-related motives) represent powerful **engagement motives** for learning behavior. In fact, Choi and Jacobs (2011) found that a distillation of learning orientation, self-efficacy, and motivation to learn was a strong predictor of not only informal learning, but also motivation to engage in a formal training program designed to facilitate informal learning. Given the importance of the factors described here, we hypothesize that:

> Hypothesis 1: The presence of engagement motives (i.e., positive general work-related attitudes, positive personality/predisposition factors, and positive general learning-related motives) fosters informal learning.

Work-Related Capabilities

There are two general categories of work-related capabilities that enable successful task completion: competencies or KSAs (knowledge, skill, ability), and experience. The prevailing logic in the literature has been that, to the extent that individuals possess task-related competencies, they are better able to recognize and exploit informal learning opportunities (Cseh, Watkins, & Marsick, 2000). Yet the results to date have been inconsistent. For example, Noe, et al. (2013) found a significant negative correlation between general mental ability "g" and informal learning. van der Heijden, Boon, van der Klink and Meijs (2009) found varied positive and negative small correlations between occupational expertise and different indices of informal learning. Alternatively, Moon and Na (2009) found a significant positive correlation between learning competency and informal learning. Although the findings do not appear to be definitive, the theories that have been advanced have generally anticipated a positive relationship between individuals' work competence and their informal learning, so we also hypothesize a positive relationship.

Experience has also been examined as a form of competence that is presumed to relate positively to informal learning and thereby to performance (Ghiselli & Brown, 1947). Here again, it is assumed that more experienced employees are better suited to recognize and take advantage of informal learning opportunities than are less experienced members (Andresen, Boud, & Cohen, 2000). Yet, the relationship between experience and informal learning has varied widely from negative to positive, sometimes even within the same empirical research (see Gonzales, 1985). These mixed findings may be attributable, in part, to a nonlinear relationship

between the two constructs. For example, it may be that individuals need to possess some minimal degree of competence to even notice learning opportunities when they present themselves. Alternatively, it could be that exceptionally competent employees may feel little need to engage in additional informal learning. However, as a whole, previous theory and findings would suggest that individuals' competence levels are positively correlated with the extent to which they engage in informal learning. Given the importance of these two factors, we hypothesize that:

>Hypothesis 2: The presence of work-relevant general capabilities (i.e., competencies/KSAs and experience) fosters informal learning.

Demographics

Demographics have often been correlated with outcomes such as informal learning, although few times in a substantive manner. Typically, scholars have considered individuals' demographics only as controls or covariates. Further, most demographics have resulted in inconclusive findings with respect to informal learning (Berg & Chyung, 2008).

Whereas, from a theoretical standpoint, demographics should not have any systematic impact on informal learning, they may nonetheless serve as "proxy" variables representing constructs of potential theoretical interest. While it is unconventional to argue from the null hypothesis, that is, discuss factors that are irrelevant to informal learning, construct explication involves differentiating anticipated positive, negative, and null relationships in a larger theoretical framework (Binning & Barrett, 1989; Campbell & Fiske, 1959). In other words, inclusion of demographics may serve to better establish convergent and discriminant validities associated with the informal learning construct. Accordingly, we hypothesize that:

>Hypothesis 3: Common demographic factors (i.e., age, education, gender, income, rank/tenure, and marital status) exhibit no direct relationships with individuals' informal learning.

In sum, numerous personal factors are likely to promote individuals' informal learning. In particular, we anticipate that individual engagement motives stemming from positive personality traits and predispositions, specific informal learning-related attitudes, as well as more general work-related motivation and attitudes will promote their informal learning. Moreover, we anticipate that work-related competencies and experiences would relate positively to informal learning. In contrast, we do not anticipate that individuals' demographics will relate significantly to informal learning.

SITUATIONAL ANTECEDENTS OF INFORMAL LEARNING

Interactionist theories make clear that individuals should not be viewed as operating in a vacuum – that situational factors may trigger certain latent behaviors or prevent others from surfacing. Some situations may be rife with learning opportunities whereas others may be woefully impoverished. Previous research suggests that the characteristics of the field or job domain can affect the degree to which informal learning takes place. For example, the body of research on experiential learning (for a review see McCauley & Brutus, 1998) suggests that people are more likely to seek out learning opportunities or capitalize on work experiences to the

extent that the situation provides them with such opportunities. Situational variables can be classified in a wide variety of fashions. Again, both previous reviews and theories (Noe, et al., 2010; Tannenbaum, et al., 2010) have tended to cluster such factors into three macro domains: 1) job/task characteristics, 2) social support resources, and 3) learning opportunities.

Job/Task Characteristics

Several job-related characteristics are likely to impact the degree to which individuals perceive the need (or ability) to engage in informal learning. One simple task characteristic is the extent to which the presence (and perhaps balance) of *demands* and *resources* foster and enable informal learning. For example, applying a valence-instrumentality-expectancy theory (Vroom, 1964) framework, Mathieu, Tannenbaum, and Salas (1992) illustrated that situational constraints (e.g., inadequate equipment and supplies, insufficient authority to complete tasks) can undermine motivation to learn. Their findings suggest that when employees believe that learning new skills will not be instrumental in gaining valued outcomes because their job performance is constrained, they are less motivated to learn. LePine, LePine, and Jackson (2004) found that stress associated with hindrances in the learning environment reduces motivation to learn (and learning performance), while stress associated with *demands* or challenges actually has the opposite effect.

Another important task characteristic is the *time* available to individuals. Klein, et al. (2006) suggested that when individuals lack the time needed to participate in formal learning opportunities, they will be less likely to engage in them because they are less motivated to do so. This is almost certainly the case with informal learning, which requires more personal initiative and discipline. Some research has arisen that supports this idea; for example, Gijbels, Raemdonck, Vervecken, and Van Herck (2012) and van der Heijden, et al. (2009) confirmed that a lack of time was negatively related to informal learning.

Of course, any consideration of the social environment must take into account not merely the environment itself, but also the perceptions of the environment. Previous studies have found that the degree to which individuals perceive *control/autonomy* over their task has a strong impact on the extent to which they engage in extra-role type behaviors such as teamwork and participation in non-mandated formal training. It follows that this logic would extend to engagement in informal learning. For example, Gijbels, et al. (2012) and Ouweneel, Taris, Van Zolingen, and Schreurs (2009) demonstrated that when individuals have control over their work, informal learning is increased. Further, greater control or task autonomy may allow individuals to create learning opportunities, and a malleable environment may enable a proactive employee to generate learning opportunities.

> Hypothesis 4: Certain job/task characteristics impact the degree to which individuals engage in informal learning, such that enabling factors (i.e., resources, time, control/autonomy) foster informal learning while constraining factors (i.e., demands) inhibit learning.

Support

Whether provided from specific others within the organization or on behalf of the organization as a whole, research suggests that employees are more likely to engage in informal learning when they feel encouraged to do so.

People support, or support and encouragement provided by important others in the workplace such as one's supervisor and coworkers, has repeatedly been shown to have a positive impact on learning and self-development behaviors (e.g., Choi & Jacobs, 2011; Maurer & Tarulli, 1994). Often discussed within the literature as a form of social support, supervisor and coworker support has been shown to enhance informal learning (Choi & Jacobs, 2011; van der Heijden, et al., 2009). Not only can individuals show support by conveying a sense of caring and promoting well-being, but they can also provide support by assisting with goal-directed behaviors, such as those aimed at learning and development. Work in the area of supervisor support suggests that supervisor support might contribute to employee informal learning in a number of ways. For instance, supportive supervisors often encourage employees to engage in activities that lead to professional development/career advancement (Rooney & Gottlieb, 2007). Moreover, they provide employees with decisional discretion and encourage them to solve their own problems (Rooney & Gottlieb, 2007; Yukl, 2010). It is thought that supervisor support leads to a more open environment that encourages learning and a willingness to admit errors (Edmondson, 1996).

The influence of coworker support on learning behaviors is not as well understood or explicated as clearly within the literature. Some have suggested that coworker support might become more important when the influence of the supervisor is neutralized or reduced (i.e., in situations where employees are not co-located with their supervisor; Yukl, 2010). As with supervisor support, it is likely that employees who feel supported by their coworkers develop a perceived sense of security and self-confidence to try new things.

Formal organizational support includes factors such as incentives, practices, policies, and rules. Incentives can provide a strong, formal, tangible support for informal learning. For example, Rowden (2002) and Rowden and Conine (2005) found positive correlations between recognition programs and informal learning. Rowden and Conine (2005) and Moon and Na (2009) found that compensation or merit in support of informal learning promoted informal learning activities. Skule (2004) included among the determinants of "learning intensive jobs" the rewarding of proficiency through higher wages.

Another form of support is *informal organizational support*. Informal organizational support describes employees' attitudes and beliefs about the support they receive from their organization. The organization's climate is one example of informal organizational support. If climate is considered to be employee feelings and perceptions about the organizational practices, policies, values, etc., then one aspect of this might include employee opinions about the extent to which the organization values and is supportive of informal learning. In a conceptual discussion of how an organization's climate is likely to have a positive influence on informal learning behaviors, Tannenbaum et al. (2010) proposed that certain organizational signals promote the importance of informal learning. These signals might include things like the discussion of

learning opportunities associated with assignments or projects, the use of team debriefs that could encourage reflection behaviors, and leaders who "think aloud" about their experiences, which could encourage others to reflect on their own experiences.

Rowden and Conine (2005) found empirical support for the positive relationship between organizational climate and informal learning. In this investigation, climate referred to employee perceptions of practices and policies that enable good job performance, improvement, and promotion. In this instance, it could be that the organization's practices sent signals to suggest the importance and support for informal learning.

Organizational culture can also be considered an aspect of informal organizational support. For example, organizations that implement policies that make it possible (and easy) for employees to engage in self-development opportunities often claim to have a "learning culture." A few studies provide evidence to substantiate the positive association between organizational culture and informal learning. For example, Berg and Chyung (2008) found positive, albeit low, correlations between a learning culture and informal learning. Also, Jeon and Kim (2012) found a positive relationship between "innovative culture" and informal learning.

Regardless of whether the support is formal or informal or whether it comes from the organization or a perceived agent of the organization (i.e., a supervisor), one interesting explanation for a relationship between support and informal learning is based on Organizational Support Theory (OST: Eisenberger, Huntington, & Sowa, 1986; Rhoades & Eisenberger, 2002; Shanock & Eisenberger, 2006). Organizational Support Theory suggests that employees who feel supported by their organization seek ways to give back to the organization for the positive treatment they receive. Based on social exchange theory and the reciprocity norm, OST assumes that employees look to trade effort, loyalty, and commitment to their organization for rewards, including tangible rewards such as compensation, benefits, and training opportunities, and socio-emotional resources, such as esteem, acceptance, and caring. In support of this, previous studies based on OST have found that organizational support engenders a felt obligation to give back to the organization for positive treatment (Eisenberger, Armeli, Rexwinkel, Lynch, & Rhoades, 2001; George & Brief, 1992). In turn, employees with this felt obligation have been shown to care about the organization's well-being and engage in behaviors directed toward helping the organization (e.g., via better in-role and extra-role behaviors). Research in the area of supervisor support provides evidence to suggest that, because supervisors are viewed as agents of the organization, employees also feel obligated to reciprocate positive treatment they receive from their supervisor (Shanock & Eisenberger, 2006). While we are unaware of any studies that have examined a relationship between perceived organizational support (POS) and informal learning, OST would suggest that employees who feel supported by their organization/supervisor might try to learn new skills and knowledge as a means to help their organization/supervisor succeed and meet goals. Thus, we hypothesize that:

Hypothesis 5: Perceptions of support at work are associated with higher levels of informal learning.

Opportunities for Learning

The extent to which individuals are driven by the situation to engage in informal learning is likely dependent on the presence of viable opportunities for learning. When individuals are given opportunities to interact with their peers, exchange information, and develop their skills, they are more likely to engage in informal learning behaviors and have more effective learning (Mistler-Jackson & Songer, 2000). One such factor that contributes to learning opportunities is the potential for new learning. *Potential for new learning* refers to the extent to which the situation affords ample opportunities for new informal learning. Situations can vary from those in which there are many opportunities for informal learning ("learning rich") to those with few natural opportunities for informal learning ("learning poor"). Provision of feedback can be seen as one type of learning environment "richness," since one can take advantage of feedback to understand how to guide future behavior. In general, environments that provide opportunities for feedback aid learning (Kluger & DeNisi, 1996). For example, de Groot et al. (2012) found positive, although weak, correlations between the extent to which individuals' work settings provided peer feedback and informal learning. Given the additional importance of "learning richness" in active learning contexts (Grabinger & Dunlap, 1995), we suggest that it will drive informal learning, as well.

In addition, the *type of organization/business sector* may impact opportunities for informal learning. For example, Molloy and Noe (2010) linked organization type or sector (e.g., government, military, civilian) and the organization's state of growth with the likelihood that individuals would engage in informal learning behaviors. The structure of the organization and the situation may also drive informal learning. The *organizational structure* element here refers to the extent to which individuals are free to explore or alter their environments. Less structured environments permit exploration and alternative ways to conduct activities that enhance informal learning, whereas high degrees of structure or bureaucracy may yield fewer field-based learning opportunities.[2]

Thus, given the three factors described here, it seems reasonable to expect that:

Hypothesis 6: Opportunities for learning (i.e., potential for new learning, type of organization/business sector, organizational structure) are associated with higher levels of informal learning.

Hypotheses 3 to 6 are based on the premise that numerous situational variables are likely to relate directly to informal learning (e.g., job/task characteristics, social support, learning opportunities). The presence of some of these opportunities may not always be self-evident. Moreover, some situations afford individuals the opportunity to explore, alter, or choose their own role or work environment. In any case, the situations in which employees find themselves have different affordance structures in terms of how much they promote or stifle informal learning.

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[2] However, interestingly, Moon and Na (2009) found that several features of bureaucratic organizational structures (e.g., centralization, formalization) in Eastern cultures related positively to informal learning

In sum, our six individual hypotheses represent two overarching propositions: 1) person-related variables and 2) situation-related variables are associated with informal learning. These underlying propositions and the more specific hypotheses derived from them are based on the interactionist theory of behavior, which states that behavior is a function of the person and the situation. Next, we will describe the meta-analysis of the literature that examined the relationships between the previously identified categories of personal and situational factors with informal learning.

METHOD

We used meta-analysis to help synthesize the informal learning literature. Meta-analysis is a technique whereby the results of previous investigations are scaled on a common metric (in this case, correlation coefficients), and the average x-y relationship (ρ) is calculated adjusting for statistical artifacts such as relative sample sizes and measurement unreliability. Meta-analysis also yields an 80% credibility interval and 95% confidence interval, which characterizes the homogeneity/heterogeneity of results across studies.

Locating Existing Research

A number of databases were extensively searched for published studies, including psycINFO, ERIC, PubMed, Scopus, Google Scholar, and Dissertation Abstracts International. Variations of terms related to the operationalization of informal learning were searched, including *informal learning, field-based learning, situated learning, self-directed learning,* and *on-the-job learning*. In order to be included, an article had to report an effect size for either a personal or environmental antecedent of informal learning. An exploratory and inductive approach was applied in that we initially included any research with situational or personal antecedents of informal learning and later placed them into more practically and theoretically meaningful antecedent categories.

To make things clear, the dual-purpose of the report has necessitated two frameworks. Our first framework, the three-axis conceptualization of the learning space, is used to position informal learning within the greater organizational learning domain. We deliberately chose not to code the dependent variable (i.e., informal learning) in various degrees of each axis (e.g., formal vs. informal, intentional vs. unintentional, past vs. future). This is because attempting to use the three-axis concept of the organizational learning space to categorize types of informal learning studies would have involved coding that was too subjective. For example, the decision of the intentionality of the learning activity would have been too subjective. Thus, although we categorized the antecedents of informal learning into the person and situation categories discussed earlier (the second framework), informal learning was coded only at a broad, omnibus level.

We developed several exclusion criteria after reviewing and coding the data. Articles with questionable or non-verifiable measures were dropped. For example, Moon and Na (2009) measured centralization of power and formality, both of which should have an impact on informal learning. However, that research was excluded because the construct and its measurement were insufficiently defined to code clearly. Several constructs related to informal learning were also considered, but not included in the current review. Many of these were factors

that are ostensibly a form of, or related to informal learning, such as experiential learning, debriefing, adventure learning, and error-management learning. However, we sought to maintain a focus on informal learning, as defined earlier, as a rule for inclusion so as to minimize contamination of tangential constructs. From an initial pool of 2,840 sources, we read through all abstracts and selected 388 for deeper review.

When disagreements occurred regarding what construct instruments were actually assessing, deference was given to the original author of the instrument. Non-English research and samples under high-school age were not included, given the focus on a working population. Otherwise, no *a priori* moderators, specific populations, research designs, time periods, years, or geographical locations were rejected. Unless otherwise indicated, all analyses include both published and unpublished samples.

Creating Antecedent Categories and Coding Data

Each source was read for content prior to coding. A coding schema was developed in advance and every data point was coded independently. A subset of articles (approximately 10%) was coded by multiple authors, yielding 100% agreement. Further, the majority of articles were discussed at length by three authors to ensure a common mental model for selecting and placing a particular primary research study into the appropriate antecedent category. Given the high level of agreement and extensive discussions, it was not deemed necessary to double-code all sources.

There were three general considerations involved in coding an antecedent. The first was fitting an effect size into a particular existing category as detailed in Table 1. Those categories were derived from the theoretical framework outlined earlier. Once we had the entire sample of effect sizes, we attempted to fit antecedents into the theoretical categories noted. Although the majority of antecedents were easily categorized into a single category, several studies did not readily lend themselves any category in particular. For example, it was initially unclear whether de Groot and colleagues' (2012) investigation of the relationship between heavy workload/lack of time and informal learning should be categorized under the category of job/task: time or job/task: task specific demands. Such situations were resolved through consensus discussions among all the authors.

After the articles were coded, the next consideration was how to handle effect sizes associated with antecedents not included in Table 1. Provided there were enough independent samples to constitute a new category, we would have attempted to create a category aligned with theory. However, only two studies did not fit a category: a union versus non-union sample from Livingstone and Raykov (2008), and teacher versus human resource development professionals from Lohman (2005). Given that these were not theoretically critical antecedents, and that they bore no similarity to one another, they were dropped from all analyses.

The third consideration was how to handle categories for which no data were available. Given that we did not locate any research examining organizational structure or sector, we were unable to include it in analyses. For categories that included only one sample, we included them for comparison purposes (e.g., Potential for New Learning), but note that these estimates may only yield limited conclusions.

Analysis

We employed the random-effects meta-analysis methods pioneered by Hunter and Schmidt (2004) to aggregate effect sizes from primary data. In comparison to fixed effects models, random effects models are built *for generalizability from an observed sample to a larger population.* The fundamental assumption underlying random-effects models is that even the most comprehensive collection of studies for a meta-analysis can, at best, be considered a representative sample of the unobservable larger population one wishes to make inferences about (i.e., one can never truly locate all studies on a particular effect). In contrast, fixed effects models (e.g., validity generalization studies) are assumed *to merely describe the current sample.* They assume that after correcting for artifactual error, the same effect size underlies all studies (Hunter & Schmidt, 2004). Specifically, they assume that after correction for artifactual error, *any additional variance must be due to moderators.*

We do not employ fixed-effects models for several reasons. Given the broad nature of the informal learning field, it is all but certain we have not located all possible studies. Additionally, as our meta-analysis and review is the first attempt to aggregate theory and research on informal learning, it would be inappropriate to suggest that we have accounted for all theoretically germane moderators. Finally, we avoid fixed-effects models for several statistical reasons; for example, the presence of additional variance under fixed-effects models is often estimated through chi-square significance tests, which, for several reasons, can lead to inflated Type I and Type II error rates (Hunter & Schmidt, 2004; National-Research-Council, 1992). Thus, we adhere to the call of previous researchers to default to random effects models (Erez, Bloom, & Wells, 1996).

In a related vein, in adherence with Hunter and Schmidt's random effects model, we also do not provide significance tests for the difference between effects. Instead, we rely on whether the variability estimates around one effect size include another effect size or zero. For the detection of moderators, Hunter and Schmidt advocate the use of 80% credibility intervals. Credibility intervals (CrIs) are ideal because they directly speak to the generalizability of results (Hunter & Schmidt, 2004). Specifically, they are based on the *standard deviation* of the corrected population correlation (SD_{rho}), meaning they estimate the variability in true effect sizes across situations. We also provide 95% confidence intervals (CIs), which can be used to infer whether an observed effect is significantly different from zero. Confidence intervals provide an index of measurement error. Specifically, they are based on the *standard error* of the corrected population correlation (SE_{rho}), meaning they use the number of studies to downwardly adjust the variance estimate. For a review of issues related to the use of credibility versus confidence intervals in random-effects meta-analysis see Whitener (1990).

We used a conventional approach to calculating meta-analytic estimates, such that the only correction for artifactual error applied was for sampling error (i.e., smaller samples are weighted less heavily) and measurement reliability (i.e., a correction for the mathematically predictable attenuation of the correlation between two imperfectly measured constructs). All statistics reported in primary studies (e.g., *t*-values, *F*-tests, means and standard deviations) were converted to bivariate Pearson's *r* correlations.

Each meta-analytic estimate we calculated represented an independent sampling from the population of available studies. Because most empirical research examined multiple antecedents, a given source could appear in multiple meta-analytic estimates. However, to preserve the assumptions of independence, a sample could contribute only one effect size toward any given calculation. Depending on the antecedent category examined, most studies had multiple estimates that could contribute to the meta-analytic estimate. To maintain independence, it is necessary to provide one estimate (a composite correlation) from each sample, and there are three general ways this can be done. The first is to choose one estimate at random or one estimate that is theoretically relevant. We did not take this route because it lends itself to selection biases and introduces additional error. The second, a conservative approach, is to take a mathematical average of the observed effects for the composite correlation. The third, the frequently preferred method, is take the intercorrelations of all primary correlations, and create composite correlations in line with recommendations from Mosier(1943) or Bijmolt and Pieters (2001). However, the preferred method tends to only be viable when the dependency (i.e., intercorrelation) among variables can be assessed. Given that most of the intercorrelation data was not available to compute Mosier composites, and randomly choosing a single estimate is unadvised (Bijmolt & Pieters, 2001; Hedges, Tipton, & Johnson, 2010), we took the second approach. All totaled, we derived 270 effect sizes covering 50,205 respondents from 32 primary studies, representing 35 independent samples.

RESULTS

Our meta-analysis results are summarized for personal antecedents in Table 2 and for situational antecedents in Table 3. A comprehensive breakdown of effect sizes per sample appears in the Appendix.

Personal Antecedents

Hypothesis 1 (that the presence of *engagement motives* fosters informal learning) was supported. All three categories of engagement motives displayed positive associations with informal learning and no credibility intervals/confidence intervals spanned zero, suggesting a positive-definite effect. The strongest predictor of informal learning (both overall and compared to all other factors) was positive general learning-related motives ($\rho = .40$, $k = 10$, $N = 1,535$; 80% CrI = .14, .66; 95% CI = .28 - .52). Positive personality/propensity factors displayed a positive association with informal learning ($\rho = .30$, $k = 6$, $N = 2,408$; 80% CrI = .30, .30; 95% CI = .28 - .32), as well as a stable one, as evidenced by 100% of the variance in effect sizes being accounted for by differences in samples sizes and measurement properties. Finally, positive general work attitudes also predicted informal learning ($\rho = .25$, $k = 6$, $N = 5,275$; 80% CrI = .08, .43; 95% CI = .14 - .36).

Hypothesis 2 (that *work-related capabilities* – i.e., competencies/KSAs and experience – foster informal learning) received mixed support. Experience was the second strongest predictor, on average, of engagement in informal learning out of all the factors we examined ($\rho = .37$, $k = 2$, $N = 277$; 80% CrI = -.01, .75; 95% CI = -.04 - .78); although, it should be noted that only two samples contributed to this estimate and the 80% credibility interval and 95% confidence interval included zero. Competency/KSA factors also predicted informal learning ($\rho = .28$, $k = 7$, $N =$

1,617; 80% CrI = >.00, .56; 95% CI = .12 - .44). Given the large variability and intervals that include zero, additional research is warranted before conclusions can be drawn.

Hypothesis 3 (that *demographic factors* would exhibit no significant relationships with informal learning) was rejected. Contrary to predictions, demographics evidenced correlations that were significantly different from zero for age (ρ = -.08, k = 11, N = 37,766; 80% CrI = -.15, .00; 95% CI = -.11 - -.05), gender (ρ = -.03, k = 9, N = 37,285; 80% CrI = -.06, .00; 95% CI = -.05 - -.01), education (ρ = .10, k = 3, N = 1,217; 80% CrI = .10, .10), rank/tenure (ρ = .23, k = 5, N = 3,424; 80% CrI = .12, .35; 95% CI = .15 - .31), marital status (ρ = .17, k = 6, N = 36,005; 80% CrI = .07, .28; 95% CI = .11 - .23), and income (ρ = -.05, k = 7, N = 35,236; 80% CrI = -.09, -.01; 95% CI = -.07 - -.03). Importantly, however, all of these correlations were modest, and the largest of them (rank/tenure, ρ = .23), was smaller than that observed for any of the engagement motives or capabilities. In addition, there was a great deal of overlap in credibility intervals, making it difficult to conclude whether one factor was more predictive than another.

Situational Antecedents

Hypothesis 4 (that certain *job/task characteristics* relate significantly to informal learning) received support. Higher levels of perceived *control/autonomy* were associated with higher levels of informal learning (ρ = .31, k = 4, N = 3,675; 80% CrI = .17, .44; 95% CI = .20 - .42). Findings were consistent with the hypothesis for *resources* (ρ = .26, k = 1, N = 1,290), but it is difficult, and ill-advised, to generalize from a single sample. Similarly, with reference to confidence intervals, there was evidence that the effects for *demands* (ρ = .07, k = 4, N = 3,715; 80% CrI = -.01, .16; 95% CI = .01 - .13) and *time* (ρ = .16, k = 5, N = 2,670; 80% CrI = -.04, .36; 95% CI = .02 - .30) were significantly different from zero.

Hypothesis 5 (that perceived *support* at work is positively related to informal learning) was fully confirmed across the three types of support examined. Specifically, *people* support (ρ = .29, k = 5, N = 3,979; 80% CrI = .17, .41; 95% CI = .21 - .37), *informal organizational support* (ρ = .25, k = 9, N = 5,329; 80% CrI = .03, .47; 95% CI = .14 - .36), and *formal organizational support* (ρ = .38, k = 5, N = 1,810; 80% CrI = .01, .74; 95% CI = 12. - .64) displayed similar positive-definite associations with levels of informal learning (as indicated by confidence intervals).

Finally, findings were consistent with Hypothesis 6 (that *opportunities for learning* are associated with higher levels of informal learning), although this observation is based on the relationship for one sample that examined *potential for new learning* (ρ = .14, k = 1, N = 295). Accordingly, additional research is warranted before conclusions can be drawn. We did not locate any viable studies that examined *organization/business sector* or *organizational structure*.

Table 2. *Meta-Analysis of Personal Antecedents of Informal Learning*

	N	k	r_{obs}	SD_{obs}	ρ	$SD_ρ$	80 % CrI			% err	File Drawer		Mean α		95 % CI	
							.10	.90	Δ		.10	.05	r_{xx}	r_{yy}	L	U
Personal Overall	47,284	30	.05	.11	**.06**	.14	-.11	.24	.35	4.93	-	-	.80	.80	.01	.11
Individual Drivers	8,148	17	.23	.12	**.29**	.15	.10	.47	.37	13.48	22	61	.79	.81	.22	.36
Work Attitudes	5,275	6	.20	.11	**.25**	.13	.08	.43	.35	8.88	6	18	.78	.80	.14	.36
Personality/Propensity	2,408	6	.23	.02	**.30**	-	.30	.30	.00	100.00	8	22	.77	.77	.28	.32
Learning Motives	1,535	10	.34	.17	**.40**	.20	.14	.66	.52	15.54	24	58	.85	.78	.28	.52
Capability	1,617	7	.24	.19	**.29**	.22	.01	.57	.56	10.78	10	27	.85	.82	.12	.46
Competencies/KSA	1,617	7	.24	.19	**.28**	.22	.00	.56	.56	10.32	10	27	.85	.82	.12	.44
Experience	277	2	.25	.20	**.37**	.29	-.01	.75	.76	13.26	3	8	.60	.78	-.04	.78
Demographics	40,975	15	.01	.06	**.01**	.06	-.07	.10	.17	10.45	-	-	-	.74	-.02	.04
Age	37,766	11	-.07	.05	**-.08**	.06	-.15	.00	.15	9.33	-	-	-	.77	-.11	-.05
Education	1,217	3	.09	-	**.10**	-	.10	.10	.00	100.00	0	2	-	.78	-	-
Female (0) vs. Male (1)	37,285	9	-.02	.02	**-.03**	.02	-.06	.00	.06	37.75	-	-	-	.82	-.05	-.01
Income	35,236	7	-.05	.03	**-.05**	.03	-.09	-.01	.08	17.55	-	-	-	-	-.07	-.03
Rank/Tenure	3,424	5	.20	.08	**.23**	.09	.12	.35	.23	18.36	5	15	-	.75	.15	.31
Single (0) vs. Married (1)	36,005	6	.16	.07	**.17**	.08	.07	.28	.21	2.85	4	13	-	.82	.11	.23

Note: N = number of participants/subjects; k = number of independent samples; r_{obs} = observed correlation after removing sampling error; SD_{obs} = standard deviation after removing sampling error; ρ = corrected population correlation; $SD_ρ$ = corrected population standard deviation; 80% CrI = the lower, upper, and range of the 80% credibility interval of the true population correlation; % error = percentage of variance in the corrected population correlation accounted for by statistical artifacts (error); Filedrawer = number of unpublished/unavailable studies at ρ = .10 or .05 needed to pull the corrected population correlation below that value; Mean α = mean Cronbach's alpha reliability estimate; r_{xx} = mean reliability of the independent variable; r_{yy} = mean reliability of the dependent variable; 95% CI = the lower (L; .025) and upper (U; .975) bounds of the 95 percent confidence interval.

Table 3. *Meta-Analysis of Situational Antecedents of Informal Learning*

	N	k	r_{obs}	SD_{obs}	ρ	SD_ρ	80 % CrI			% err	File Drawer		Mean α		95 % CI	
							.10	.90	Δ		.10	.05	r_{xx}	r_{yy}	L	U
Situational Overall	11,126	21	.19	.14	**.24**	.18	.02	.47	.45	8.67	19	59	.80	.81	.16	.32
Job/Task Characteristics	8,284	10	.14	.09	**.18**	.11	.03	.32	.29	14.28	4	18	.78	.81	.11	.25
Demands	3,715	4	.06	.05	**.07**	.07	-.01	.16	.17	26.58	-	1	.80	.84	.01	.13
Resources	1,290	1	.16	-	**.26**	-	-	-	-	-	1	2	.62	.62	-	-
Time	2,670	5	.12	.12	**.16**	.16	-.04	.36	.40	12.56	1	7	.76	.75	.02	.30
Control/Autonomy	3,675	4	.25	.09	**.31**	.10	.17	.44	.27	13.61	6	16	.79	.84	.20	.42
Support	8,318	16	.24	.14	**.29**	.17	.07	.51	.44	9.35	22	61	.81	.81	.21	.37
Formal Org. Support	1,810	5	.30	.23	**.38**	.28	.01	.74	.73	4.95	10	25	.78	.81	.12	.64
Informal Org. Support	5,329	9	.20	.14	**.25**	.18	.03	.47	.44	8.53	9	27	.79	.80	.14	.36
People Support	3,979	5	.24	.08	**.29**	.09	.17	.41	.24	20.39	7	19	.83	.83	.21	.37
Opportunities for Learning	295	1	.13	-	**.14**	-	-	-	-	-	-	-	-	.87	-	-
Potential for New Learning	295	1	.13	-	**.14**	-	-	-	-	-	-	-	-	.87	-	-

Note: N = number of participants/subjects; k = number of independent samples; r_{obs} = observed correlation after removing sampling error; SD_{obs} = standard deviation after removing sampling error; ρ = corrected population correlation; SD_ρ = corrected population standard deviation; 80% CrI = the lower, upper, and range of the 80% credibility interval of the true population correlation; % error = percentage of variance in the corrected population correlation accounted for by statistical artifacts (error); Filedrawer = number of unpublished/unavailable studies at ρ = .10 or .05 needed to pull the corrected population correlation below that value; Mean α = mean Cronbach's alpha reliability estimate; r_{xx} = mean reliability of the independent variable; r_{yy} = mean reliability of the dependent variable; 95% CI = the lower (L; .025) and upper (U; .975) bounds of the 95 percent confidence interval. Org. = organizational.

DISCUSSION

An old adage suggests that what you need to know to effectively perform is learned through experience. There is a growing consensus that informal learning occupies anywhere from 70% to over 90% of actual workplace learning. Unfortunately, the proportion of the research literature dedicated to informal learning pales by comparison to that of formal learning. The field is in need of additional research to understand informal learning and how to foster it. This is critical because "while 80 percent of workplace learning occurs through informal means, only 20 percent of what organizations invest in learning is dedicated to enhancing informal learning" (Berg & Chyung, 2008, p. 230). This review and meta-analysis is an attempt to summarize existing theory, summarize current empirical findings, and fuel an integrated program of future research. Our two goals in this report were to: (a) define and position informal learning in the greater organizational learning space, and (b) explore, categorize, and quantify the impact of personal and situation factors that foster informal learning.

Research related to informal learning is extensive and informative: for example, a brief review by Cseh (1998) located 135 dissertations from 1980 to 1998 alone discussing issues surrounding informal learning. Yet, this research remains limited in several meaningful ways. First, it is fragmented in that the important elements of informal learning have been studied under a variety of different terms, including continuous learning, experiential learning, self-directed learning, and active learning. Although there are slight, yet meaningful differences in how these terms are defined (e.g., whether they are activities related to a specific role or domain, whether they are on-going activities, whether they are part of formal or informal learning), there is a great deal of overlap among the constructs, their theoretical foundations, nomological networks, and practical implications. It is important to note that the contributions of researchers in these areas have been non-trivial, including their contribution to our understanding of the situational and personal characteristics that influence informal learning behaviors. By the same token, this fragmentation and lack of coherence in the literature hinders development and progress. What is needed, we submit, is a unifying approach to informal learning.

We began by providing an overarching framework that can be used to evaluate the entire field of organizational learning, and delineate and define the scope of informal learning. Under this framework, any organizational learning can be described along three axes: 1) formal vs. informal, 2) intentional vs. unintentional, and 3) past- vs. future-focused. Following an extensive review of major and minor sources on the topic, we developed a definition that was consistent with the majority of the existing literature. To reiterate, we defined informal learning as *the non-curricular development of knowledge, skills, and wisdom. Informal learning is predominantly self-directed, intentional, and field-based, and is not lecture-based, discrete, or linear*. This definition places informal learning primarily outside the classroom in the field; although it implicitly acknowledges that it can occur within formal settings, it must be beyond or outside the objectives of formal curricula to be considered informal learning (e.g., learned team skills as the unintended outcome of a group-assigned task). This definition also takes something of a centrist point of view on intentionality; it suggests that informal learning (and perhaps the majority of its value) is typically intentionally driven, although not exclusively so. Further, consistent with theories that invoke time and cyclical learning (Argyris & Schon, 1974; Lewin, 1946), our conceptualization of informal learning allows for reflection on any experience, be it past, present, or envisioned future.

Our second goal after developing a unified definition of informal learning was to explore factors that facilitate the extent to which individuals engage in informal learning behaviors. We began by articulating an interactionist based framework and detailed personal and situational antecedents of informal learning at three different levels of construct specificity. Using this framework, we then reviewed and highlighted the extant literature and conducted meta-analyses to summarize what is known.

We reasoned broadly that informal learning would be predicted, to some degree, by both personal and situational factors. Results were clearest with respect to situational factors. The perceived presence of support, either formally from the organization or informally from one's peers, bore a consistently positive impact on the extent to which individuals reported engaging in informal learning. This finding is in line with an extensive body of research in social psychology that has demonstrated the powerful and consistent impact of social cues and environments on individual behavior (Ross & Nisbett, 1991). Results supported our hypothesis for job/task characteristics, such that a greater degree of control/autonomy and resources were facilitative of informal learning, although the effect was weaker than expected. One possible explanation for these findings could be that a lack of time pressure fails to necessitate informal learning, while too much demand is prohibitive. In other words, perhaps the relationship is somewhat curvilinear (as originally discovered with tests for soldiers entering military service; Teigen, 1994), which would explain weak or nonsignificant linear results in a meta-analysis. Clearly this a question for future research.

Results were also consistent with what we anticipated for many personal antecedents. Informal learning was predicted by a broad category of engagement motives, which included general positive work attitudes (e.g., job satisfaction), personality factors theorized to foster informal learning (e.g., agreeableness), and specific attitudes toward learning (e.g., perceived utility of the learning activity). In addition, the category of competence/KSAs also showed a relationship to informal learning. This is consistent with the notion that the personal characteristics that contribute to learning (Terborg, 1977) and performance (Cerasoli, 2014) are ability and motivation. By the same token, however, we observed high variability around the mean effect sizes for work-related competencies – informal learning relationships. One explanation for such variability may well be the existence of non-linear relationships between variables. In fact, we might anticipate a step function relationship between members' competencies and their engagement in informal learning. For example, it could be that at low competency levels, employees are so overwhelmed with the immediate tasks at hand that they are restricted in their ability to engage in informal learning. Alternatively, at exceedingly high levels of competence, members' performance levels may have achieved asymptote, or they may perceive little benefit from additional informal learning. Such dynamics would generate complex nonlinear relationships that cannot be adequately modeled in meta-analyses. Therefore we encourage future investigations to examine these and other nonlinear relationships directly in original studies.

The findings for demographics were surprising, in that age, gender, education, grade/tenure, and marital status were all positively related to informal learning, albeit at small levels. Perhaps the education relationship reveals that more educated employees seek out more opportunities to learn and view learning more favorably (Birdi, Allan, & Warr, 1997; McCauley & Hezlett, 2001). It may be that grade/tenure reflects the fact that management employees tends

to have a more favorable view of learning programs than do subordinates (McCauley & Hezlett, 2001). The positive marriage status results may reflect the same theoretical basis that underlies previous meta-analytic results showing marriage being correlated to various aspects of career success (Ng, Eby, Sorensen, & Feldman, 2005). Perhaps most importantly, save for grade/tenure, none of the demographics exhibited greater than a "small" effects size using Cohen's (1969) conventions (i.e., each effect size was less than $\rho = .20$). Although age and gender had significant effects, the effects were quite weak. This is consistent with a body of research that suggests the two are largely unrelated to critical organizational criteria, such as attitudes, motivation, and performance (Cerasoli, Nicklin, & Ford, 2014; Ng & Feldman, 2010, 2012). And even the grade/tenure effect was less than that observed for all other personal antecedents. In short, consistent with what others have found (Berg & Chyung, 2008), demographics do not appear to have particularly powerful influences on employees' informal learning.

In sum, both situational and personal factors evidenced significant relationships with employees' informal learning. Notably, however, the interactionist perspective also holds that interactions among person and situation factors are vital to understanding behavior. We should note that our review uncovered no research that advanced and tested *interactive* effects of person and situation as related to informal learning. We return to this point below.

Implications for Theory and Research

The main theoretical implication of our research is a need for greater emphasis on the interactionist perspective among informal learning researchers. Not only is an individual's behavior influenced by significant features of the situations that he or she encounters, but by the person, who may even select some of the situations in which he or she performs (Endler & Magnusson, 1976; Mathieu & Tesluk, 2010). We should be clear that future research is needed that examines person-situation interactions because we did not locate any viable data to do so here. Specifically, only main (i.e., person and situation) effects were reported and no interactive (i.e., person X situation) effects were located. This is a limitation of the data and of data analysis, given the difficulties exploring interactions among continuous data in meta-analysis (Cerasoli, et al., 2014). So, while we see from the meta-analytic results a number of important main effect relationships between situational characteristics and informal learning and between personal characteristics and informal learning, what is still lacking is empirical data showing the interactional situation X person synergistic effects where informal learning may truly flourish.

Interactionist theories hinge on the principle that individuals' natural inclinations will manifest when activated and enabled by situational cues (Tett & Guterman, 2000). For example, if an individual has a natural curiosity and motivation to explore and learn, and his or her work situation provides times and opportunities to learn new things, informal learning is much more likely to occur. Conversely, if either the engagement motives or situational opportunities are absent, informal learning is far less likely to occur; a curious individual's natural tendencies can be thwarted by a dull, resource-poor environment, or an incurious person will not be learning-engaged, even in a stimulus-rich environment. Eraut (2004), in some interesting ethnographic research, found that personal confidence is critical in allowing workers to take advantage of job context factors such as support and work structure. In short, the extent to which personal factors influence an individual's informal learning behavior must depend, to some degree, on elements of the situation. Further, we anticipate that, generally speaking, there will be some individual

factors that facilitate, and others that inhibit, informal learning. Similarly, some situations will promote and enable informal learning, whereas others may constrain or distract from informal learning. This is consistent with the literature that examines the associations of situational and individual variables with traditional training effectiveness (Colquitt, et al., 2000). Future research should explore factors that we were unable to investigate here.

Interactionist theories not only identify individual and situational variables that facilitate some targeted behaviors, but also specify combinations that are particularly synergistic or particularly dysfunctional (cf. Chen & Kanfer, 2006; Mathieu & Tesluk, 2010). For example, in a traditional training context, Noe and Wilk (1993) found that situational constraints undermined trainees' motivation effects on outcomes. Ford, Sego, Quinones, and Sorra (1992) found that situational constraints limited trainees' opportunities to practice learned skills and thereby decreased training transfer. Alternatively, when positive situational factors align with positive individuals' predispositions, informal learning will be enhanced (cf. Ellinger, 2005; Enos, Kehrhahn, & Bell, 2003; Skule, 2004; Tannenbaum, et al., 2010). Therefore, individual differences and situational factors are likely to exhibit complex interactions as related to informal learning (Mathieu & Martineau, 1997).

We would suggest that, in any given field setting, there are "triggers", that, if noticed by an individual, signal that a learning opportunity is available and perhaps even essential. The task, the setting, or even the individuals with whom the person is interacting can provide potential informal learning triggers. Unlike simulated training environments, where such triggers are designed into scenarios (Cannon-Bowers & Bowers, 2010), in field settings triggers are naturally occurring phenomena. Some field settings are "target rich" in the sense that they provide abundant learning opportunities. Alternatively, other situations are "target poor" and offer few opportunities to learn. Understanding the nature of field learning triggers will allow training designers to identify them as part of a training need analysis and incorporate them into training.

We posit that some people will be more or less likely to create learning opportunities proactively or to recognize and capitalize on existing opportunities depending on features of the situation and the personal attributes they possess. Research has already suggested some potential interactions between individual and situational characteristics in terms of their informal learning outcomes. For example, Simmering, et al. (2003) found that conscientiousness was positively related to development, but only in some situations. As another example, Boyce, et al. (2010) found that the relationship between propensity for development and participation in developmental activities was moderated by degree of organizational support.

Notably, situational factors exist at several levels – such as job (e.g., job demands), immediate work environment (e.g., team or units arrangements; leader support), and the larger organizational environment (e.g., the culture). In this fashion, interactions may be within or may traverse levels of analysis in a multilevel fashion (see Mathieu & Chen, 2011; Mathieu & Tesluk, 2010). A notable shortcoming of the literature that we reviewed is that "situational characteristics" were measured as individuals' perceptions and analyzed at the individual level. Conceptually, situational factors (beyond job/task characteristics) refer to group, unit, or organizational features – i.e., some aggregate beyond the individual level of analysis. Failure to properly measure, index, and analyze multi-level data and taking into account such nesting arrangements is fraught with interpretation ambiguities (see Mathieu & Chen, 2011). We

encourage future research to advance and test multi-level models of informal learning (Mathieu & Tesluk, 2010).

Implications for Practice

Despite the fact that informal learning accounts for 70–90 percent of what most individuals learn on the job and is critical to most organizations, typically few resources are formally dedicated to helping bolster it. Formally dedicating resources does not convert informal learning into formal learning; instead, formal resources and programs can build the knowledge and skills needed to be an effective informal learner (i.e., learning to learn). Given the importance and proportion of learning that occurs informally, we implore organizations to begin looking for ways to boost informal learning.

One way organizations can formally boost informal learning is through targeted needs analyses. Comprehensive work analyses are common in many organizations and help uncover the tasks that are performed, the conditions under which they are performed, and the desirable characteristics of the individuals who will perform the tasks (Wilson, Bennett Jr, Gibson, & Alliger, 2012). Training needs analyses are also critical, as they determine in advance not only the type of training necessary, but the subsequent conditions for transfer. Developing training needs analysis methods that can uncover informal learning needs and opportunities in specified field settings would be a beneficial addition and is one focus of our current research with the U.S. Army Research Institute.

The armed forces, in particular the U.S. Army has long had an interest in fostering informal learning (Burton & Brown, 1978; Fischer, Lemke, Mastaglio, & Morch, 1991). While it is not always feasible to predict the conditions Soldiers will face, it should be possible to uncover learning needs and anticipate where field-based learning opportunities are likely to exist. Advanced knowledge of what should be learned in the field and where and how it can be learned can help trainers prepare Soldiers pre-deployment in a way that accelerates their subsequent informal learning in field settings. There is a need to develop needs analysis techniques that are designed to uncover that type of information.

There are also steps the organization can take to help ensure that the situational and personal factors that we have shown to be predictive of informal learning are in place. Organizations can foster informal learning by managing the work environment so it allows employees the time, resources, and support they need to engage in informal learning. They should attempt to communicate the importance, prevalence, and value of informal learning, highlighting the resources employees have to pursue it, modeling positive informal learning behaviors, and ensuring workers feel actively supported. While organizations may have somewhat less control over the engagement motives of informal learning, they can still endeavor to maximize worker engagement and satisfaction, and perhaps foster informal learning motivation in workers directly via some of the support mechanisms just mentioned.

We also note that informal learning and formal learning are not of necessity mutually exclusive. In fact, there is much evidence to suggest that the two can support each other: it has been noted that "informal learning facilitates the acceptance and development of formal learning and it is this synergy which produces effective growth" (Bell, 1977, p. 280, as cited in Cseh et

al., 2000). It may be feasible to modify or develop formal training that improves the ability of individuals to learn informally. Rather than attempting to predict the conditions of transfer and then teaching the necessary knowledge and skills (Tracey, Tannenbaum, & Kavanagh, 1995), it may be more effective to teach individuals how to learn. In essence, formal training can be modified from this is what you *need to know* to this is how you *learn what you need*. This shift in paradigm has particular utility for conditions of transfer that will be dynamic, unpredictable, risky, or altogether unknowable. We suggest that these are the types of challenges faced by personnel in military organizations, such as the U.S. Army.

Finally, incentivizing the correct behavior is critical to maintaining informal learning. Informal learning, by definition, is self-initiated and non-mandatory. Thus, there has to be an incentive for engaging in the behavior; for example, the potential for higher sales commissions may entice salespersons who have to rely on informal learning to understand a new territory. The disincentives to informal learning should also be removed. For example, employees are unlikely to engage in some of the experimentation, reflection, and dissemination of results if the organization places too many demands on the employee or punishes employees for trying out new ideas.

Limitations

There are several limitations to the current review that should be noted. The first is the inability of the meta-analysis to address the question of interactions due to a dearth of studies that examined an interaction effect. As theoretically posited above, person and situation factors should interact. Our data provides a first step in this direction because it demonstrates the main effects of person and situation factors. The criticism that main effects cannot be interpreted without reference to interaction effects (Howell, 2011) is a valid one, given that interactions can mask main effects. However, main effects are only fully masked with a cross-over interaction, which we do not expect here.

A second limitation of the data to keep in mind is that meta-analyses are often bestowed with an undue air of objectivity, so it is important to keep in mind they are something of an art (Cerasoli et al., 2014; Rosenthal & DiMatteo, 2001). There are numerous judgment calls that must be performed and coding can, at times, be somewhat subjective. To reduce between-person error and subjectivity, we have followed guidelines put forth by others (Aguinis, Gottfredson, & Wright, 2011; Aguinis, Pierce, Bosco, Dalton, & Dalton, 2011; Cooper, 2003), which include multiple discussions, extensive documentation, and publication of primary data (see the Appendix).

Our decision to aggregate the antecedents of informal learning into higher order construct categories was intentional. However, one downside of this is the inability to look at each category's constituent constructs alone. For example, it may be valuable to disaggregate the positive personality/predisposition category to explore the independent roles of extraversion and conscientiousness. Similarly, it might be meaningful to break down job/task characteristics to explore how demands and resources independently (and perhaps even interactively) impact informal learning. More primary studies are needed to further explore these possibilities.

A final limitation common to meta-analysis is that all data are correlational in nature. Although causal inferences are consistent with theory and supported by correlational data, it should be made clear that strong causal inferences require additional evidence. Primarily, this is a result of the inability to rule out alternative explanations in primary data. Also, some primary studies are not explicit in whether our antecedents were measured before or after informal learning, calling into question the temporal precedence of informal learning. For example, it is possible and plausible to reason that first engaging in informal learning leads to subsequent higher self-efficacy and fosters learning goal orientation, thus creating a self-sustaining cycle.

CONCLUSION

This review was prompted by the persistent observation that informal learning occupies a much larger proportion of organizational learning than does formal learning. Organizations have an unmet need because, while most learning is informal, little is invested in ways to foster it (Berg & Chyung, 2008). Further, there is a strong need to reduce some of the holes in this research because "it would be a mistake to believe that learning in the workplace often approaches its potential" (Eraut, 2004, p. 268). Not only have organizations "found that informal learning from experience cannot be left completely to chance…the need for more effective informal learning from experience is also rising" (Marsick, et al., 1999, pp. 93-94).

Given the proportion of learning that occurs informally, the demand by organizations, and the need to clarify both the construct and its antecedents, it is time that research catches up to inform theory and practice. We have taken a first step by proposing a high-level, three-axis view of the organizational learning space, and delineating where informal learning fits within it. We have also taken the first step toward an integrative understanding of the factors that foster informal learning. By applying an interactionist perspective, we have demonstrated several major main effects for personal and situation antecedents of informal learning. We encourage future research to now explicitly examine the interactive effects, as there are synergies to be gained.

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APPENDIX - BREAKDOWN OF STUDIES IN THE META-ANALYSIS

Author	Year	r	n	α IV	α DV	IV Description	IV1	IV2	IV3
Berg & Chyung	2008	.20	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	.11	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	-.06	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	.05	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	-.08	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	.34	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	.25	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	.06	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	.10	125	--	--	Age	P	DM	AGE
Berg & Chyung	2008	-.03	110	--	--	Education	P	DM	EDU
Berg & Chyung	2008	-.04	110	--	--	Gender (Female vs. Male)	P	DM	GEN
Berg & Chyung	2008	.05	125	--	--	Learning Culture	S	SU	FOR
Berg & Chyung	2008	.02	125	--	--	Learning Culture	S	SU	FOR
Berg & Chyung	2008	.10	125	--	--	Learning Culture	S	SU	FOR
Berg & Chyung	2008	.06	125	--	--	Learning Culture	S	SU	FOR
Choi & Jacobs	2011	.49	203	.88	.69	Learning Goal Orientation	P	EM	PPP
Choi & Jacobs	2011	.44	203	.88	.76	Learning Goal Orientation	P	EM	PPP
Choi & Jacobs	2011	.31	203	.88	.68	Learning Goal Orientation	P	EM	PPP
Choi & Jacobs	2011	.34	203	.88	.69	Motivation to Learn	P	EM	PLM
Choi & Jacobs	2011	.40	203	.88	.76	Motivation to Learn	P	EM	PLM
Choi & Jacobs	2011	.23	203	.88	.68	Motivation to Learn	P	EM	PLM
Choi & Jacobs	2011	.28	203	.81	.69	Self-Efficacy	P	EM	PPP
Choi & Jacobs	2011	.28	203	.81	.76	Self-Efficacy	P	EM	PPP
Choi & Jacobs	2011	.23	203	.81	.68	Self-Efficacy	P	EM	PPP
Choi & Jacobs	2011	.24	203	.77	.69	Supportive Environment	S	SU	FOR
Choi & Jacobs	2011	.28	203	.73	.69	Supportive Environment	S	SU	PPL
Choi & Jacobs	2011	.30	203	.64	.69	Supportive Environment	S	SU	FOR

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	r	n	α IV	α DV	IV Description	IV1	IV2	IV3
Choi & Jacobs	2011	.15	203	.77	.76	Supportive Environment	S	SU	FOR
Choi & Jacobs	2011	.11	203	.73	.76	Supportive Environment	S	SU	PPL
Choi & Jacobs	2011	.14	203	.64	.76	Supportive Environment	S	SU	FOR
Choi & Jacobs	2011	.12	203	.77	.68	Supportive Environment	S	SU	FOR
Choi & Jacobs	2011	.06	203	.73	.68	Supportive Environment	S	SU	PPL
Choi & Jacobs	2011	.21	203	.64	.68	Supportive Environment	S	SU	FOR
De Groot, et al.	2012	.02	1290	.64	.62	Heavy Workload/Lack Time	S	JT	TIM
De Groot, et al.	2012	.02	1290	.64	.61	Heavy Workload/Lack Time	S	JT	TIM
De Groot, et al.	2012	.03	1290	.64	.64	Heavy Workload/Lack Time	S	JT	TIM
De Groot, et al.	2012	.03	1290	.64	.60	Heavy Workload/Lack Time	S	JT	TIM
De Groot, et al.	2012	.19	1290	.62	.62	Knowledge Base Stability	S	JT	RES
De Groot, et al.	2012	.12	1290	.62	.61	Knowledge Base Stability	S	JT	RES
De Groot, et al.	2012	.15	1290	.62	.64	Knowledge Base Stability	S	JT	RES
De Groot, et al.	2012	.18	1290	.62	.60	Knowledge Base Stability	S	JT	RES
De Groot, et al.	2012	.31	1290	.60	.62	Need to be Informed	P	EM	PPP
De Groot, et al.	2012	.23	1290	.60	.61	Need to be Informed	P	EM	PPP
De Groot, et al.	2012	.27	1290	.60	.64	Need to be Informed	P	EM	PPP
De Groot, et al.	2012	.20	1290	.60	.60	Need to be Informed	P	EM	PPP
De Groot, et al.	2012	.07	1290	.65	.62	Opportunities for Feedback	S	SU	INF
De Groot, et al.	2012	.16	1290	.65	.61	Opportunities for Feedback	S	SU	INF
De Groot, et al.	2012	.03	1290	.65	.64	Opportunities for Feedback	S	SU	INF
De Groot, et al.	2012	.01	1290	.65	.60	Opportunities for Feedback	S	SU	INF
Digby	2010	-.10	1000	--	--	Age	P	DM	AGE
Digby	2010	.11	1000	--	--	Education	P	DM	EDU
Digby	2010	.04	1000	--	--	Gender (Female vs. Male)	P	DM	GEN
Digby	2010	.13	1000	--	--	Income	P	DM	INC

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	*r*	n	α IV	α DV	IV Description	IV1	IV2	IV3
Enos, et al.	2003	-.15	84	.93	.93	Coworker Support	S	SU	PPL
Enos, et al.	2003	-.46	84	.85	.93	Org. Support for Transfer	S	SU	FOR
Enos, et al.	2003	.06	84	.89	.93	Proficiency	P	CA	C/K
Enos, et al.	2003	-.26	84	.95	.93	Supervisor Transfer Support	S	SU	PPL
Gijbels, et al.	2010	.12	115	.79	.83	Job Control	S	JT	C/A
Gijbels, et al.	2010	.29	115	.72	.83	Job Demands	S	JT	DEM
Gijbels, et al.	2010	.49	115	.83	.83	Self Learning Orientation	P	EM	PLM
Gijbels, et al.	2010	.12	115	.79	.83	Social Support	S	SU	-
Gijbels, et al.	2012	.36	73	.87	.92	Job Control	S	JT	C/A
Gijbels, et al.	2012	.33	73	.81	.92	Job Demands	S	JT	DEM
Gijbels, et al.	2012	.61	73	.83	.92	Self Learning Orientation	P	EM	PLM
Gijbels, et al.	2012	.05	73	.79	.92	Social Support	S	SU	PPL
Gonzales	1984	.26	170	--	--	Age	P	DM	AGE
Gonzales	1984	.30	170	--	--	Age	P	DM	AGE
Gonzales	1984	.40	170	--	--	Age	P	DM	AGE
Gonzales	1984	.28	170	--	--	Age	P	DM	AGE
Gonzales	1984	.24	170	--	--	Degree Work Involvement	P	EM	PGA
Gonzales	1984	.24	170	--	--	Degree Work Involvement	P	EM	PGA
Gonzales	1984	.18	170	--	--	Degree Work Involvement	P	EM	PGA
Gonzales	1984	.17	170	--	--	Degree Work Involvement	P	EM	PGA
Gonzales	1984	.18	170	--	--	Experience	P	DM	RNK
Gonzales	1984	.04	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.13	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.22	170	--	--	Experience	P	DM	RNK
Gonzales	1984	-.01	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.17	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.16	170	--	--	Experience	P	DM	RNK
Gonzales	1984	-.02	170	--	--	Experience	P	CA	EXP

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	*r*	n	α IV	α DV	IV Description	IV1	IV2	IV3
Gonzales	1984	.17	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.87	170	--	--	Experience	P	DM	RNK
Gonzales	1984	.10	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.10	170	--	--	Experience	P	CA	EXP
Gonzales	1984	.05	170	--	--	Gender (female vs. male)	P	DM	GEN
Gonzales	1984	-.04	170	--	--	Gender (female vs. male)	P	DM	GEN
Gonzales	1984	-.11	170	--	--	Gender (female vs. male)	P	DM	GEN
Gonzales	1984	.08	170	--	--	Gender (female vs. male)	P	DM	GEN
Gonzales	1984	.23	170	--	--	IL Resources Used	P	CA	C/K
Gonzales	1984	.09	170	--	--	IL Resources Used	P	CA	C/K
Gonzales	1984	.04	170	--	--	IL Resources Used	P	CA	C/K
Gonzales	1984	.19	170	--	--	IL Resources Used	P	CA	C/K
Gonzales	1984	.00	170	--	--	IL Training	P	CA	C/K
Gonzales	1984	.27	170	--	--	IL Training	P	CA	C/K
Gonzales	1984	.27	170	--	--	IL Training	P	CA	C/K
Gonzales	1984	.21	170	--	--	IL Training	P	CA	C/K
Gonzales	1984	-.04	170	--	--	Income	P	DM	INC
Gonzales	1984	-.09	170	--	--	Income	P	DM	INC
Gonzales	1984	-.27	170	--	--	Income	P	DM	INC
Gonzales	1984	-.06	170	--	--	Income	P	DM	INC
Hicks, et al.	2007	-.11	110	--	--	Rank (Trainee v Mgr)	P	DM	RNK
Hicks, et al.	2007	.01	109	--	--	Rank (Trainee v Mgr)	P	DM	RNK
Hicks, et al.	2007	.21	109	--	--	Rank (Trainee v Mgr)	P	DM	RNK
Hicks, et al.	2007	-.25	106	--	--	Rank (Trainee v Mgr)	P	DM	RNK
Hicks, et al.	2007	.00	109	--	--	Rank (Trainee v Mgr)	P	DM	RNK
Hicks, et al.	2007	-.14	100	--	--	Rank (Trainee v Partner)	P	DM	RNK
Hicks, et al.	2007	.15	100	--	--	Rank (Trainee v Partner)	P	DM	RNK
Hicks, et al.	2007	.32	100	--	--	Rank (Trainee v Partner)	P	DM	RNK

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	*r*	n	α IV	α DV	IV Description	IV1	IV2	IV3
Hicks, et al.	2007	-.41	98	--	--	Rank (Trainee v Partner)	P	DM	RNK
Hicks, et al.	2007	-.08	100	--	--	Rank (Trainee v Partner)	P	DM	RNK
Hicks, et al.	2007	-.04	74	--	--	Rank (Mgr v Partner)	P	DM	RNK
Hicks, et al.	2007	.15	73	--	--	Rank (Mgr v Partner)	P	DM	RNK
Hicks, et al.	2007	.16	73	--	--	Rank (Mgr v Partner)	P	DM	RNK
Hicks, et al.	2007	-.13	72	--	--	Rank (Mgr v Partner)	P	DM	RNK
Hicks, et al.	2007	-.09	73	--	--	Rank (Mgr v Partner)	P	DM	RNK
Hutchens, et al.	2010	.00	107	--	.78	Education	P	DM	EDU
Hutchens, et al.	2010	.53	107	.60	.78	Formal learning	P	CA	EXP
Hutchens, et al.	2010	.08	107	--	.78	Job Level	P	DM	RNK
Hutchens, et al.	2010	-.19	107	.89	.78	Research Literature	P	EM	PLM
Hutchens, et al.	2010	-.21	107	--	.78	Training Certification	P	CA	C/K
Hutchens, et al.	2010	.10	107	.79	.78	Understanding of Transfer	P	CA	C/K
Jeon & Kim	2012	.18	1899	.69	--	Innovative Culture	S	SU	FOR
Jeon & Kim	2012	.12	1899	.69	--	Innovative Culture	S	SU	FOR
Jeon & Kim	2012	.15	1899	--	--	Non-routineness of Task	S	JT	C/A
Jeon & Kim	2012	.18	1899	--	--	Non-routineness of Task	S	JT	C/A
Jeon & Kim	2012	.26	1899	.85	--	Open Communication	S	SU	INF
Jeon & Kim	2012	.20	1899	.85	--	Open Communication	S	SU	INF
Jeon & Kim	2012	.24	1899	.88	--	Org. Leadership	S	SU	PPL
Jeon & Kim	2012	.17	1899	.88	--	Org. Leadership	S	SU	PPL
Jeon & Kim	2012	.18	1899	--	--	Task Satisfaction	P	EM	PGA
Jeon & Kim	2012	.16	1899	--	--	Task Satisfaction	P	EM	PGA
Lindner ('95)	2011	-.04	12109	--	--	Age	P	DM	AGE
Lindner ('95)	2011	-.06	12109	--	--	Earnings	P	DM	INC
Lindner ('95)	2011	.09	12109	--	--	Marital Status	P	DM	MAR
Lindner ('95)	2011	.00	12109	--	--	Sex (female vs. male)	P	DM	GEN
Lindner ('99)	2011	-.04	4108	--	--	Age	P	DM	AGE

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	*r*	n	α IV	α DV	IV Description	IV1	IV2	IV3
Lindner ('99)	2011	-.06	4108	--	--	Earnings	P	DM	INC
Lindner ('99)	2011	.12	4108	--	--	Marital Status	P	DM	MAR
Lindner ('99)	2011	-.03	4108	--	--	Sex (female vs. male)	P	DM	GEN
Lindner ('01)	2011	-.09	5886	--	--	Age	P	DM	AGE
Lindner ('01)	2011	-.04	5886	--	--	Earnings	P	DM	INC
Lindner ('01)	2011	.24	5886	--	--	Marital Status	P	DM	MAR
Lindner ('01)	2011	-.05	5886	--	--	Sex (female vs. male)	P	DM	GEN
Lindner ('03)	2011	-.09	7396	--	--	Age	P	DM	AGE
Lindner ('03)	2011	-.06	7396	--	--	Earnings	P	DM	INC
Lindner ('03)	2011	.21	7396	--	--	Marital Status	P	DM	MAR
Lindner ('03)	2011	-.02	7396	--	--	Sex (female vs. male)	P	DM	GEN
Lindner ('05)	2011	-.09	4567	--	--	Age	P	DM	AGE
Lindner ('05)	2011	-.08	4567	--	--	Earnings	P	DM	INC
Lindner ('05)	2011	.24	4567	--	--	Marital Status	P	DM	MAR
Lindner ('05)	2011	-.03	4567	--	--	Sex (female vs. male)	P	DM	GEN
Livingstone	2001	.21	489	--	--	Hours Worked	S	JT	TIM
Livingstone	2001	.10	390	--	--	Hours Worked	S	JT	TIM
Livingstone & Raykov	2008	.22	2895	--	--	Decision maker?	P	DM	RNK
Livingstone & Stowe	2007	-.31	286	--	--	Age	P	DM	AGE
Livingstone & Stowe	2007	-.77	286	--	--	Age	P	DM	AGE
Livingstone & Stowe	2007	.91	286	--	--	Paid Hours Worked	S	JT	TIM
Livingstone & Stowe	2007	-.06	286	--	--	Paid Hours Worked	S	JT	TIM
Matsuo & Nakahara	2013	.45	127	.86	.91	Sup. Empowerment	S	SU	INF
Matsuo & Nakahara	2013	.62	127	.96	.91	Sup. Learning Support	S	SU	INF
Moon & Na	2009	.55	388	--	.85	Communication	S	SU	INF
Moon & Na	2009	.28	388	.78	.85	Curiosity	P	EM	PPP
Moon & Na	2009	.40	388	.91	.85	Learning Competency	P	CA	C/K
Moon & Na	2009	.11	388	.66	.85	Locus of Control	P	EM	PPP

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	r	n	α IV	α DV	IV Description	IV1	IV2	IV3
Moon & Na	2009	.50	388	--	.85	Merit System	S	SU	FOR
Moon & Na	2009	.35	388	.84	.85	Motivation to Learn	P	EM	PLM
Moon & Na	2009	.16	388	.57	.85	Self-Esteem	P	EM	PPP
Noe, Tews, & Marand	2013	.00	180	--	.71	Age	P	DM	AGE
Noe, Tews, & Marand	2013	.17	180	.80	.71	Agreeableness	P	EM	PPP
Noe, Tews, & Marand	2013	.16	180	.87	.71	Conscientiousness	P	EM	PPP
Noe, Tews, & Marand	2013	.20	180	.76	.71	Emotional Stability	P	EM	PPP
Noe, Tews, & Marand	2013	.26	180	.71	.71	Extraversion	P	EM	PPP
Noe, Tews, & Marand	2013	-.17	180	--	.71	General Mental Ability	P	CA	C/K
Noe, Tews, & Marand	2013	.17	180	.70	.71	General Self-Efficacy	P	EM	PPP
Noe, Tews, & Marand	2013	.16	180	.77	.71	Openness to Experience	P	EM	PPP
Noe, Tews, & Marand	2013	-.09	180	--	.71	Tenure	P	DM	RNK
Noe, Tews, & Marand	2013	.31	180	.69	.71	Zest	P	EM	PPP
Ouweneel, et al.	2009	.35	1588	.71	.78	Job Control	S	JT	C/A
Ouweneel, et al.	2009	.08	1588	.86	.78	Job Demands	S	JT	DEM
Ouweneel, et al.	2009	.24	1588	.76	.78	Support (colleague)	S	SU	PPL
Ouweneel, et al.	2009	.37	1588	.92	.78	Support (supervisor)	S	SU	PPL
Pike	1999	.09	295	--	.84	Residence: Interactive?	S	OP	POT
Pike	1999	.16	295	--	.89	Residence: Interactive?	S	OP	POT
Reardon	2010	.28	288	--	--	Learning Culture	S	SU	FOR
Reychav & Te'eni	2009	.52	273	.85	.94	Utility of Knowledge Sharing	P	EM	PLM
Riaz et al.	2010	.41	473	.82	.74	Web-Based Learning	P	CA	C/K
Richter, et al.	2011	-.09	1939	--	.82	Age	P	DM	AGE
Richter, et al.	2011	.06	1939	--	--	Age	P	DM	AGE
Richter, et al.	2011	-.18	1939	--	.82	Gender (Female vs. Male)	P	DM	GEN
Richter, et al.	2011	.07	1939	--	--	Gender (Female vs. Male)	P	DM	GEN
Richter, et al.	2011	.02	1939	--	.82	Mgt. Responsibilities?	S	JT	DEM
Richter, et al.	2011	.03	1939	--	--	Mgt. Responsibilities?	S	JT	DEM

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	*r*	n	α IV	α DV	IV Description	IV1	IV2	IV3
Richter, et al.	2011	.02	1939	--	.82	Marital Status	P	DM	MAR
Richter, et al.	2011	-.02	1939	--	--	Marital Status	P	DM	MAR
Richter, et al.	2011	-.04	1939	--	.82	Service Responsibilities?	S	JT	DEM
Richter, et al.	2011	.06	1939	--	--	Service Responsibilities?	S	JT	DEM
Richter, et al.	2011	.15	1939	.75	.82	Work Engagement	P	EM	PGA
Richter, et al.	2011	.11	1939	.75	--	Work Engagement	P	EM	PGA
Rowden	2002	.28	794	.75	.73	Affective Enjoyment	P	EM	PGA
Rowden	2002	.20	794	.72	.73	Compensation	S	SU	FOR
Rowden	2002	.44	794	.83	.73	Overall Job Satisfaction	P	EM	PGA
Rowden	2002	.58	794	.76	.73	Recognition	S	SU	-
Rowden	2002	.29	794	.88	.73	Supportive Environment	S	SU	-
Rowden & Conine	2005	.45	341	.74	.83	Climate	S	SU	INF
Rowden & Conine	2005	.48	341	.83	.83	Compensation	S	SU	FOR
Rowden & Conine	2005	.49	341	.74	.83	Contentment with Work/Org	P	EM	PGA
Rowden & Conine	2005	.65	341	.80	.83	Recognition	S	SU	FOR
Sanders, et al.	2011	.24	132	.84	.82	Attitude/Expected Value	P	EM	PLM
Sanders, et al.	2011	.11	132	.89	.82	Career Orientation	P	EM	PGA
Sanders, et al.	2011	.15	132	.70	.82	Coworker Support	S	SU	PPL
Sanders, et al.	2011	-.12	132	.80	.82	Job Insecurity	P	EM	PGA
Sanders, et al.	2011	.41	132	.84	.82	Management Support	S	SU	PPL
Sanders, et al.	2011	.19	132	.94	.82	Perceived Behavioral Control	P	EM	PPP
Sanders, et al.	2011	.28	132	.90	.82	Subjective Norms	S	SU	PPL
Santos & Ali	2012a	.79	15	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.35	15	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.66	15	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.53	15	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.71	15	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.71	15	--	--	Utility of Learning Activity	P	EM	PLM

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	r	n	α IV	α DV	IV Description	IV1	IV2	IV3
Santos & Ali	2012a	.71	14	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.62	13	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012a	.69	15	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.45	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.66	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.71	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.59	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.60	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.62	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.68	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.54	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.62	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.63	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.55	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.67	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.74	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.50	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.65	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.60	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.51	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.11	16	--	--	Utility of Learning Activity	P	EM	PLM
Santos & Ali	2012b	.20	16	--	--	Utility of Learning Activity	P	EM	PLM
van der Heijden, et al.	2009	.13	215	.81	.93	Personal Flexibility	P	EM	PPP
van der Heijden, et al.	2009	.03	215	.81	.89	Personal Flexibility	P	EM	PPP
van der Heijden, et al.	2009	.20	215	.81	.84	Personal Flexibility	P	EM	PPP
van der Heijden, et al.	2009	.19	215	.81	.89	Personal Flexibility	P	EM	PPP
van der Heijden, et al.	2009	.15	215	.83	.93	Anticipation & Optimization	P	EM	PLM
van der Heijden, et al.	2009	.23	215	.83	.89	Anticipation & Optimization	P	EM	PLM

Appendix - Breakdown of Studies in the Meta-Analysis (continued)

Author	Year	r	n	α IV	α DV	IV Description	IV1	IV2	IV3
van der Heijden, et al.	2009	.15	215	.83	.84	Anticipation & Optimization	P	EM	PLM
van der Heijden, et al.	2009	.29	215	.83	.89	Anticipation & Optimization	P	EM	PLM
van der Heijden, et al.	2009	.19	215	.93	.93	Expertise	P	CA	C/K
van der Heijden, et al.	2009	-.02	215	.93	.89	Expertise	P	CA	C/K
van der Heijden, et al.	2009	.20	215	.93	.84	Expertise	P	CA	C/K
van der Heijden, et al.	2009	.17	215	.93	.89	Expertise	P	CA	C/K
van der Heijden, et al.	2009	.44	215	.84	.93	External Support (Team)	S	SU	INF
van der Heijden, et al.	2009	-.04	215	.84	.89	External Support (Team)	S	SU	INF
van der Heijden, et al.	2009	.12	215	.84	.84	External Support (Team)	S	SU	INF
van der Heijden, et al.	2009	.04	215	.84	.89	External Support (Team)	S	SU	INF
van der Heijden, et al.	2009	.33	215	.88	.93	Time	S	JT	TIM
van der Heijden, et al.	2009	-.13	215	.88	.89	Time	S	JT	TIM
van der Heijden, et al.	2009	-.01	215	.88	.84	Time	S	JT	TIM
van der Heijden, et al.	2009	.01	215	.88	.89	Time	S	JT	TIM
Wasiyo	2009	.11	656	.83	.71	Social Capital	S	SU	INF

Note: r = observed/calculated correlation between informal learning and an antecedent. α IV and α DV refer to the observed antecedent and informal learning reliabilities, respectively. IV1 = the Level 1 antecedent category (P = person; S = situation); IV2 = the Level 2 antecedent category (EM = engagement motives; CA = capability; DM = demographics; JT = job/task characteristics; OP = opportunity for learning; SU = support); IV3 = the Level 3 antecedent category (AGE = age; C/K = competency/KSA; C/A = control/autonomy; DEM = demands; EDU = education; EXP = experience; FOR = formal support; GEN = gender; INC = income; MAR = married; PEO = support from people; PGA = positive general work-related attitudes; PLM = positive learning-related motives; PPP = positive personality/propensities; POT = potential for new learning opportunities; RNK = rank/tenure; RES = resources; TIM = time). -- = unavailable; ? = a dichotomous or yes/no variable.