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Creative Self-Efficacy Development and Creative Performance Over Time

Pamela Tierney
Portland State University

Steven M. Farmer
Wichita State University

Building from an established framework of self-efficacy development, this study provides a longitudinal examination of the development of creative self-efficacy in an ongoing work context. Results show that increases in employee creative role identity and perceived creative expectation from supervisors over a 6-month time period were associated with enhanced sense of employee capacity for creative work. Contrary to what was expected, employees who experienced increased requirements for creativity in their jobs actually reported a decreased sense of efficaciousness for creative work. Results show that increases in creative self-efficacy corresponded with increases in creative performance as well.

Keywords: creative self-efficacy, creativity, role identity, leader expectations, job required creativity

Although employee creativity is recognized as a critical part of an organization's ability to be innovative (Amabile, 1988) and thrive in dynamic environments (Baer & Oldham, 2006), creative engagement in work settings can be challenging (Ford, 1996). Accordingly, Bandura and Locke (2003) noted that "a resilient sense of efficacy provides the necessary staying power in the arduous pursuit of innovation and excellence" (p. 97). Self-efficacy specific to a given activity domain is most instrumental in predicting performance in that domain (Bandura, 1986). A promising application of self-efficacy theory to employee creative performance is evidenced in the construct of creative self-efficacy (Shalley, Zhou, & Oldham, 2004), defined as the self-view "that one has the ability to produce creative outcomes" (Tierney & Farmer, 2002, p. 1138). Creative self-efficacy has demonstrated associations with creativity among individual employees (e.g., Tierney & Farmer, 2004) as well as work teams (Shin & Zhou, 2007) and across diverse settings such as education, manufacturing, operations, financial, and insurance services, as well as research and development (Beghetto, 2006; Carmeli & Schaubroeck, 2007; Choi, 2004; Gong, Huang, & Farh, 2009; Jaussi, Randel, & Dionne, 2007; Shin & Zhou, 2007; Tierney & Farmer, 2002, 2004). Research also suggests that creative self-efficacy serves as an important mediator between a variety of individual and contextual factors and employee creative performance (cf. Gong et al., 2009; Shin & Zhou, 2007). Given the relevance creative self-efficacy may hold for workplace creativity, there is a need for inquiry into a number of issues related to the construct (Shalley et al., 2004).

One critical but rudimentary issue is whether employees alter their sense of efficacy for creative work. Self-efficacy is considered malleable (Bandura, 1977, 1986; Gist, 1989), and some empirical evidence supports this notion (e.g., Mathieu, Martineau, & Tannenbaum, 1993; McNatt & Judge, 2004, 2008). However, no studies have assessed whether this assertion bears out in terms of creative self-efficacy among employees in ongoing work settings. If confidence in one's creative capacity is necessary for creative performance, as has been suggested (Bandura, 1997; Bandura & Locke, 2003; Tierney & Farmer, 2002, 2004), understanding how to build employee creative efficacy is a crucial step in an organization's attempt to innovate. A second, related issue is the identification of factors that account for changes in an employee's sense of creative efficacy. Leadership, education level and heterogeneity, job and team tenure, job efficacy, and complexity (Shin & Zhou, 2007; Tierney & Farmer, 2002, 2004) have been considered as antecedents in cross-sectional studies, and one time-lag study (Gong et al., 2009) examined the influence of employee learning orientation on creative self-efficacy level. Although useful, these studies provide no real sense of whether such factors relate to changes in creative efficacy views. Finally, our understanding of creative self-efficacy development is valuable to the extent that positive changes in self-views of creative efficacy actually lead to increments in creative performance. The need for studies examining how creativity unfolds over time has been expressed (see Zhou & Shalley, 2003), but with few exceptions (cf. Amabile, Barsade, Mueller, & Staw, 2005; Amabile & Conti, 1999), the vast majority of explorations into creativity have been cross-sectional (Zhou & Shalley, 2008). Further, no studies to date have examined corresponding fluctuations in creative self-efficacy and creativity in an organizational setting.

In response, we approached the current study with three main goals. Our first goal was to assess whether employees' creative self-efficacy can change and the type of factors that might account for such development. Building from creativity (e.g., Amabile, 1988, 1996; Ford, 1996; Woodman, Sawyer, & Griffin, 1993) and social-cognitive and self-efficacy theories (Bandura, 1986, 1997; Gist & Mitchell, 1992), we tested effects of changes in creative role identity, job creativity requirement, and supervisor creative

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Pamela Tierney, School of Business Administration, Portland State University; Steven M. Farmer, W. Frank Barton School of Business, Wichita State University.

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Correspondence concerning this article should be addressed to Pamela Tierney, School of Business Administration, Portland State University, Portland, OR 97207-0751. E-mail: tierneyp@pdx.edu

expectation on employee creative self-efficacy change. By testing such a model, we hoped to contribute to the understanding of creative self-efficacy emergence and how intrapersonal, task, and interpersonal dynamics play a role in efficacy formulation. Determining whether creative self-efficacy is malleable and identifying factors that might account for its change are relevant steps in advancing both theory and practice dedicated to fostering creative activity in organizational settings. Our study may also contribute to the broader literature on self-efficacy by examining changes in efficacy views as they relate to a combination of dynamic influences among employees. Only a handful of field studies have explored fluctuations in specific self-efficacy (Axtell & Parker, 2003; Gist, 1989; McNatt & Judge, 2004; Parker, 1998; Parker, Williams, & Turner, 2006). Bandura and Locke (2003) pointed out that the field of self-efficacy research needs investigations that take place in naturalistic settings over time and are conducted in a manner that permits the commonplace emergence and culmination of inherent sociostructural and personal factors for self-efficacy views. For instance, prior laboratory research (Vancouver, Thompson, Tischner, & Putnam, 2002; Vancouver, Thompson, & Williams, 2001) suggests that intraindividual increments in self-efficacy levels may have self-debilitating effects on subsequent performance. Our study was designed to permit assessment of whether such performance decrements also occur when self-efficacy for complex performance increases among job incumbents in their normal work setting.

The second study goal was to explore whether employee creative performance levels change and to ascertain whether such changes correspond with changes in creative self-efficacy, thereby providing greater insight into the nature of the creative self-efficacy–creativity association. The current study is one of the few to temporally track creative performance in a natural work setting. In order for the body of organizational creativity and innovation research to further evolve, we need to advance our understanding of how and why creative performance is evidenced in work settings over time. Our study results could indicate factors that may elicit creative processes (i.e., creative self-efficacy development) and performance from employees over time and experiences. More notably, with its change focus, our study would be the first to illustrate that increases in creative self-efficacy and performance are evidenced as employees move from lower to higher states of identity, social influences, and job requirements. In sum, the first two study goals should contribute to the literature on both self-efficacy and creativity and advance our understanding of how the two areas may inform one another.

Recent discourse (e.g., Hambrick, 2005; Von Glinow, 2005) calls for organizational researchers to expand their focus and potential impact by considering not-for-profit organizations as study settings for theory testing and application. Therefore, our third goal was to test our study model in a not-for-profit organization, in which both a sense of creative efficaciousness and creative performance would be particularly salient. The study took place in a child welfare organization, characterized by a dynamic work context where employees face the emergence of novel and unpredictable issues that need to be creatively resolved in the face of limited resources. The study, therefore, should extend prevailing organizational creativity research by testing our hypotheses in a unique, but relevant domain.

Study Model and Hypotheses

The self-efficacy model by Gist and Mitchell (1992) was instrumental in formulating our model of creative self-efficacy development. The model builds on Bandura's (1986) work, providing a dynamic view of how individuals formulate and change efficacy judgments over time and experience in work settings. A main goal of Gist and Mitchell's model was to identify and organize types of cues employees use in trying to determine their personal capacity levels in relevant performance domains. This typology model delineates between two types of cues: self-based internal efficacy determinants and external contextual determinants. Gist and Mitchell noted that both determinant types are important to consider in assessing how self-efficacy views develop and modify. We relied on their model in choosing the efficacy determinants for our study and in ascertaining how these determinants should influence the development of employee efficacy views.

Bandura (1986, 1997) regards self-efficacy development as a function of self-appraisal and as a relationally derived social construction. As such, Gist and Mitchell (1992) noted that employee views of personal agency derive from personal attributes as well as from information provided by social context members. Accordingly, we tested whether changes in employees' creative role identity—a self-concept trait reflecting an individual's identification with conducting creative work (Farmer, Tierney, & Kung-McIntyre, 2003)—and creative expectations of supervisors may shape employee efficacy development. Self-efficacy levels are also influenced by the nature and requirements of the task employees conduct (Gist & Mitchell, 1992). Hence, we also considered the impact that changes in employees' job creativity requirement have on their creative self-efficacy change. Changes in these three potential determinants were related to changes in employee creative self-efficacy over a six-month period. Degree of change in creative self-efficacy was also assessed in relation to the change in employee creative performance over the corresponding time period.

Creativity, the generation of novel and practical ideas or solutions, is the initial step in the broader innovation process (Amabile, 1988), which also includes idea development and implementation (Anderson, De Dreu, & Nijstad, 2004). With time and study, overlapping streams of research have emerged that address a myriad of individual-level work-related innovation behaviors. For example, one collection of creativity studies focuses primarily on the idea generation or solution phase of innovation (cf. Farmer et al., 2003; Hirst, van Knippenberg, & Zhou, 2009; Tierney & Farmer, 2004; Zhou, Shin, Brass, Choi, & Zhang, 2009). A related body of research has examined individual innovation (cf. Axtell et al., 2000; Axtell, Holman, & Wall, 2006; Miron, Erez, & Naveh, 2004) or innovative behavior (cf. Janssen, 2003, 2005; Pieterse, van Knippenberg, Schippers, & Stam, 2010; Yuan & Woodman, 2010), which are broader in focus and encompass employee activities such as idea development, support, and implementation. It is therefore important to conceptually distinguish among work innovation criteria and to specify the form examined (Hülshager, Anderson, & Salgado, 2009).

Because they represent critical outcomes, creative idea and solution generation were targeted for our study criteria. The choice of our study's time frame and setting was appropriate for this particular creativity focus. Whereas six months is a reasonable period for increases in employees' generation of creative work-

related solutions to be evidenced, the emergence of more mature forms of innovative outcomes would take longer to materialize. For instance, new technology implementations can comprise a time-consuming process consisting of pre-adoption deliberations, an adoption decision, pre-implementation activities, and, finally, implementation itself (Herold, Farmer, & Mobley, 1995). As it relates to our setting in particular, a case worker could increasingly produce spontaneous solutions to client issues over a six-month time frame, but it would take substantially longer for one of these solutions to become formally developed and adopted by her department.

Creative Role Identity as a Determinant of Creative Self-Efficacy Change

Employees make determinations about their capacity partially based on how they see themselves (Gist & Mitchell, 1992), and identity theory asserts that one influential way in which individuals see themselves is through a sense of role identity (Stryker, 1980). Creative role identity (Farmer et al., 2003) reflects identification with the role of being creative at work and seeing such activity as a central component of who one is. Critical to the current study is the tenet that sense of efficacy in a domain is often grounded in self-identification with that domain (Erez & Early, 1993) and that creative role identity is related to creativity (Farmer et al., 2003).

Identity and efficacy are complex self-views subject to both self-regulation and reciprocal determinism (Bandura, 1986; Burke, 1996), making specification of absolute causality between the two constructs challenging. However, we believe that there is theoretical and empirical support for the causal primacy of identity to self-efficacy. Literature on identity (cf. Burke & Stets, 1999) has noted that self-efficacy stems from identity enactment, suggesting identity as a precursor to efficacy development. Identity theory also points to a series of identity-based cognitions and behavioral orientations that reflect the antecedents that self-efficacy theory discerns as influential for efficacy views. For example, attribution processes play a major role in self-efficacy generation (Gist & Mitchell, 1992). Identities correspond with self-consistency motives (Swann, 1985), attendance to identity-confirming evidence (Swann, 1983), and cognitive barriers to identity-discrepant feedback (Swann, Polzer, Seyle, & Ko, 2004). Strong identity orientations thereby prompt attribution processes as a means of maintaining valued self-views (Swann, 1985). For example, someone with a strong creative role identity would be motivated to pay more attention to information that confirms that he or she is creative and to interpret cues in ways that support that identity. Likewise, the individual would tend to ignore information cues that might contradict or threaten that particular identity. Self-efficacy increases when successful past performances are attributed to internal causes (Tolli & Schmidt, 2008). We expected that employees with a strong creative role identity would, over time, tend to acknowledge creative task information consistent with positive attributions regarding creative performance, thereby influencing sense of creative capacity.

Personal priorities and interests also influence self-efficacy determination (Gist & Mitchell, 1992) as does enactive mastery gained through task engagement (Bandura, 1986). Individuals with strong identities focus their effort and attention toward identity domain-related engagement and performance as a means of enacting their identities (Swann, 1983). They also create opportunity

structures to ensure success in role-related tasks (Swann, 1987). From a temporal perspective, possession of a creative role identity should establish creativity-related activities as a set priority for employees' attention and time and lead to greater involvement and experience in creativity engagement (Petkus, 1996). We therefore expected to see identity-induced priorities and engagement bolstering employees' sense of creative efficacy.

A series of studies presented in the education area provides empirical support for positioning identity as an agent for self-efficacy development. Whereas two of these studies (Hejazi, Sharahray, Farsinehad, & Asgary, 2009; Swenson & Prelow, 2005) reported that the degree to which identity influenced key outcomes was dependent on identity's influence on self-efficacy, two additional studies (Ling & Erger, 2009; O'Brien, Martinez-Pons, & Kopala, 1999) explicitly found a causal connection between identity and academic-related self-efficacy.

Finally, the relative strength of an identity to an individual's sense of self can change over time (Collier & Callero, 2005; Kernis & Goldman, 2003). Consistent with the theoretical tenets noted above, as employees' creative role identity strengthens, they should pay greater attention to creative identity-verifying information, make more internal attributions regarding the locus of creative successes, have enhanced interest in creative endeavors, and engage in creative activities conducive to enactive mastery for creative performance. All of these tendencies should contribute to the positive development of creative self-efficacy over time.

Hypothesis 1: Increments in creative role identity will be positively related to increments in creative self-efficacy.

Job Creativity Requirement as a Determinant of Creative Self-Efficacy Change

The nature of certain jobs makes creativity a requirement for successful task completion (Oldham & Cummings, 1996), and recent study results (e.g., Gilson & Shalley, 2004; Unsworth, Wall, & Carter, 2005; Yuan & Woodman, 2010) indicate that creativity requirement may be an influential factor for employee creative activity. There are likely to be varying levels of creativity requirements across different jobs within most work settings. For example, in our study context, there were positions with lower creativity requirements, such as case assistants whose work role largely consists of maintaining and processing case forms and other routine duties. In contrast, there were employees, such as specialized case managers who regularly encounter unpredictable problems involving complicated and sometimes volatile situations with children or family dynamics. These latter employees had substantially more creativity requirements associated with their work role.

Jobs that require creativity can be viewed as having efficacy-building elements in that they convey cues employees consider in their efficacy formulation. For example, creativity requirement serves as a "creativity prompt" (George, 2007, p. 456) and means of communicating that creativity is expected job behavior for employees (Shalley, 2008; Yuan & Woodman, 2010). Jobs that require creativity also tend to be more challenging and entail more discretion in terms of addressing problems as they arise (Unsworth et al., 2005). For example, whereas the specialized case workers in our sample were provided with general guidelines for handling problems they might encounter in their daily work, they were also

afforded a fair amount of latitude in confronting difficult issues that necessitated immediate and novel solutions. Assignment to such work may be interpreted as a signal of others' high performance expectations and confidence in one's ability (Bandura, 1997). In this regard, being appointed to tasks requiring creativity may provide a persuasion source of efficacy cue (Bandura, 1986) in that the assignment may convey external beliefs that the employee has what it takes to handle the creative aspects of the job.

Creative jobs require cognitive fluency and originality on a regular basis and should provide employees with more prospects for enactive mastery through repeated use of complex cognitive abilities, perseverance, and persistence (De Dreu, Baas, & Nijstad, 2008), as well as active experimentation with novel strategies and techniques. Bandura (1997) stated that sense of efficacy derives from being immersed in situations requiring perseverance in overcoming impediments and that afford a consistent use of complex skills conducive to enactive mastery. Engagement in creativity-related activity has also been characterized as a heightened cognitive process that influences emotional experience (Amabile et al., 2005) and induces positive affect (Csikszentmihalyi, 1996). Positive affect is positioned as a main driver of efficacy formulation because it elicits selective recall, whereby personal success experience memories are enhanced, whereas those of failure are reduced in salience (Bandura, 1986, 1997).

It is possible that a strong sense of creative self-efficacy can result in employees being assigned to jobs that require creativity. However, once in the job, the nature of creative work suggests strong potential for employees' ongoing creative efficacy development. Schein (1978) stated that employees learn about their skills and abilities only after spending adequate time engaged in task activities, and Gist and Mitchell (1992) noted that efficacy judgments are based on interpretations of task cues. Creativity-laden jobs present occupants with complex situations that unexpectedly arise in their work, providing ongoing opportunities to generate creative responses and thereby develop creative self-efficacy. Prior research provides empirical support for the causal precedent of job content on self-efficacy development. For example, Parker (1998) and Axtell and Parker (2003) found that increases in employee job control led to increased role breadth self-efficacy over time. Frese, Garst, and Fay (2007) reported a positive influence of elevated job control and complexity on a personal orientation construct that included self-efficacy as a main component. We expected that the association between job creativity requirement and creative self-efficacy should likewise be dynamic, as employees faced with increased requirements of creative work experience the persuasion, enactive mastery, and affect arousal that accompany such work.

Hypothesis 2: Increments in job creativity requirements will be positively related to increments in creative self-efficacy.

Creative Expectation as a Determinant of Creative Self-Efficacy Change

Because creative efforts often result in failure or lack of acceptance, it is not uncommon for creators to question their creative capabilities (Ford, 1996). Thus, a common challenge facing potential innovators is one of validation (Bandura, 1997). Social information that persuades employees that they are competent is

critical to their self-efficacy formulation (Gist & Mitchell, 1992), and one relevant form of efficacy-validating information is performance expectations (Eden, 1988; McNatt & Judge, 2004). Of particular importance to the shaping of employee self-efficacy is expectation-inspired leadership, by which leaders convey performance expectations indicative of their confidence in employees' ability to succeed (Eden, 1992). Studies (e.g., Scott & Bruce, 1994) have shown that creativity expectations of others are relevant for employee creative performance (Shalley, 2008). If perceived supervisor validation reflects views of the employees that are consistent with creative action (Farmer et al., 2003), it should influence employee creative self-efficacy as well.

Perceived supervisors' creativity expectation should promote employees' assessment that they possess the personal resources necessary for creativity and should be conducive to subsequent employee attributions contributing to creativity efficacy beliefs. For example, if an employee concludes, "My supervisor expects me to be creative in my work," a logical attribution for the employee is "I must be good at creative tasks." We expect that, over time, such employees, persuaded of their creative potential, would engage in more creative efforts, leading to a greater creative mastery basic to enhanced creative self-efficacy. Empirical work (Carmeli & Schaubroeck, 2007) has shown that when employees believe that their supervisors hold expectations for their creativity, they report being more creatively involved in their jobs. Another study (Tierney & Farmer, 2004) finding links between supervisor behavior, perceived creativity expectations, and employee creative self-efficacy explained that employees interpreted supervisors' creativity actions as verification that the supervisor believed the employees could demonstrate creativity in their job, and such expectations directly enhanced employees' self-efficacy for creative work. Supervisors' creativity expectations thereby provided a form of efficacy persuasion.

Creative self-efficacy could lead to employee demonstrations that shape supervisors' actual creativity expectations, which, in turn, could influence employees' perceptions of such expectations. However, we believe that there is support for a more direct, causal effect of supervisor expectations on self-efficacy. Prior research indicates that social verification has longitudinal effects on mastery perceptions (Burke & Stets, 1999; Stets & Harrod, 2004) and that supervisor expectations have a sustaining effect on employee efficacy views (Eden, 1992). Indeed, the influence of leader performance expectations on the subsequent shaping of subordinates' efficacy views has been established by a strong stream of research (Eden, 2003). If employees' perceived creative expectations become stronger over time, we would expect the influence of corresponding persuasion, attributions, and mastery assessments to strengthen and lead to stronger levels of employee self-efficacy views.

Hypothesis 3: Increments in supervisor creativity expectation will be positively related to increments in creative self-efficacy.

Creative Self-Efficacy as a Determinant of Creative Performance Change

A creativity-focused sense of efficacy should be conducive to creativity because it can offset obstacles inherent to creative en-

agement. First, creativity requires trial-and-error experimentation and the willingness to learn from such efforts. Research (Stevens & Gist, 1997) has found that self-efficacy can facilitate adoption of a mastery goal orientation (Elliott & Dweck, 1988), contributing to the use of metacognitive or self-regulative learning strategies linked to creative activity (Nickerson, 1999). In support of this point, recent studies found that creative self-efficacy was associated with mastery goal orientations (Beghetto, 2006, 2007). Furthermore, domain-specific efficacy beliefs can lead to later experiences of work-related flow (Csikszentmihalyi, 1996), an affective state that is closely tied to creative idea generation (Csikszentmihalyi & LeFevre, 1989). In addition, because novel tasks elicit active appraisals of task requirements (Bandura, 1997), individuals pursuing creative outcomes should be cognizant of, and attempt to account for, likely challenges encountered and should not be deterred when they feel efficacious (Bandura, 1986). Research (Barron & Harrington, 1981; Petkus, 1996) also suggests a high level of confidence; what Bandura (1997) referred to as “invincible self-efficacy” (p. 73) is a trait of highly successful creators. Indeed, previous studies have found creative self-efficacy to be linked to both creative performance (Choi, 2004; Gong et al., 2009; Jaussi et al., 2007; Shin & Zhou, 2007; Tierney & Farmer, 2002, 2004) and creativity work involvement (Carmeli & Schaubroeck, 2007) in employees. Thus, both conceptual and empirical support suggests that as creative efficacy beliefs develop, so should incidents of creative performance.

From a causality standpoint, the substantive area of experimental and longitudinal research provides compelling evidence that self-efficacy drives behavioral functioning and performance (Bandura & Locke, 2003). Bandura (1997) noted, however, that in examining connections between self-efficacy and performance outcomes in actual task settings, it is critical to study them as they operate concurrently or in close temporal proximity to one another. He emphasized that current efficacy views have their most salient and strong effects on current activity and that close timing between efficacy and performance measurement will result in a more accurate assessment of the true effects of an individual’s self-efficacy beliefs. Empirical studies have tended to support the idea that immediately preceding self-efficacy has greater impacts on performance than does earlier self-efficacy (Shea & Howell, 2000). Therefore, we offer the following:

Hypothesis 4: Increments in creative self-efficacy will be positively related to concurrent increments in employee creative performance.

Method

Setting, Sample, and Procedure

The core mission of the participating organization, a state-sponsored provider of social services, was that of helping vulnerable children and their families. The organization provided residential treatment for emotionally disturbed or disruptive youths, emergency shelter for runaway children or children in immediate danger from others, foster care, adoption, and referral and similar programs. Finding creative ways to solve work-related problems was emphasized by the chief executive, supervisors, and members of the Human Resources department.

Our first procedural step was to conduct extensive exploratory work to develop a working knowledge of the organization, its operation, and its employees. This inquiry included examining relevant archival documents (e.g., organizational newsletters, program evaluation manuals, internal correspondence regarding roles, and valued activities), as well as conducting semistructured interviews with organization leaders and employees in all major job categories. This work highlighted several issues particularly germane to creative self-efficacy, such as how supervisors’ expectation of creative behavior seemed to strengthen employees’ beliefs in their creative capabilities and how individuals with a stronger sense of creative self-identity expressed greater confidence and willingness to attempt creative action. We used these data to adjust our research questions and constructs to be more relevant given the nature of participants’ work, to ensure that important questions and issues were not being missed, and to ensure that our measurement and operationalization of variables were contextually meaningful. Because we were interested in examining the effect of job creativity requirement changes, we also wanted to get a sense of the workflow and determine a feasible time frame for our data collections that would realistically allow for job changes.

The second procedural step consisted of the administration of surveys at two time periods. A major challenge in conducting longitudinal investigations is that theory is often not precise in defining relevant time intervals for assessing phenomena change (Mitchell & James 2001). For example, the length of time it takes for job attributes to influence self-efficacy is currently unknown (Axtell & Parker, 2003). Similarly, literature concerned with identity and supervisor expectations relays the processes, but not the time frames, by which such constructs play out. A second challenge involves studying phenomena and their related processes as they naturally unfold over time, aspects that are dictated by the flow of organizational life that researchers need to accommodate by study design. A third challenge involved our attempts to examine changes in constructs that are different in nature, a factor that can also influence rate of self-efficacy change (Gist & Mitchell, 1992).

Our study took place during ongoing work operations with employees exposed to, and processing, numerous sources of data relevant for efficacy formulation. In designing our data collection points, we needed to negotiate the natural timing of changes in employee jobs, with prior research suggesting the timing of self-efficacy change in organizational contexts. However, prior longitudinal field studies on self-efficacy revealed a wide disparity in timing on data collection intervals, ranging from two months (e.g., Choi, 2004) to 18 months (e.g., Axtell & Parker, 2003). Interestingly, we found more specific guidance for our data collection timing from the literature on socialization. Although it was not our intent to examine newcomer acclimation, socialization research is commonly characterized by the following attributes that paralleled our study interests: a longitudinal focus, employee acquisition of diverse information cues, resultant social learning and employee change, complex employee-related outcomes (Anderson & Ostroff, 1997), and a focus on self-efficacy as a common employee adjustment outcome (see Bauer, Bodner, Erdogan, Truxillo, & Tucker, 2007). Socialization research also appears more advanced in identifying the temporal aspects of patterns of change in both information that employees use and the effects of such use, including changes in employee self-efficacy levels (Bauer, Morri-

son, & Callister, 1998). A recent meta-analysis (Bauer et al., 2007) reported that the average timing between first and second data collections for socialization studies is approximately four and a half months, with some studies involving self-efficacy change using a five-month (Tay, Ang, & Van Dyne, 2006) or six-month (e.g., Jokisaari & Nurmi, 2009) time lag. We were also interested in tracking increases in creative idea and solution generation over an appropriate time frame. Longitudinal studies focusing on individual creativity (Van Dyne, Jehn, & Cummings, 2002) and team innovative performance (e.g., Pearce & Ensley, 2004) have used a six-month time frame. Our initial study interviews also indicated that six months was a viable time frame for accommodating an adequate number of experienced job changes. Considering these factors, we allowed for a six-month lag in our data collections, expecting that it would permit adequate time for requisite changes in our predictors and self-regulation processes concerning identity-based attributions, persuasion, enactive mastery, and verification dynamics to take place, as well as for individual changes in creative self-efficacy and creative performance.

Data at Time 1 were collected onsite by the second author through group administrations. Employees who could not attend group sessions received surveys through intra-organizational mail, with a paid return envelope addressed to the second author. At senior managers' request, the second data collection was conducted by intra-organizational mail. Prior to each data collection, group meetings, e-mail messages from the chief executive, flyers, and paycheck inserts informed employees (e.g., study purpose, response confidentiality, voluntary participation) about the upcoming data collection. Employee surveys provided data at the two time periods for the creative role identity, creative expectation, and the creative self-efficacy variables.

At Time 1, 278 of 435 eligible employees returned surveys, for a response rate of 63.9%. Six months later (Time 2) 225 of 444 eligible employees returned surveys (50.68% response rate). Supervisors rated the creative performance of their direct reports at both time periods, with 51 of 60 supervisors reporting at Time 1 (85% response rate) and 42 of 67 supervisors reporting at Time 2 (62.69% response rate). Examining 490 studies published between 2000 and 2005 in 17 refereed organizational journals, Baruch and Holtom (2008) found that the average response rate for studies collecting data from individuals was 52.7%. Our Time 1 and Time 2 response rates compare favorably to this reported rate. With regard to response rate over time, Ployhart and Vandenberg (2010) noted that it is not uncommon for the response rate in field studies to drop by half or more between the first and last measurement occasions. Of our original 278 respondents, 33 left the organization between our two time periods, so our Time 1 to Time 2 response rate of 59.8% ($n = 145$) is normative. Typical employee jobs involved foster care, residential youth care, family social work, placement, case management, case assistance, department management and support, and clerical work. Average age for the Times 1 and 2, respectively, was 39.30 and 39.77 years ($SD = 12.34$ and 12.60), and organizational tenure was 4.00 and 4.79 years ($SD = 3.93$ and 4.47). The sample was 71.2% and 68.8% female, and 59.0% and 71.0% held a bachelor's degree or higher at Times 1 and 2, respectively.

Measures

As noted earlier, our initial work involved gathering information from organizational members that would permit us to frame the focus of the study in a way that was meaningful and appropriate to participants' work. In our discussions, employees regularly referred to the need to be creative in solving seemingly intractable client-related issues. Accordingly, a focus on creative problem solving was applied to adapt the wording of established measures when indicated.

Creative role identity. We used an adapted version of Farmer et al.'s (2003) Creative Role Identity Scale to measure the extent to which employees viewed creativity as a central aspect of their self-identity. The three-item measure uses 5-point Likert scaling (Time 1 $\alpha = .80$; Time 2 $\alpha = .86$). A sample item was "Being creative in my work is an important part of who I am."

Job creativity requirement. We used the Occupational Information Network (O*NET) database (Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999) to create a score for the requirement of creativity for all jobs. Fluency and originality reflect creativity components (Torrance, 1966) and are included as job-required elements in the idea generation subdomain of the O*NET score. Fluency concerns the number of ideas, whereas originality concerns the novelty of the ideas. Both dimensions are assessed on a scale ranging from 0 to 100, with higher scores connoting greater importance of worker fluency or originality to the job. For our purposes, we created a composite score consisting of the average of these two job requirements. Within the sample, there was a reasonable and expected distribution of job creativity requirements. Approximately 6% of the sample held job types (e.g., psychiatrists, chief financial officer, systems administrators, and directors) that fell into the upper quartile of the O*NET ratings and would be considered high in terms of creativity requirements. Another 7% fell into the lowest O*NET quartile (e.g., clerks, assistants, drivers). The second quartile contained jobs such as care workers, case coordinators, and some supervisors, whereas the third quartile included specialized case managers, placement coordinators, and office managers. As such, 40% of the sample had moderately low creativity requirements, and 47% had moderately high requirements associated with their jobs. Within our sample, 11.03% of the employees had changed jobs between Time 1 and Time 2 and, hence, experienced changes in their creativity requirements and O*NET scores (Time 1 $\alpha = .92$; Time 2 $\alpha = .91$).

Supervisor creative expectation. We used three items from Farmer et al.'s (2003) Creative Expectations Scale. Consistent with a recent cross-sectional examination on creativity expectations (Carmeli & Schaubroeck, 2007), we adapted the wording to have the supervisor as the referent, tapping the extent to which employees perceived that their supervisor expected them to be creative, and viewed them in ways aligned with creative action. The measure used a 5-point Likert scale (Time 1 and Time 2 $\alpha = .91$). A sample item was "My supervisor would be surprised if I did not generate creative solutions at work."

Creative self-efficacy. To assess employee perceived capacity for creative work, we used the three-item Creative Self-Efficacy Instrument (Tierney & Farmer, 2002), measured on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) (Time 1 $\alpha = .74$; Time 2 $\alpha = .81$). A sample item was "I have confidence in my ability to solve problems creatively."

Employee creativity. We used four items from Tierney, Farmer, and Graen (1999) to assess supervisors' ratings of their employees' creative problem-solving in their work on a scale ranging from 1 (*never*) to 6 (*always*) (Time 1 $\alpha = .93$; Time 2 $\alpha = .93$) A sample item was "Identifies opportunities for new ways of dealing with work-related issues."

Control variables. Because prior research on creative self-efficacy highlights the antecedent roles of education level, job self-efficacy, and complexity (Tierney & Farmer, 2002), we included these variables as controls. Education level was measured on a 10-point scale (0 = high school or less, with 1–9 reflecting subsequent years of college level education). Use of a continuous-type scale reflecting increasing years of education has been used in other studies with a similar focus (e.g., Tierney & Farmer, 2004; Tierney et al., 1999) operating under the assumption that more experience and exposure to higher education may result in both greater confidence and creative problem-solving ability. Use of a more continuous-type variable, as opposed to a categorical one, permitted us to better control for the influence of immersion in education on creative self-efficacy. Job self-efficacy was tapped with a three-item, 7-point Likert scale (Spreitzer, 1995) ($\alpha = .78$ in the current study). Job complexity was assessed with the substantive complexity scores from the *Dictionary of Occupational Titles* (Roos & Treiman 1980), which has been used in previous creativity studies (Shalley, Gilson, & Blum, 2000; Tierney & Farmer, 2002, 2004). Because reaction to changes in creativity requirements might be affected by time in a new job role, we used self-reports of job tenure at Time 2 (in years) as a control. Finally, because performance and efficacy have reciprocal effects (Bandura, 1986), we controlled for Time 1 creative performance. Heggstad and Kanfer (2005) found that self-efficacy did not predict performance when the past performance control variable was unadjusted (not residualized), so we used unadjusted past creative performance in order to provide a stronger test for the prediction of self-efficacy change.

Analytical Considerations

We experienced some degree of response attrition as a result of turnover and lack of response to the Time 2 survey, resulting in a final set of 145 Time 1 to Time 2 matched responses. To alleviate concerns about nonrandom sampling bias across the time periods (Goodman & Blum, 1996), we conducted a multiple logistic regression using a dichotomous variable to distinguish Time 1 respondents from Time 2 nonrespondents. We also attended to a number of relevant measurement issues in the study. First, we assessed internal consistency and factor structures for the study scales to establish discriminant and convergent validity. Following recommendations (Pitts, West, & Tein, 1996) for establishing validity in longitudinal measurement, we ran preliminary analyses on all of our Time 1 cross-sectional data using confirmatory factor analysis (CFA) to assess goodness of fit for the proposed factor structure. Because our study included self-report scales, we followed the initial CFA with tests of alternative factor structures for these scales at Time 1. We tested 15 possible factor structure permutations, including the hypothesized four-factor model, six possible three-factor models (e.g., creative role identity and creative self-efficacy combined, along with creative expectation and job self-efficacy as separate factors), seven possible two-factor

models (e.g., a factor combining creative role identity, creative self-efficacy, and creative expectation with job self-efficacy as a second factor), and a single-factor model collapsing all four constructs together. Separate factors were allowed to correlate in all models. Because the assumption of multivariate normality was violated per normalized Mardia coefficients, we report results with statistics designed to adjust for non-normality (Satorra & Bentler, 1994): a scaled chi-square statistic for overall model fit, robust versions of the comparative fit index (CFI) and the root-mean-square error of approximation (RMSEA), and robust estimates of standard error.

Once adequate measurement properties at the initial time period were established, we assessed measurement invariance over time for the study variables. This step assured that the same construct was being measured over time (stationarity; Chan, 2002; Pitts et al., 1996) and was done by comparing two longitudinal measurement models. In each model, creative role identity, creative expectation, creative self-efficacy, and creative performance measured at both time periods are represented with paths from each construct at Time 1 to its corresponding factor at Time 2. All other factor correlations were allowed as well. Measurement errors of each item at the two waves were allowed to covary. The first model was estimated with all paths free. The second model constrains the factor loadings involving the same indicator at the two time periods to be equivalent. A lack of significant difference in the chi-square values of the full and constrained models indicates that the construct is being measured equivalently over time. The assumption of non-normality was violated in these models, so we again reported adjusted statistics.

Finally, our hypotheses involved within-person effects. To disaggregate within-person from between-person effects, we used random coefficient modeling (Raudenbush & Bryk, 2002) to examine prediction of creative self-efficacy (Hypothesis 1 through Hypothesis 3) and creative performance (Hypothesis 4). Time-dependent (within-person) variation was modeled at Level 1, whereas Level 2 represented between-person variation. To isolate the time-varying portion of each predictor measured at the two time periods from the time-invariant aspect of each, we decomposed each into two variables: an average for each individual across the two time periods (time invariant) and deviations of each individual's score from this average at each time period (Barnett & Brennan, 1997; Singer & Willett, 2003). This latter variable reflects change and is the appropriate predictor for testing change hypotheses (Singer & Willett, 2003). For the analysis testing creative self-efficacy change, the disaggregated variables included as Level 1 predictors were creative role identity, creative expectation, and job creativity requirement. Educational level, job self-efficacy, substantive complexity, and Time 1 creative performance were included as person-level (Level 2) controls for initial status and change rate. Control variables, average creative role identity, average creative expectation, and average job creativity requirement were grand-mean centered (Hofmann & Gavin, 1998). Components representing change in these predictors were person-mean centered (Raudenbush & Bryk, 2002). For testing creative performance change, creative self-efficacy was also disaggregated into its stable and time-varying components and was accompanied at Level 1 by several disaggregated control variables: creative role identity, creative expectation, and job creativity. Educational level, job self-efficacy, and substantive complexity were included as

person-level (Level 2) controls for initial status and change rate. These controls were grand-mean centered as were average creative self-efficacy, average creative role identity, average creative expectation, and average job creativity. The self-efficacy, identity, expectation, and job creativity change components were person-mean centered.

As a precondition for assessing change, significant within-person variability must be present. Following Dalal, Lam, Weiss, Welch, and Hulin (2009), we estimated within- and between-person variance components for each main study variable within a null or empty model. Percentages of within-person variation as a percent of the total were 38.00 ($p < .001$) for creative role identity, 5.69 ($p < .001$) for job-required creativity, 36.89 ($p < .001$) for supervisor creative expectation, 40.62 ($p < .001$) for creative self-efficacy, and 29.90 ($p < .001$) for creative performance. Temporal variance for all variables with the exception of job-required creativity represents a major component of the total variance of the variable. However, even for job-required creativity, temporal variation is a statistically significant component of overall variance. On the basis of these results, we proceeded with hypothesis testing.

Results

Assessment of Respondent Attrition

All Time 1 variables were included in the multiple logistic regression model as predictors. No variable was significant, indicating that the probability of being included in the sample at Time 2 was not dependent on the value of the variables used at Time 1. We conclude that the data are missing at random per these variables (Little & Rubin, 1987) and that no meaningful sampling bias exists due to the longitudinal nature of the data collection.

Discriminant Validity, Convergent Validity, and Temporal Invariance of Study Scales

The initial CFA for all multi-item variables measured at Time 1 showed good fit to the data, $\chi^2(137) = 230.69$, $p < .001$; CFI = .96; RMSEA = .05, suggesting that the hypothesized factor structure of the Time 1 variables is tenable. We followed with tests of all alternative factor structures for the self-report variables at Time 1. Results (see Table 1) show that the hypothesized four-factor

Table 1

Comparison for Alternative Factor Structure Models for Creative Self-Efficacy, Creative Role Identity, Supervisor Creative Expectation, and Job Self-Efficacy at Time 1

Model	Scaled χ^2	df	p	Robust CFI	Robust RMSEA	Scaled χ^2 difference with Model 1 (df)
Model 1: Hypothesized four-factor model (all items load on appropriate factors)	116.34	59	<.001	.954	.062	
Model 2: Three-factor model (Creative Efficacy and Identity combined)	169.86	62	<.001	.914	.083	32.38*(3)
Model 3: Three-factor model (Creative Efficacy and Expectation combined)	279.92	62	<.001	.826	.118	96.54*(3)
Model 4: Three-factor model (Creative Efficacy and Job Efficacy combined)	274.62	62	<.001	.830	.117	140.05*(3)
Model 5: Three-factor model (Creative Identity and Expectation combined)	301.95	62	<.001	.842	.133	105.56*(3)
Model 6: Three-factor model (Creative Identity and Job Efficacy combined)	329.93	62	<.001	.786	.131	76.87*(3)
Model 7: Three-factor model (Job Efficacy and Expectation combined)	355.10	62	<.001	.766	.137	85.66*(3)
Model 8: Two-factor model (Creative Efficacy, Job Efficacy, and Creative Identity combined)	352.91	64	<.001	.769	.134	119.14*(5)
Model 9: Two-factor model (Creative Efficacy, Job Efficacy, and Expectation combined)	472.05	64	<.001	.674	.159	155.46*(5)
Model 10: Two-factor model (Creative Efficacy, Creative Identity, and Expectation combined)	391.99	64	<.001	.738	.143	138.86*(5)
Model 11: Two-factor model (Creative Identity, Expectation, and Job Efficacy combined)	507.84	64	<.001	.645	.166	163.02*(5)
Model 12: Two-factor model (Creative Efficacy and Job Efficacy combined, Creative Identity, and Expectation combined)	425.04	64	<.001	.711	.150	208.92*(5)
Model 13: Two-factor model (Creative Efficacy and Identity combined, Job Efficacy and Expectation combined)	383.47	64	<.001	.745	.141	110.59*(5)
Model 14: Two-factor model (Creative Efficacy and Expectation combined, Job Efficacy and Identity combined)	469.38	64	<.001	.676	.159	146.51*(5)
Model 15: Single-factor model (all four constructs combined)	560.87	65	<.001	.604	.174	180.28*(6)

Note. CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

* $p < .05$.

structure is by far the best fit in terms of chi-square and the CFI and RMSEA indexes. Only one other model demonstrated fit that would be deemed acceptable by minimum standards: Model 2, which combines creative self-efficacy and creative role identity. However, this model shows much poorer fit than the hypothesized model on the test statistics. We conducted comparisons between the hypothesized model (Model 1) and all alternative models using a corrected scaled difference chi-square test statistic (Satorra & Bentler, 2001). Results (Table 1) indicate that the fit of the hypothesized factor structure to the sample covariance matrix is significantly better than any alternatives. These results support the viability of the expected factor structure and provide evidence for discriminant and convergent validity.

We then assessed temporal equivalence in construct measurement for variables measured at both time periods. Fit for the full (unconstrained) model was excellent, $\chi^2(111) = 125.46, p > .16; CFI = .99; RMSEA = .03$. Although it was very good in absolute terms, the model constraining factor loading equivalence for each item across measurement waves showed some decrement relative to the full model, $\chi^2(117) = 138.48, p > .08; CFI = .98; RMSEA = .04$. The scaled chi-square difference between the models was 13.69, with 6 *df* ($p < .05$). This decrement in fit indicated that one or more constraints on the factor loadings across time were inappropriate. Inspection of LaGrange multiplier constraint tests showed that a single loading for one indicator of creative expectation should be free to vary across time periods. We did so and ran the model again, $\chi^2(116) = 126.88, p > .23; CFI = .99; RMSEA = .03$, finding that the revised constraint model showed no significant differences in fit from the full model: scaled $\Delta\chi^2(5) = 1.13, p > .05$. These results suggest adequate measurement stability across the time periods for the study variables.

Hypothesis Tests

Table 2 provides descriptive statistics and correlations for study variables. Overall sample mean levels of creative self-efficacy were flat across time periods, whereas creative performance increased. Creative self-efficacy at the two time periods was corre-

lated $.56 (p < .01)$. As would be expected, self-efficacy-creative performance concurrent relationships, Time 1, $r = .26, p < .01$; Time 2, $r = .29, p < .01$, were significantly greater than the lagged relationship ($r = .15, p > .05$). Creative self-efficacy at both time periods showed fairly strong relationships with creative role identity both concurrently (Time 1, $r = .58, p < .01$; Time 2, $r = .53, p < .01$) and for the lagged relationship ($r = .66, p < .01$). Creative self-efficacy was, as expected, significantly related to job creativity requirement concurrently (Time 1, $r = .20, p < .01$; Time 2, $r = .26, p < .01$) and across time ($r = .22, p < .01$). As with prior research (Tierney & Farmer, 2002), Time 1 creative self-efficacy was positively associated with both Time 1 job self-efficacy ($r = .38, p < .01$) and substantive complexity ($r = .31, p < .01$). In addition, Time 1 substantive complexity was highly correlated with job creativity requirement at both time periods ($r = .63, p < .01; r = .53, p < .01$).

Table 3 shows the final-step two-level equations we used, with Level 1 including a time vector assessing rate of change (coded 1 for Time 1 and 2 for Time 2) and average and change components of the three hypothesized predictors. Level 2 included the control variables.

Analyses were conducted hierarchically, with initial models fit with control variables only and the subsequent model adding substantive predictors of interest. Results for creative self-efficacy (Hypothesis 1 through Hypothesis 3) are shown at each step, with effect sizes indicated by the unstandardized coefficients. In the first step, individuals with higher levels of job self-efficacy ($\beta_{02} = .33, p < .05$) and substantive complexity ($\beta_{03} = .14, p < .05$) had higher levels of creative self-efficacy at Time 1. No other control variable was a significant predictor of initial status or change rate. Overall change rate for creative self-efficacy was not significant ($\pi_1 = .04, p > .01$). This result is not surprising, as we had no expectation that the sample as a whole would show increases or decreases in creative self-efficacy across the time periods.

In the second step, substantive complexity was a significant predictor of Time 1 creative self-efficacy ($\beta_{03} = .14, p < .05$). No

Table 2
Descriptive Statistics and Correlations for Study Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Creative self-efficacy (Time 1)	3.91	0.54													
2. Creative self-efficacy (Time 2)	3.95	0.56	.56**												
3. Creative performance (Time 1)	4.00	1.11	.26**	.23**											
4. Creative performance (Time 2)	4.18	1.05	.15	.29**	.71**										
5. Creative role identity (Time 1)	3.81	0.66	.58**	.50**	.21*	.12									
6. Creative role identity (Time 2)	3.80	0.62	.53**	.66**	.20*	.13	.63**								
7. Supervisor creative expectation (Time 1)	3.66	0.65	.62**	.54**	.36**	.25**	.58**	.57**							
8. Supervisor creative expectation (Time 2)	3.75	0.63	.46**	.55**	.39**	.34**	.41**	.61**	.63**						
9. Job-required creativity (Time 1)	44.96	14.75	.20*	.27**	.041	.18*	.04	.08	.21*	.14					
10. Job-required creativity (Time 2)	45.71	14.25	.22*	.26**	.04	.15	.06	.08	.20*	.16	.92**				
11. Educational level (Time 1)	4.94	2.20	.30**	.27**	.24**	.02	.20*	.07	.18*	.18*	.37**	.38**			
12. Job self-efficacy (Time 1)	4.15	0.64	.38**	.39**	.13	.14	.37**	.39**	.32**	.32**	-.11	-.12	-.05		
13. Substantive complexity (Time 1)	5.94	1.44	.31**	.24**	.15	.13	.09	.13	.23*	.20*	.60**	.53**	.53**	-.08	
14. Job tenure (Time 2)	3.93	4.00	-.09	.08	.04	.11	.02	.06	.13	.00	.14	.11	-.05	.18	.04

Note. After listwise deletion, *n* = 145.
* $p < .05$. ** $p < .01$.

Table 3
Regression Analyses for Changes in Creative Self-Efficacy

Variable	Creative self-efficacy			
	Step 1		Step 2	
	Initial status (π_0)	Change rate (π_1)	Initial status (π_0)	Change rate (π_1)
Educational level, β_{01}	3.88**	.04	3.89**	.04
Job self-efficacy, β_{02}	.02	.01	-.02	.03
Substantive complexity, β_{03}	.33*	.01	.12	.03
Time 1 creative performance, β_{04}	.14*	-.01	.14*	-.07
Time 2 job tenure, β_{05}	.03	.12	-.02	.01
Creative role identity average, π_2	-.05	.02	-.05	.02
Creative role identity change, π_3				.40**
Supervisor creative expectation average, π_4				.22*
Supervisor creative expectation change, π_5				.24*
Job-required creativity average, π_6				.16*
Job-required creativity change, π_7				.01*
Temporal (within-person) variance	0.118		0.103	-.02*
Change in temporal variance			0.015	
Percentage of explained temporal variance			12.71%	
Deviance (parameters)	352.97		288.37	
Deviance change (as χ^2)			64.60** (df = 6)	

Note. After listwise deletion, $n = 361$ observations and 237 individuals. HLM unstandardized coefficients are reported at each step. Final step equations are given below:

Level 1: Creative self-efficacy = $\pi_0 + \pi_1(\text{Time}) + \pi_2(\text{Creative role identity average}) + \pi_3(\text{Creative role identity change}) + \pi_4(\text{Supervisor creative expectation average}) + \pi_5(\text{Supervisor creative expectation change}) + \pi_6(\text{Job-required creativity average}) + \pi_7(\text{Job-required creativity change}) + e$.

Level 2: $\pi_0 = \beta_{00} + \beta_{01}(\text{Educational level}) + \beta_{02}(\text{Job self-efficacy}) + \beta_{03}(\text{Substantive complexity}) + \beta_{04}(\text{Time 1 creative performance}) + \beta_{05}(\text{Time 2 job tenure}) + r_0$; $\pi_1 = \beta_{10} + \beta_{11}(\text{Educational level}) + \beta_{12}(\text{Job self-efficacy}) + \beta_{13}(\text{Substantive complexity}) + \beta_{14}(\text{Time 1 creative performance}) + \beta_{15}(\text{Time 2 job tenure})$; $\pi_2 = \beta_{20}$; $\pi_3 = \beta_{30}$; $\pi_4 = \beta_{40}$; $\pi_5 = \beta_{50}$; $\pi_6 = \beta_{60}$; $\pi_7 = \beta_{70}$.

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

control variable predicted change rate. Added at this step were average and change components for creative role identity, creative expectation, and job creativity requirement. Individuals with higher average creative role identity ($\pi_2 = .40, p < .01$), higher average creative expectation ($\pi_4 = .24, p < .05$), and higher average job creativity requirements ($\pi_6 = .01, p < .05$) tended to report higher average levels of creative self-efficacy. Accounting for these relationships, changes in creative role identity were positively and significantly related to changes in creative self-efficacy, as predicted by Hypothesis 1 ($\pi_3 = .22, p < .05$). Changes in creative expectation were also positively related to changes in creative self-efficacy, supporting Hypothesis 2 ($\pi_5 = .16, p < .05$). Results showed a significant but negative relationship between changes in job creativity requirements and self-efficacy changes ($\pi_7 = -.02, p < .05$). Thus, Hypothesis 3 was not supported. Overall, the addition of the average and change components of the three predictors at this step explained 12.71% of the temporal (Level 1) variance in creative self-efficacy change relative to the controls-only model in Step 1.

Table 3 also reports deviance statistics (Singer & Willett, 2003). The deviance change between steps was significant, indicating that the addition of average and change components for the three predictors significantly improved model fit, difference $\chi^2(6) = 64.60, p < .001$. A model run with only the hypothesized change components (leaving out the average components) showed the same pattern of significance for the three predictors, explaining 11.86% of temporal variance relative to the controls-only model, and showed significantly improved fit from that model, difference $\chi^2(3) = 46.68, p < .001$.

Hypothesis 4 predicted that changes in creative self-efficacy would positively relate to changes in creative performance (see Table 4 for equations and results). As before, Level 1 included a time vector that assessed rate of change in creative performance (coded 1 for Time 1, 2 for Time 2), as well as the average and change components for creative self-efficacy and its three antecedents, whereas Level 2 included the control variables.

At Step 1, average supervisor creative expectation predicted higher average levels of creative performance ($\pi_4 = .86, p < .01$). No other control variable significantly predicted either initial status of creative performance or its change. The change rate in creative performance was significant and positive ($\pi_1 = .22, p < .01$). Step 2 results again show average supervisor creative expectation relating to higher average creative performance levels ($\pi_4 = .87, p < .01$). At this step, average and change variables for creative self-efficacy were added. In the presence of the controls, higher average levels of creative self-efficacy were unrelated to higher average creative performance ($\pi_8 = -.05, p > .05$). In support of Hypothesis 4, within-person changes in creative self-efficacy were positively related to creative performance improvement ($\pi_9 = .41, p < .01$). The average and change creative self-efficacy variables explained 4.85% of the variance in creative performance change relative to the controls-only model in Step 1. The deviance change between steps was significant, $\Delta\chi^2(2) = 6.07, p < .01$.

Discussion

In summary, our findings show that increments in employee creative role identity and in perceptions of supervisor creative

Table 4
Regression Analyses for Changes in Creative Performance

Variable	Creative self-efficacy			
	Step 1		Step 2	
	Initial status (π_0)	Change rate (π_1)	Initial status (π_0)	Change rate (π_1)
	3.73**	.21**	3.76**	.19*
Educational level, β_{01}	.08	-.06	.10	-.07*
Job self-efficacy, β_{02}	-.30	-.17	.20	-.17
Substantive complexity, β_{03}	.02	.01	-.03	.04
Time 2 job tenure, β_{04}	-.01	.02	.01	.01
Creative role identity average, π_2		-.14		-.12
Creative role identity change, π_3		.03		-.05
Supervisor creative expectation average, π_4		.86**		.87**
Supervisor creative expectation change, π_5		.16		.07
Job-required creativity average, π_6		-.01		-.01
Job-required creativity change, π_7		-.02		-.01
Creative self-efficacy average, π_8				-.05
Creative self-efficacy change, π_9				.41**
Temporal (within-person) variance	0.330		0.314	
Change in temporal variance			0.016	
Proportion of explained temporal variance			4.85%	
Deviance (parameters)	643.61		637.54	
Deviance change (as χ^2)			6.07* (df = 2)	

Note. After listwise deletion, $n = 217$ observations and 119 individuals. Hierarchical linear modeling unstandardized coefficients are reported at each step. Final step equations are given below:

Level 1: Creative performance = $\pi_0 + \pi_1(\text{Time}) + \pi_2(\text{Creative role identity average}) + \pi_3(\text{Creative role identity change}) + \pi_4(\text{Supervisor creative expectation average}) + \pi_5(\text{Supervisor creative expectation change}) + \pi_6(\text{Job-required creativity average}) + \pi_7(\text{Job required creativity change}) + \pi_8(\text{Creative self-efficacy average}) + \pi_9(\text{Creative self-efficacy change}) + e$.

Level 2: $\pi_0 = \beta_{00} + \beta_{01}(\text{Educational level}) + \beta_{02}(\text{Job self-efficacy}) + \beta_{03}(\text{Substantive complexity}) + \beta_{04}(\text{Time 2 job tenure}) + r_0$; $\pi_1 = \beta_{10} + \beta_{01}(\text{Educational level}) + \beta_{02}(\text{Job self-efficacy}) + \beta_{03}(\text{Substantive complexity}) + \beta_{04}(\text{Time 2 job tenure})$; $\pi_2 = \beta_{20}$; $\pi_3 = \beta_{30}$; $\pi_4 = \beta_{40}$; $\pi_5 = \beta_{50}$; $\pi_6 = \beta_{60}$; $\pi_7 = \beta_{70}$; $\pi_8 = \beta_{80}$; $\pi_9 = \beta_{90}$.

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

expectations both related to increases in employee creative self-efficacy over time. Contrary to our prediction, as employees experienced increases in creativity job requirements, their creative self-efficacy actually decreased. Our results also reveal that creative performance levels increased over a six-month period as employees' sense of creative efficacy became stronger. Study results illustrate that an employee's sense of capacity for creative work is malleable and can fluctuate with changes in self, task, and social context-related factors. As employees' creative role identity strengthened, so did their creative self-efficacy. On the basis of logic by Gist and Mitchell (1992), employees with a creative role identity may likely conclude that they have the personal resources necessary to be successful in creative endeavors. Enhanced creative self-efficacy was likewise evidenced for employees who reported that their supervisors had increased creative expectations for them. This finding suggests that by verifying to employees that they believe them to be creative in their work, supervisors may be providing a form of persuasion, key to bolstering efficacy judgments (Bandura, 1986).

Contrary to what we predicted, employees assigned work requiring higher levels of creativity from Time 1 to Time 2 reported a decrease in creative self-efficacy. Although engagement in work necessitating experimentation and ideation is conducive to creativity (Amabile, 1988), Gist and Mitchell (1992) stated that complex and challenging task requirements, as well as low control, may lessen sense of efficacy. Moreover, it is important to note that our

focus was on the impact of increases in the creativity requirements employees experienced, not the general level they held at a single point in time. The distinction is important in that job alterations may result in work intensification that can diminish sense of control and efficacy (Axtell & Parker, 2003). Among our sample, enhanced creativity requirements could often reflect greater intensity as employees dealt with more complex incidents involving troubled youths and their family dynamics, entailing numerous factors over which the employee would have little control. Given the nature of such a job change, potential increments in creative self-efficacy may take longer to appear as employees adjust and develop confidence in their altered work role.

Our tracking of creativity over the study's six-month period suggested that creative performance is not necessarily a stable mode of employee behavior, but one that can change with relevant influences. Pertinent to the study's main focus is the finding that performance increments corresponded with increases in employees' sense of creative efficacy. Such results lend credence to Bandura's (1997) position that domain-specific efficacy views are instrumental for domain performance and that creative endeavors are supported by an enhanced self-efficacy.

Theoretical Contributions and Implications

Our study contributes to the broader literature on self-efficacy in a number of regards. At a most basic level, it provides further

support for theory (Gist & Mitchell, 1992) proposing that employees assess themselves, their task, and the social work context in which they are embedded as a means of determining how competent they are in a given performance domain. The correspondence between increments in self-efficacy and employee creative performance in our study illustrates one way in which self-efficacy may be a useful influence in an area of important employee functioning. In addition, the findings augment lines of research examining determinants of specific self-efficacy forms relevant in the workplace (cf. Chen, Gully, Whiteman, & Kilcullen, 2000; Ng, Ang, & Chan, 2008), as well as employee self-efficacy change (cf. Frese et al., 2007). Our study responds to calls for inquiry into efficacy judgments related to more complex work activity, such as creativity (Bandura & Locke, 2003; Gist & Mitchell, 1992). Another study benefit is that the design meets criteria that Bandura and Locke (2003) cited as necessary for meaningful tests of intraindividual self-efficacy change, in which ongoing activity is permitted to naturally influence self-efficacy views and performance in a dynamic setting. Finally, contrary to recent reports of an adverse performance effect of increasing efficacy views (Vancouver et al., 2001, 2002; Yeo & Neal, 2006), we found that enhanced creative self-efficacy was related to higher levels of creative performance. The result suggests that dynamics between self-efficacy and performance in natural field settings may deviate from those found in controlled, laboratory settings and that the threshold for self-efficacy's positive impact on performance may be higher when the behavioral realm entails more complex, challenging work, as with creativity. Therefore, our findings are consistent with Bandura and Locke's (2003) assertions that self-efficacy beliefs are a positive, not self-debilitating, force for performance attainment.

In terms of contribution to literature specific to creativity, creative self-efficacy has been cited as a construct that warrants further research investigation (Shalley et al., 2004). Our study addresses this request by examining creativity-specific efficacy development and the predictive validity of these efficacy views for creative performance. Our study goes beyond previous work examining creative self-efficacy correlates (Tierney & Farmer, 2002, 2004) by providing the first exploration into whether, and how, employees' creative self-efficacy levels change over time and experiences in a work setting. By showing that employees may alter their creative self-efficacy levels over time, the study provides greater insight into the dynamic nature of the creative process, especially efficacy building, in work settings and the types of factors that might strengthen, or weaken, the occurrence of employee creative performance. One strength of our analytic design is that we were able to disaggregate stable and temporal relationships, providing a more detailed assessment of creative self-efficacy antecedents and creative self-efficacy than that reported in prior work. We were also able to more successfully distinguish between creative self-efficacy and creative performance than previously.

By detecting increments in creative performance in relation to changes in identity, creative expectations, and job requirements over time, we corroborate extant theory (e.g., Amabile, 1988; Woodman et al., 1993) portraying creativity as a dynamic phenomenon that should materialize in work settings under the right conditions. The study also provides a unique perspective on a critical manner by which such antecedent types identified in creativity models (i.e., employee attributes, job characteristics, and

the social context) influence creative performance. Our interest was in the development of creative self-efficacy, not its mediating role, but our results pattern does support that factors linked to creative performance in previous studies may do so through their alteration of employee creative self-efficacy, as recent work has suggested (cf. Gong et al., 2009).

There is growing sentiment that the social realm is a prominent element of the contextual landscape from which creative activity emerges (cf. Perry-Smith, 2006; Perry-Smith & Shalley, 2003). Results of the current study add to our understanding of how members of the social context influence employees' creativity efficacy views. The findings also address a call (Tierney, 2008) for exploration into ways leaders prime employees' cognitive frames related to creativity-relevant self-views. It was not the main focus of the study, but our longitudinal results indicate that, on average, when employees perceive that their supervisor expects them to be creative in their work, the employees tend to exhibit higher levels of creative performance over time.

Study results contribute to identity research by providing a field test of role identity changes over time in a work setting. In addition, the results corroborate and extend prior research (Farmer et al., 2003) by affirming that a creativity-specific role identity plays a part in creative performance and that this role identity influences a corresponding sense of personal agency. Examination of changes in both creative role identity and creative self-efficacy over our study time frame also permits some clarification on the potential nature of the relationship between these variables, an issue that has been cited as needing further attention (see Shalley et al., 2004).

The finding that conducting a job that objectively requires greater creativity depresses creative efficacy formulations seems counterintuitive compared with previous studies testing perceived creativity requirements (cf. Unsworth et al., 2005). However, it is consistent with studies in the broader efficacy literature suggesting that greater job demands can have a derogatory impact on efficacy formulations and their effect on performance (cf. Ng, Ang, & Chan, 2008). Although one previous study detected a positive correlation between subjective and objective creativity requirements (Shalley et al., 2000), a second study (Unsworth et al., 2005) found the relationship between the two types to be negative. A post hoc test found that our objective measure was positively related to a subjective requirement measure, but not strongly so ($r = .24, p < .05$). The measurement distinction and our contradictory findings may have implications for how job attributes are considered in future examinations of employee creativity, insofar as there may be a latency period in which job changes initially depress creative self-efficacy, and thereby creative performance, but are ultimately followed by later increases in both.

We noted earlier that different streams of research on individual innovation behavior exist and have developed concurrently. It is beyond the scope of the current article to provide an in-depth analysis of the areas of convergence among these various lines of study, but we would like to point out that our results are comparable to those of studies addressing other individual innovation-related criteria. For example, our finding that creative self-efficacy can enhance over time in response to changes in individual, task, and contextual factors is compatible with work noting longitudinal effects of similar factors on role breadth efficacy (e.g., Axtell & Parker, 2003; Parker, 1998; Parker, Williams, & Turner, 2006)—a specific efficacy form linked

to employee idea generation and implementation proactive behaviors. Our findings are also consistent with studies detecting influences of a myriad of employees' supervisor-related perceptions (e.g., support, Janssen, 2005; relational quality, Yuan & Woodman, 2010) on innovative behavior.

Practical Contributions and Implications

It is apparent from the numerous studies conducted over the past decade that creativity is an important activity for diverse functional areas and corporate types. Researchers also have a responsibility to consider how theoretical models and empirical conclusions may benefit not-for-profit organizations (Von Glinow, 2005) as well as address issues related to social welfare (Walsh, Weber, & Margolis, 2003). Like their peers in profit-focused corporations, not-for-profit employees deal with complex issues that need addressing by novel, but practical means. A significant difference is that not-for-profit organizations, such as the one we studied, often deal with potentially volatile issues and operate under conditions of extremely limited resources. In such settings, the cost of inability to bring creativity to bear is not a loss of profit, but—as in this case—a vulnerable child's welfare. A potentially important practical contribution of our study is that it demonstrates that the theories and empirical findings that apply to corporate settings can also apply to not-for-profit settings and provide some guidance in their quest to enhance their employees' efficacy for addressing critical work-related problems creatively.

A core message stemming from our results is that organizations can shape—positively or negatively—employee sense of efficacy for important performance realms. Such knowledge can help managers capitalize on employee creative efficacy, potentially an integral resource for creative performance and innovation advancement. Findings also point to mechanisms by which organizations may positively shape such efficacy views. Because supervisors are instrumental for employee efficacy development (Eden, 1992), leadership training for efficacy building may be warranted. Training might include encouraging supervisors to convey expectations and other feedback that affirm employees' creative capability, stressing connections between employee efforts and creative successes that can elicit efficacy-building attributions and taking steps to make a creative identity salient. Results also suggest that managers should be thoughtful when infusing more creativity requirements into employees' jobs through job enhancement efforts, job rotation, or new job assignment. Previous work (Axtell & Parker, 2003; Gist, 1989) has shown that task-specific training enhances levels of employee self-efficacy over time. It would therefore be prudent to ensure that employees who are assigned jobs with higher creativity requirements also be provided with training for creativity skill development and be given time and leeway to experiment with creative problem solving without penalty so that they can build a sense of confidence for creative work.

Study Limitations

As is common with longitudinal research, we experienced some degree of participant attrition. Analyses we conducted, however, show that the attrition level was not due to any meaningful sample bias and, therefore, was not a cause for concern. Although our longitudinal data collection has advantages beyond the majority of

existing cross-sectional creativity field studies, with only two time periods, observed changes may be subject to measurement error (Willett, 1988), and we were limited in our ability to distinguish between linear versus curvilinear or other polynomial trends. Our development of hypotheses presented arguments for the causal influence of our proposed antecedents on creative self-efficacy, but we acknowledge that a case could also be made for reverse causality. For example, the relationship between creative self-efficacy and creative performance may be reciprocal, insofar as prior performance levels can influence subsequent efficacy estimates (Bandura, 1997). Our analyses revealed no effect for prior creative performance on changes in creative self-efficacy, but the natural relational form between self-efficacy and performance may be more of a spiral that is evidenced over multiple events and time (Lindsley, Brass, & Thomas, 1995). Given the self-regulative nature of identity processes, it is conceivable that creative self-efficacy could contribute to creative identity. Because individuals are motivated to uphold positive self-views, they may assume a creative role identity if they feel that creativity is a domain in which they are quite capable.¹ It is also possible that creatively efficacious employees may be assigned to jobs that require more creativity because they have demonstrated such ability. Because we relied on self-report for some of our study variables, there is also a possibility of common method variance.

Although follow-up analyses show temporal variance estimates for study variables to be highly similar regardless of tenure, results for job-required creativity were indeterminate with estimation problems for the high-tenure group. There was a relatively small number of job changes in this subsample, meaning that the organization tended to change job requirements more for employees with less tenure or that job changes occurred more frequently among certain job categories that tended to have lower tenure employees. With this caveat in mind, we conclude that study variables were malleable regardless of tenure, with the possible exception of job-required creativity. Furthermore, standard deviations for creative role identity and supervisor creativity expectations suggest the possibility of some restricted range in these variables. Finally, although the nonprofit study setting offered a unique and relevant venue for testing our hypotheses, there is a possibility that results may not generalize to other setting types.

Future Research

Our results underscore the need for additional longitudinal field studies of creative performance. Outside of a handful of studies (e.g., Amabile et al., 2005; Gong et al., 2009), we know little about what affects changes in creative engagement over time. Creativity and self-efficacy manifest at a team level (cf. Gilson & Shalley, 2004; Shin & Zhou, 2007; Tasa, Taggar, & Seijts, 2007), and investigations adopting multilevel and cross-level perspectives on the two constructs would be useful. Testing of cross-level effects could determine whether enhancing members' creative self-efficacy leads to team creative efficacy and creativity or whether membership in a creatively efficacious team increases members' sense of creative confidence and individual creative outcomes. Conversely, it is possible that working with peers who are strongly

¹ We thank one of our reviewers for this insight.

efficacious for creative work may put a high degree of pressure on team members who are not as personally confident in their creative efforts. Peer pressure can lead to stress and sense of vulnerability, which are antithetical to creativity (Van Dyne et al., 2002) and individual efficacy views (Bandura, 1997). As such, future research needs to consider whether peer pressure to be creative is conducive, or inhibitive, to creative self-efficacy and subsequent performance. At a more macro level, it would be useful to consider the effects that organizational culture may have on employee creative self-efficacy. Cultures that embody creativity-favorable values and practices may provide employees with relevant role models, promote interactions and communication conducive to creative development, and provide encouragement and resources (West & Richter, 2008), which ultimately may shape sense of efficacy for creative work.

Studies extending over longer or additional time periods may also be warranted. Detection of the more complex nature of the functional form of the creative self-efficacy–creative performance relationship may require more frequent measurement within longer time frames. There is also likely to be variation in the time it takes for different self-efficacy determinants to shape efficacy views (Gist & Mitchell, 1992), and consideration of creative self-efficacy development for longer periods may evidence the impact of creativity requirements that we failed to detect in the current study. It would also be interesting for future studies adopting a similar change focus to explore how initial antecedent levels impact the influence that subsequent antecedent increments have on self-efficacy and creativity. For example, it may be the case that an employee starting in a job with a relatively low baseline for creativity job requirements may respond more strongly to being assigned a work role with greater creativity requirements than would an employee whose initial job previously had required a fairly high level of creativity.² In addition, the prevailing interactionist perspective of creativity (Amabile, 1988) suggests the utility of studying moderating factors that might influence creative self-efficacy development. For example, it is possible that certain variables (e.g., training) may moderate the influence of job-required creativity on creative self-efficacy.

In conclusion, given the degree of difficulty and risk that often accompany creative activity in organizational contexts, a strong belief in one's ability to persevere and succeed in creative endeavors is vital to employees' decisions to engage in such activity (Bandura, 1997; Tierney & Farmer, 2002). Enriching employees' sense of personal agency for creative work would place organizations in a prime position to benefit from incidents of creative problem solving and generation of novel and useful ideas. Findings of the current study suggest that not only is developing employees' sense of creative efficacy plausible in the work setting but that the means to do so are present within the employees, their jobs, and the social context in which they operate.

² We thank the editor for this suggestion.

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