Journal of Applied Psychology
2009, Vol. 94, No. 4, 859–875

0021-9010/09/$12.00 DOI: 10.1037/a0015317

Developing Leaders via Experience: The Role of Developmental Challenge, Learning Orientation, and Feedback Availability

D. Scott DeRue and Ned Wellman
University of Michigan

Prior research offers limited insight into the types of work experiences that promote leadership skill development and the ways that the person and context shape the developmental value of these experiences. In this article, the authors develop a series of hypotheses linking leadership skill development to features of the experience (developmental challenge), person (learning orientation), and context (feedback availability). Based on 225 on-the-job experiences across 60 managers, their results demonstrate that the relationship between developmental challenge and leadership skill development exhibits a pattern of diminishing returns. However, access to feedback can offset the diminishing returns associated with high levels of developmental challenge.

Keywords: leadership, leadership development, experience, learning orientation, feedback

Organizations view leadership capacity as a source of competitive advantage and invest in its development accordingly (McCall, 1998; Vicere & Fulmer, 1998). Approximately 45% of the $56 billion that organizations spent on organizational learning and development in 2006 was targeted specifically at leadership development (O'Leonard, 2007). Most of these expenditures were directed at formal off-job activities, such as coursework, training, assessments, and mentoring programs (London & Mone, 1999; Noe, Wilk, Mullen, & Wanek, 1997). However, there is a growing belief among scholars and practitioners alike that on-the-job work experience is the most effective way to develop individual leadership skills. As McCall (2004) stated, "The primary source of learning to lead, to the extent that leadership can be learned, is experience. The role played by training and other formal programs is relatively modest in comparison to other kinds of (on-the-job) experiences" (p. 127). In fact, researchers estimate that upward of 70% of all leadership development occurs through informal, on-the-job experiences, whereas training and other formal programs contribute less than 10% of a leader's development (Robinson & Wick, 1992; Wick, 1989).

The developmental value of experience is well documented across a variety of theoretical perspectives and empirical studies. Experiential learning theories, such as those developed by Dewey (1938), Knowles (1975), Kolb (1984), Marsick and Watkins (1990), and Rogers (1969), propose that learning occurs as individuals engage in challenging experiences and then reflect on the outcomes of those experiences. Cognitive theories of learning (e.g., Ausubel, 1968) suggest that knowledge structures grow and develop when they are challenged by novel information obtained via experience. Likewise, Kanfer and Ackerman's (1989) motivation-based theory of skill acquisition posits that challenging experiences facilitate skill development by motivating individuals to exert additional effort to acquire the skills demanded of them. In support of these theoretical propositions, McCall and colleagues (McCall & Hollenbeck, 2002; McCall, Lombardo, & Morrison, 1988) have interviewed diverse samples of executives and found that challenging work experiences involving novel responsibilities and "stretch" assignments are perceived to be more developmental than experiences that are more routine and less challenging. Likewise, McCauley, Ruderman, Ohlott, and Morrow (1994) found that how challenging work experiences are predicts how much on-the-job learning occurs as a result of those experiences.

Although existing research has pointed to the developmental value of challenging on-the-job experiences, there are several important limitations of this research that should be addressed. First, existing theory on experience-based leadership development generally assumes that the more challenging an experience is for an individual, the more developmental value that experience holds for the individual (Ohlott, 2004). Yet, adult learning theories suggest that the uncertainties regarding performance and success that come with overly challenging experiences can be overwhelming and, as a result, can hinder key learning processes and ultimately threaten the developmental value of the experience (Boud, Keogh, & Walker, 1985; Taylor & Smith, 1956). Drawing from these theories, we posit that the developmental value of experience may reach a point of diminishing returns once a certain level of challenge is realized.

Because the existing literature does not address the potential diminishing returns of challenging work experiences, we know very little about how individuals or organizations might offset these diminishing returns. We address this limitation in two ways. First, we posit that features of the person, namely that person's orientation toward learning, will help offset the diminishing returns of developmental challenge by emphasizing the value of

D. Scott DeRue and Ned Wellman, Management and Organizations, University of Michigan.

We thank Susan J. Ashford, Jason A. Colquitt, Jane E. Dutton, John R. Hollenbeck, Daniel R. Ilgen, Frederick P. Morgeson, and John A. Wagner for their helpful comments on earlier drafts of this article.

Correspondence concerning this article should be addressed to D. Scott DeRue, Management and Organizations, Stephen M. Ross School of Business, University of Michigan, 701 Tappan Street, Ann Arbor, MI 48109. E-mail: dsderue@umich.edu

learning and reframing the notion of failures and mistakes not as performance problems but as feedback and opportunities for learning. Second, we theorize that features of the work context, namely access to feedback, will help reduce the uncertainties associated with challenging work experiences and enable the individual to focus on learning.

Another conceptual limitation of the existing research on developmental work experiences is that no research to date has empirically examined the impact of work experiences on the development of leadership skills. Existing research has examined only general, on-the-job learning as an outcome of interest (e.g., Brutus, Ruderman, Ohlott, & McCauley, 2000; McCauley et al., 1994). Despite the conceptual and empirical contributions of this research, it is unclear from these studies whether work experiences promote the development of important leadership skills in addition to general learning outcomes. In the present article, we draw from existing reviews of leadership skill requirements to conceptualize leadership skills as consisting of the cognitive, interpersonal, business, and strategic skills required to effectively influence people and processes in organizations (T. V. Mumford, Campion, & Morgeson, 2007). We then use this concept of leadership skills to examine the developmental value of discrete work experiences.

Our final concern with the existing literature on developmental work experiences is methodological in nature. Prior research has generally asked individuals to identify and evaluate the developmental impact of a single experience. By relying on a single experience per individual, prior research confounds the nature of the experience with individual differences. For example, individual differences, such as intelligence, motivation, and affectivity, shape the types of work experiences that individuals encounter in the workplace (Morgeson & Campion, 2003). As a result, when research is designed purely between individuals, any learning or developmental effects attributed to one's experience on the job are confounded with individual differences. In the present study, we controlled for these individual differences by using a within-person design where each individual acts as his or her own matched control. This enabled us to control for individual differences and isolate the effect of work experiences on leadership skill development.

In the following sections, we develop and empirically test a model of leadership development that specifies how developmental work experiences, individuals' orientation toward learning, and access to feedback collectively shape the development of individuals' leadership skills.

Theoretical Development and Hypotheses

Developing Leaders via Experience: The Role of Developmental Challenge

Scholars in the field of leadership development have long considered challenging work experiences to be a key input in the process of developing individuals' leadership skills (e.g., McCall et al., 1988; Ohlott, Ruderman, & McCauley, 1994). This is because challenging experiences provide a platform for individuals to try new behaviors or reframe old ways of thinking and acting. Challenging work experiences put individuals in dynamic settings where they must solve complex problems and make choices under conditions of risk and uncertainty. Further, by highlighting the gap between individuals' current skill set and the requirements of the leadership role, challenging work experiences provide several sources of motivation for learning and development (McCauley, 2001). Thus, although developmental challenge is not the only input that affects learning on the job, developmental challenge is an essential ingredient in experience-based perspectives of leadership development (Ohlott, 2004; Robinson & Wick, 1992).

To conceptualize developmental challenge, we draw from the research of McCauley, Ohlott, and Ruderman (1999); McCauley et al. (1994); and Ohlott (2004). This research is particularly insightful because it identifies the characteristics of work experiences that require individuals to deal with challenges unique to leadership roles and responsibilities (e.g., creating change, working across organizational boundaries, influencing people and processes for which one has no direct authority). In particular, this research identifies five task-related characteristics that make work experiences developmentally challenging: unfamiliar responsibilities, high levels of responsibility, creating change, working across boundaries, and managing diversity. As suggested by McCauley et al. (1999) and Ohlott (2004), developmental challenge is conceptualized as a higher order latent construct consisting of these five experience characteristics. In Table 1, we draw from Ohlott (2004) to provide a brief description of each experience characteristic.

Following the logic of prior theory and research on developmental challenge (McCall et al., 1988; McCauley et al., 1994, 1999), there are several reasons why we might expect a positive relationship between the developmental challenge of an experience and the leadership skill development that results from that experience. Developmentally challenging work experiences should facilitate the development of individuals' cognitive and strategic leadership skills by motivating individuals to think critically about the situation, identify the underlying causes and consequences of problems, and process new and ambiguous information (Cox & Cooper, 1988; Gillen & Carroll, 1985; Graham, 1983; Jacobs & Jaques, 1987). Likewise, developmentally challenging experiences should enhance individuals' interpersonal leadership skills by enabling individuals to experiment with new ways of influencing people from different demographic and cultural backgrounds, as well as people and processes for which the individuals have no direct authority. Finally, developmentally challenging experiences that require the facilitation of organizational change processes should enhance individuals' business and strategic leadership skills by forcing individuals to identify critical drivers of and barriers to change and to consider how organizational resources should be allocated. Thus, on the one hand, it seems reasonable to expect that developmental challenge will exhibit a positive, linear relationship with leadership skill development.

On the other hand, drawing from learning theories and research on human cognition, we expect that, once developmental challenge reaches an optimal level, further challenge might hinder learning processes. This would result in a pattern of diminishing returns in the relationship between developmental challenge and leadership skill development. To establish the theoretical rationale for this argument, we draw from activation theory (Scott, 1966) and research on individual learning and cognition (e.g., Fiedler & Garcia, 1987; Sweller, 1994).

Activation theory suggests that an individual's activation level (i.e., the degree of arousal in cognitive processing) increases when an individual is unfamiliar with a task or situation, or when a

Table 1
Developmental Challenge

Characteristic of developmental challenge	Description	Examples
Unfamiliar responsibilities	• Must handle novel responsibilities	• Experience a major change in one's work role/position
Creating change	• Create and facilitate change in the way business is conducted or in an employee's behavior, or fix a preexisting problem	• Manage a new product launch or acquisition • Manage subordinate performance problems • Deal with inherited morale problems in a group
High levels of responsibility	• Lead initiatives that are highly important to the organization and entail multiple functions, groups, or products/services	• Secure financing for a key acquisition • Negotiate with a large customer • Assume responsibility for a nationwide initiative
Working across boundaries	• Influence/manage people or processes for which one has no direct authority	• Convince upper management to support a proposal • Manage key interactions with an important labor union
Managing diversity	• Lead people from different cultures, gender, or racial or ethnic backgrounds	• Lead a team dispersed across several continents • Lead a team with extensive gender and racial diversity

person is exposed to stimuli that are either extremely intense or highly meaningful (Berlyne, 1960; Scott, 1966). Thus, stimuli that are novel, uncertain, or meaningful (all elements of developmental challenge) should create a heightened sense of arousal within the individual. This heightened arousal has been positively linked to a wide range of behavioral and cognitive processes (e.g., learning) and is one explanation for why developmentally challenging experiences might facilitate leadership skill development. However, activation theory also suggests that the benefits of increased activation and arousal are most apparent at intermediate levels of activation. Above these intermediate levels, individual performance and learning are handicapped by overarousal of cognitive processes due to anxiety and uncertainty about how to respond (Scott, 1966). Thus, on the basis of activation theory, developmentally challenging work experiences should lead to an increase in leadership skill development until an optimal level of activation is reached. Once the challenge of the experience induces a level of activation that exceeds this point, the positive effects of developmental challenge should diminish.

Similarly, theories of cognitive functioning, namely cognitive resource theory (Fiedler & Garcia, 1987) and cognitive load theory (Sweller, 1988, 1994), suggest that individuals in challenging and stressful experiences divert their cognitive resources (i.e., intellect and attention) away from the task. Rather than being devoted to problem solving and learning-related processes, these cognitive resources are focused on worries over possible performance failures and evaluation anxieties. This focus creates a situation of cognitive overload, as there are not enough cognitive resources available to attend to both task-relevant processes and off-task anxieties and uncertainties. As a result, individuals who become cognitively overloaded often exhibit symptoms such as a lack of perspective and an inability to select out relevant information, both of which interfere with learning (Sutcliffe & Weick, 2008).

If cognitive overload and overactivation divert attention away from the learning process and toward anxieties related to performance failure and evaluation, it is essential that we understand what it is about challenging work experiences that induces cognitive overload. A long history of research on human cognition suggests that individuals' cognitive capacity to interpret and process real-time events is limited, especially when those events are novel and challenging (Baddeley, 1992; Miller, 1956). Experiences rich in developmental challenge would certainly present individuals with novel and challenging situations. Moreover, the cognitive load of any single experience is a function of the variety of distinct elements that must be processed simultaneously during that experience (Sweller, 1994; van Merrienboer & Sweller, 2005). The more distinct elements are embedded in an experience, the more likely it is that off-task cognitions will come to the fore and divert cognitive resources away from the learning process (Sarason, 1984). This is evident in research showing that individuals' cognitive load is lower and overall learning is higher when tasks include fewer distinct elements that must be processed simultaneously (Maybery, Bain, & Halford, 1986; Pollock, Chandler, & Sweller, 2002). Following this logic, work experiences rich in developmental challenge should place individuals at a high risk for cognitive overload, not only because these experiences are novel but because they require individuals to deal with and process multiple demands simultaneously. As such, experiences rich in developmental challenge are likely to inhibit learning processes by diverting cognitive resources away from learning and toward performance anxieties and evaluation uncertainties.

Thus, although the relationship between developmental challenge and leadership skill development might be generally positive, we posit that the relationship is more complex than a straightforward linear effect. Work experiences not rich in developmental challenge are less likely to induce cognitive overload but also less likely to promote individual learning and development. Some developmental challenge is necessary in order to "activate" the individual to further develop his or her leadership skills. However, as developmental challenge increases, so does the risk of cognitive

overload. After a certain point, experiences consisting of too much developmental challenge will induce anxieties related to performance failure and evaluation uncertainty that ultimately impair learning. In the context of leadership development, this fact should create a pattern of diminishing returns in skill development. Thus, we hypothesized that the impact of developmental challenge on leadership skill development is curvilinear and exhibits a pattern of diminishing returns.

> *Hypothesis 1:* The relationship between developmental challenge and leadership skill development will exhibit a predominantly positive, concave downward curve, such that developmental challenge will positively impact leadership skill development to some point and then begin to exhibit decreasing, diminishing returns.

Offsetting the Diminishing Returns of Developmental Challenge

The potential for diminishing returns in the developmental value of experience poses a significant problem for organizations interested in developing leadership talent via on-the-job experiences. On one hand, to develop a rich pipeline of leadership talent, organizations should deploy individuals to challenging work experiences. On the other hand, if an experience is too challenging, the developmental value of that experience can be undermined. Understanding the mechanisms through which these diminishing returns can be prevented can help organizations navigate this dilemma.

Drawing again from theories related to human cognition and arousal (Fiedler & Garcia, 1987; Scott, 1966; Sweller, 1988), we posit there are two mechanisms that explain why developmental challenge exhibits a pattern of diminishing returns with leadership skill development. First, work experiences that reach high levels of developmental challenge are more likely to induce concerns and fears about possible performance failures, which divert cognitive resources from learning processes. In addition, these experiences are more likely to create evaluation uncertainties, which likewise divert cognitive resources from learning. However, these mechanisms also suggest ways that the diminishing returns in leadership skill development might be offset. Individuals who are more oriented toward learning should be less susceptible to fears over possible performance failure. Moreover, individuals who have access to feedback should experience less uncertainty related to evaluation concerns. As a result, individuals who are oriented toward learning or have access to feedback should be less susceptible to diminishing returns in leadership skill development.

Learning orientation. Individuals who possess a strong learning orientation strive to comprehend new things and increase their level of competence in a given activity (DeShon & Gillespie, 2005; Dweck, 1986; Dweck and Leggett, 1988). When faced with challenging situations, individuals with a strong learning orientation respond with adaptive and mastery-oriented behaviors that promote persistence in the face of obstacles, encourage the discovery of new solutions, and lead to sustained or improved levels of performance (Elliott & Dweck, 1988). Learning-oriented individuals are highly motivated to learn from on-the-job activities (Colquitt & Simmering, 1998) and are likely to value experiences that foster development (VandeWalle & Cummings, 1997; VandeWalle, Ganesan, Challagalla, & Brown, 2000). Moreover, when faced with challenging situations, individuals with a strong learning orientation view errors as feedback and opportunities for learning and, in response, often increase their effort toward developing new skills and accomplishing their tasks (Ames, 1984; Nicholls, 1976, 1984). These individuals define success and failure in terms of learning, not performance execution per se.

In contrast, when faced with challenging situations, individuals who are naturally less oriented toward learning often attempt to protect their self-image by exhibiting maladaptive patterns of behavior. In particular, these individuals tend to become overwhelmed in the face of challenge, experience performance deterioration, and avoid further challenge in their work (Button, Mathieu, & Zajac, 1996). Similarly, individuals without a strong learning orientation are often at a greater risk of unhealthy stress and burnout and often withdraw psychologically from overly challenging situations (Cordes & Dougherty, 1993).

Thus, we expected that trait-based learning orientation would be an important determinant of individuals' responses to challenging work experiences and of the leadership skill development that results from these experiences. Individuals who lack a strong orientation toward learning should be more likely to view these work experiences as risky and overwhelming and thus to exhibit withdrawal behaviors that impede learning. Conversely, learning-oriented individuals should be more likely to exhibit a mastery-oriented response to these experiences, retain their focus on learning, and, as a result, further enhance their leadership skills. For these reasons, we hypothesized as follows:

> *Hypothesis 2:* Learning orientation will moderate the curvilinear relationship between developmental challenge and leadership skill development, such that the diminishing returns pattern will be weaker for learning-oriented individuals and stronger for individuals low in learning orientation.

Feedback availability. The availability of systematic and evaluative feedback is often hypothesized to be an essential input to the leadership development process (Halpern, 2004; Morrison & Brantner, 1992). Yet, the amount of empirical research linking feedback and leadership skill development pales in comparison to the literature on feedback in general performance domains (Day, 2000). We theorized that feedback availability is especially important to developing leaders via challenging work experiences because access to feedback helps individuals deal and cope with uncertainty. In particular, we expected that feedback availability would help reduce the evaluation uncertainties that arise due to too much developmental challenge in an experience. By addressing these uncertainties, access to feedback reduces the likelihood that cognitive resources will be diverted away from the task and learning process. Although other dimensions of feedback, such as sign, specificity, and frequency, might also be important considerations, we are particularly interested in availability because access to feedback should be particularly important for addressing evaluation uncertainty, which we expect causes the pattern of diminishing returns in leadership skill development.

Individuals learn in a dynamic, continuous, and reciprocal interaction with their environment (Bandura, 1986). Within the context of this person–environment interaction, access to feedback serves as an enabling mechanism that facilitates learning. Feed-

back is information pertaining to the appropriate or correctness of behavior for attaining certain goals (Ashford & Cummings, 1983; Ilgen, Fisher, & Taylor, 1979). Access to feedback enables individuals to become more self-aware and to have a more accurate understanding of their own competence and performance (Kluger & DeNisi, 1996; Maki, 1998). In organizations, individuals receive feedback through formalized feedback interventions, such as performance reviews and 360-degree appraisals, and also from informal sources, such as interpersonal interactions that offer cues about how others perceive and evaluate an individual's behavior (Ashford, 1986). Although empirical research on the effectiveness of feedback is plagued with mixed results, the overall effect of feedback on performance has been shown to be positive (Kluger & DeNisi, 1996). Additionally, learning theories (e.g., Kanfer & Ackerman, 1989; Rogers, 1969) and models of leadership development (e.g., Avolio, 2004; McCauley & Van Velsor, 2004) emphasize the importance of feedback availability in the development process.

We expected that access to feedback information would be particularly important in work experiences that reach high levels of developmental challenge. Feedback is an information resource that allows individuals to cope with extremely challenging situations, especially when there is a high degree of uncertainty about how to act and how those actions will be evaluated by others (Ashford, 1986). Experiences rich in developmental challenge should be particularly fertile ground for the rise of these uncertainties. By reducing these uncertainties and providing evaluative information, access to feedback should reduce the uncertainty associated with these experiences and thus allow the individual to focus attention and energy on the task. In this sense, greater access to feedback should mitigate the overarousal and cognitive strain caused by these experiences and enable individuals to develop skills from work experiences that, in the absence of feedback, would be cognitively overwhelming. Thus, we hypothesized as follows:

> *Hypothesis 3:* Feedback will moderate the curvilinear relationship between developmental challenge and leadership skill development, such that the diminishing returns pattern will be weaker for individuals with greater feedback availability and stronger for individuals with less feedback availability.

Method

Research Setting and Procedure

This study was conducted in a field setting with an initial sample of 99 middle- and senior-level managers from over 80 different for-profit and not-for-profit organizations. Participants were recruited from the executive and weekend MBA programs at a large, midwestern university. They were all employed full time and had reported to the same supervisor for an average of 1.9 years ($SD = 1.7$), which ensured that independent ratings of development could be obtained from the supervisors for experiences occurring within the last 12 months. In terms of sample characteristics, participants had worked in their respective organizations for an average of 5.3 years ($SD = 2.9$), had been in their current job for 2.6 years ($SD = 1.9$), and had at least one direct report. The average age was 33.4 years ($SD = 5.5$), and 73% were male.

This research was conducted in four distinct phases and utilized both survey and interview methods. Table 2 summarizes the data collection schedule. In the first phase of this research, we used surveys to assess individual difference variables, such as demographics, learning orientation, and access to feedback. These surveys were administered 1 month prior to the second phase of data collection, and the entire initial sample returned the surveys.

Because this research was concerned with how individuals develop leadership skills via on-the-job experiences, the second phase consisted of in-depth, semistructured interviews with each participant. Our purpose in these interviews was to gather examples and rich descriptions of specific on-the-job experiences. These interviews lasted for approximately 60 min. The interview form was modeled after the critical incident technique (Flanagan, 1954), which has been used to study topics as diverse as team leadership (Morgeson, 2005; Morgeson & DeRue, 2006), error management (van Dyck, Frese, Baer, & Sonnentag, 2005), and learning (Cope, 2003). Information was gathered on each experience, the context of the experience, the actions that preceded and followed the experience, and the ultimate outcome of the experience.

Prior to the interview, each participant was asked to reflect on his or her work experiences over the past year. To capture the possible range of work experiences from highly developmental to not developmental at all, we asked each participant to think of two specific experiences that occurred in the past 12 months and "were highly developmental in that they greatly enhanced his/her leadership skills, knowledge, or confidence." Each participant was also asked to think of two experiences that "hurt his/her development as a leader in that they really hurt his/her confidence as a leader, impaired his/her career trajectory, or weakened his/her skills or knowledge." Individuals were also asked to consider experiences where they had performed well and experiences where they had not performed well. Securing such a range of work experiences for each individual was essential for minimizing potential confounds between the nature of the work experience and the person. Last, individuals were asked to consider only work experiences for which their supervisor had in-depth knowledge. Supervisor knowledge of the experience was essential so that the supervisor could

Table 2
Data Collection Schedule

	Phase 1	Phase 2	Phase 3	Phase 4
Data collected	Learning orientation and feedback	Descriptions of work experiences	Developmental challenge	Leadership skill development
Source	Leader	Leader	Leader	Supervisor
Method	Survey	Interview	Survey	Survey

provide independent ratings of leadership skill development for each experience. In sum, each individual had a unique set of on-the-job experiences that ranged from low to high in terms of perceived developmental impact. Brief summaries of exemplary work experiences appear in the Appendix.

During the interview, individuals were asked about these specific on-the-job experiences. Follow-up questions were asked to solicit additional details to put the experiences into context. For example, each individual was asked to describe what led up to the actual experience, what happened during the experience, what his or her reaction was to each experience, and the ultimate outcome of the experience. After each interview, a summary of the interview was vetted with the study participant to ensure accuracy. Interviews were conducted with 82 individuals. This process resulted in a total of 320 specific task-level work experiences (per individual, $M = 3.9$, $SD = 0.58$).

In phase three of the research, we used surveys to gather additional information on each work experience. Approximately 3 weeks after the interview, participants rated each experience on the developmental challenge components identified in the Developmental Challenge Profile (DCP; McCauley et al., 1994, 1999). Given that each experience was rated independently, these surveys were longer than many surveys that leaders complete in organizational research. Nonetheless, 91% of the individuals returned their phase three surveys.

In phase four of the research, which occurred approximately 3 weeks after the phase three surveys were returned, we collected supervisor ratings of leadership skill development for each of the specific work experiences. Seventy-three percent of the supervisors responded, resulting in a final sample of 60 leaders and 225 work experiences with complete data. Assuming a moderate effect size ($d = 0.50$; Cohen, 1988) on the basis of data from McCauley et al. (1994), moderate effect size variability (Raudenbush & Liu, 2000), a cutoff for statistical significance of .05, and four observations per individual, the statistical power for this study exceeded .80 (Liu, Spybrook, Congdon, & Raudenbush, 2005). All subsequent analyses are based on this final sample.

Measures

We organize our discussion of the measures by the phase of research in which they were collected. Unless otherwise noted, all measures were assessed on a scale of 1 to 5 (1 = *strongly disagree* to 5 = *strongly agree*).

Learning orientation. We assessed participant's trait-based learning orientation using VandeWalle's (1997) five-item scale (e.g., "I often look for opportunities to develop new skills and knowledge"). We chose this particular measure of learning orientation because it was specifically designed for and had previously been validated with working professionals. Internal consistency reliability was .85.

Feedback availability. Feedback can come from multiple sources, such as the actual job or task itself, supervisors, peers, and subordinates. Moreover, the experiences in this study consisted of roles and responsibilities that included but also went beyond individuals' formal job duties. To capture the range of possible feedback sources, we assessed participants' perceptions of the availability of feedback in participants' organizations using Morgeson and Humphrey's (2006) six-item measure. These items go beyond one's formal job duties and capture feedback from one's job or tasks as well as feedback from other people (e.g., supervisor, peers). Example items included "The job itself provides me with information about my performance" and "I receive feedback on my performance from other people in my organization (such as my manager or co-worker)." Internal consistency reliability was .84.

Developmental challenge. We assessed the developmental challenge of each work experience using the DCP (McCauley et al., 1994, 1999), which consists of 5–15 items for each of the five dimensions of developmental challenge. We chose this particular measure because of its strong test–retest reliability and established validity in work contexts (Brutus et al., 2000; McCauley et al., 1994). We adapted the items by changing the referent from one's overall job to the specific experiences that were being rated in this study. Sample items include "In this experience, you were responsible for numerous different products, technologies, or services" and "In this experience, you had to get people from different racial, religious, cultural, or ethnic backgrounds to work together" (McCauley et al., 1994).

To construct the developmental challenge measure, we aggregated the scores for the five developmental challenge dimensions into a single score. This approach is consistent with prior research suggesting that an aggregate construct might best represent the developmental challenge of a work experience (McCauley et al., 1999; Ohlott, 2004). However, the assumption that these five characteristics of developmental challenge load onto a single, higher order factor has been suggested but has not been empirically tested in prior research. Thus, to assess the validity of the developmental challenge measure, we conducted a confirmatory factor analysis. Because the total number of items exceeded the recommended ratio of estimated parameters to sample size (Bentler & Chou, 1987), we used an item parceling approach for creating the observed variables (Bagozzi & Edwards, 1998; Landis, Beal, & Tesluk, 2000). We expected the five dimensions of developmental challenge to load onto the higher order composite of developmental challenge. If the path loadings in this factor structure are positive and significant and the overall model fit is sufficient, this offers empirical support for an aggregate measure of developmental challenge.

As shown in Figure 1, all of the factor loadings from the developmental challenge factors to the higher order developmental challenge construct were positive and significant. Second, the aggregate model fit the data relatively well (root-mean-square error of approximation = .07, goodness of fit index = .91; incremental fit index = .91; comparative fit index = .88).[1] In addition, this measure's composite reliability (Fornell & Larcker, 1981), which is analogous to that of coefficient alpha, was .94. The variance extracted estimate, which measures the amount of variance captured by a construct in relation to the variance due to random measurement error, was .53 and thus meets the .50 threshold suggested by Fornell and Larcker (1981). Together, these results offer empirical evidence in support of developmental chal-

[1] We also tested the model fit for several alternative models, including models where the five DCP dimensions were treated as distinct factors. The second-order factor model was the only model that met common criteria for model specification and fit.

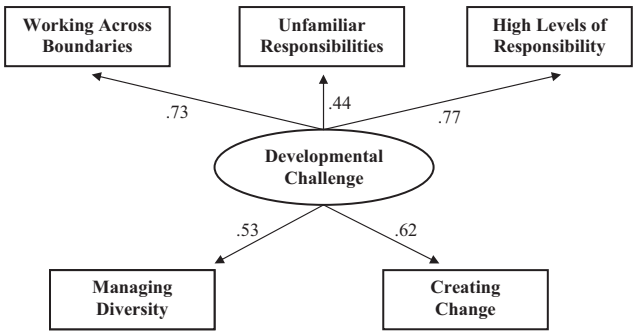

Figure 1. Results from confirmatory factor analysis. $n = 225$. Path coefficients from standardized solution. All paths significant at $p < .01$.

lenge as a single higher order construct based on the five developmental challenge characteristics.

Leadership skill development. To assess leadership skill development, we used T. V. Mumford et al.'s (2007) taxonomy of leadership skills, which was originally adapted from the Occupational Information Network (O*NET; M. D. Mumford, Peterson, & Childs, 1999) and has been validated with working professionals across organizational levels. This taxonomy includes 21 specific skills across four leadership skill dimensions: cognitive, business, interpersonal, and strategic. Cognitive skills include active listening and learning, critical thinking, and information gathering (Lau & Pavett, 1980; Zaccaro, 2001). Business skills include resource allocation and operational analysis (Mahoney, Jerdee, & Carroll, 1965; Mintzberg, 1983). Interpersonal skills include social perceptiveness and persuasion (Connelly et al., 2000), and strategic skills include visioning, problem solving, and systems perspective (Katz & Kahn, 1978; M. D. Mumford, Marks, Connelly, Zaccaro, & Reiter-Palmon, 2000). Supervisors rated leadership skill development for each experience on a scale of 1–5 (1 = *not at all* to 5 = *to a very large extent*). Each of the 21 leadership skills served as an item and was preceded by the following: "To what extent did this specific work experience enhance this person's . . ." In the event supervisors were not comfortable rating the developmental impact of an experience, a "do not know" option was included in the scale; these data were coded as missing data in the final sample. Internal consistency reliability was .94.

Control variables. Age, gender, and ethnicity have all been shown to relate to learning patterns in adults (Cassara, 1990; Maurer, 2001; Severiens & Ten Dam, 1994), so we controlled for these demographic variables in all analyses. Scholars have theorized that cognitive ability impacts an individual's ability to learn (Ackerman, 1988), so we controlled for cognitive ability using individuals' scores on the Graduate Management Admissions Test. Last, we controlled for organizational and job tenure to ensure that length of service had no impact on our results.

Data Analysis

To test the hypotheses proposed in this study, we used hierarchical linear modeling (HLM; Bryk & Raudenbush, 2001). HLM allows one to analyze variables at multiple levels of analysis. In this study, the first level of analysis was the work experience. Each work experience was rated according to its developmental challenge and the leadership skill developed attributed to that experience. The second level of analysis was the individual leader level and included measures of learning orientation and job feedback. Thus, the Level 1 variables (work experiences) were nested within the Level 2 variables (leaders).

To interpret the estimates as representing strictly within-individual effects, we centered the Level 1 predictor variable (developmental challenge) to each individual's mean (Hofmann, Griffin, & Gavin, 2000). This form of centering removes any between-individual variance in estimates of within-individual relations among the variables. This procedure ensures that any Level 1 relationships are not confounded by between-person individual differences. We used HLM 6.0 to analyze all of the hierarchical models.

Results

Before testing our hypotheses, we investigated whether systematic within- and between-individual variance existed in the ratings of developmental challenge and leadership skill development. Table 3 presents parameter values and variance components for this null model. The null model analyses indicated that there was significant between-individual and within-individual variance in both developmental challenge and leadership skill development. These data provide compelling evidence that individuals and their supervisors discriminated among work experiences when rating those experiences for developmental challenge and leadership skill development, respectively. These results also suggest that hierarchical modeling of the data was appropriate.

Table 4 presents the means, standard deviations, and intercorrelations among the Level 2 study variables. The observed variance on all measured variables was adequate. Of note, males received on average less job feedback than did females, and Caucasians tended to approach their work with less of a learning orientation than did non-Caucasians. Although not the focus of the present study, these data may help explain some of the mixed results of prior research related to the impact of gender and

Table 3
Parameter Estimates and Variance Components for the Null Model

Variable	M (γ_{00})	Within-individual variance (ρ^2)	Between-individual variance (π_{00})
Developmental challenge	2.85	.22	.10**
Leadership skill development	3.37	.30	.22**

Note. $n = 225$ (Level 1); $n = 60$ (Level 2).
** $p < .01$ (two-tailed).

Table 4
Descriptive Statistics and Intercorrelations Among Level 2 Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Gender	0.75	0.44	—						
2. Age	32.9	5.31	.09	—					
3. Ethnicity	0.63	0.49	−.04	−.28*	—				
4. Organizational tenure	5.31	2.88	−.03	.33*	.04	—			
5. Job tenure	2.58	1.88	.13	.13	.29	.28*	—		
6. Cognitive ability	553.04	73.33	.15	.05	−.10	.20	−.06	—	
7. Learning orientation	4.59	0.43	.03	−.22	−.25*	−.31*	−.11	.12	—
8. Feedback	3.55	0.73	−.31*	.12	−.13	.17	−.22	−.20	−.03

Note. $n = 60$. Ethnicity is coded such that Caucasian equals 1 and all other ethnicities equal 0. Gender is coded such that male equals 1.
* $p < .05$ (two-tailed).

ethnicity on learning and development (Dreeben & Gamoran, 1986; Hilton & Berglund, 1974; Licht & Dweck, 1984). That is, any observed relationships between gender, ethnicity and learning may be less about inherent differences in gender or ethnicity and instead may be confounded with feedback availability or learning orientation differences across genders and ethnicities.

Prior to testing our formal hypotheses, we tested whether the developmental challenge of a particular experience would be positively related to the amount of leadership skill development associated with that experience. As indicated in Table 4, the degree to which a work experience was developmentally challenging was positively related to leadership skill development ($\gamma_{10} = 1.42$, $p < .01$, $\Delta R^2 = .34$). Variance explained (ΔR^2) was computed as follows: [(unrestricted within-person variance – restricted within-person variance)/ unrestricted within-person variance] (Kreft & de Leeuw, 1998; Singer, 1998). This finding is important because it is consistent with prior qualitative research that suggests a positive relationship between developmental challenge and leadership skills (McCall et al., 1988) and because it provides the basis for examining our more nuanced predictions of a curvilinear relationship (see Table 5).

Hypothesis 1 predicted that the relationship between developmental challenge and leadership skill development would exhibit a pattern of diminishing returns. In particular, we expected individuals to suffer diminishing returns in terms of leadership skill development as on-the-job experiences reached extremely high levels of developmental challenge. We tested this hypothesis by adding a squared term for developmental challenge to the linear model. As indicated in Table 4, results suggest that a curvilinear relationship does exist between developmental challenge and leadership skill development ($\gamma_{20} = -0.13$, $p < .05$). To understand the form of this curvilinear relationship, we used the mixed model equation to estimate and graph both the linear and curvilinear effects of developmental challenge on leadership skill development (see Figure 2; Cohen, Cohen, West, & Aiken, 2003). Consistent with the hypothesis, the relationship between developmental challenge and leadership skill development exhibits a predominantly positive, concave downward curve, which is indicative of a diminishing returns model (Aiken & West, 1991). In particular, as work experiences reach high levels of developmental challenge, the developmental value of those experiences begins to decrease. In Table 6, we present excerpts from our interviews. They illustrate that experiencing some developmental challenge is necessary for leadership skill development but that combining too much developmental challenge in a single experience can lead to cognitive overload and diminished leadership skill development. Together, these data support Hypothesis 1.

Table 5
Effects of Developmental Challenge on Leadership Skill Development

Predictor	Coefficient	*SE*
Intercept (γ_{00})	3.36**	0.06
Gender (γ_{01})	−0.27	0.14
Age (γ_{02})	0.00	0.01
Ethnicity (γ_{03})	0.00	0.04
Organizational tenure (γ_{04})	0.06**	0.02
Job tenure (γ_{05})	0.09**	0.03
Cognitive ability (γ_{06})	0.00	0.00
Developmental challenge (γ_{10})	1.45**	0.37
Developmental challenge squared (γ_{20})	−0.13*	0.06

Note. $n = 225$ (Level 1); $n = 60$ (Level 2). Ethnicity is coded such that Caucasian equals 1 and all other ethnicities equal 0. Gender is coded such that male equals 1.
* $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

Hypotheses 2 and 3 predicted that individuals' learning orientation and access to feedback, respectively, would moderate the curvilinear relationship proposed in Hypothesis 1. In particular, we expected that individuals with a high learning orientation or greater feedback availability would not experience the same diminishing returns in leadership skill development as would those individuals with a low learning orientation or less access to feedback. We tested these hypotheses by examining the cross-level moderating effects of learning orientation and feedback availability on the relationship between the squared term for developmental challenge and leadership skill development.[2] First, we entered learning orientation as a Level 2 variable predicting the Level 1 slope coefficient for the squared term of developmental challenge, controlling for the Level 2 main effect of learning orientation and its cross-level moderating effect on the linear term. Cross-level moderation is present if the Level 2 variable is a significant predictor of the Level 1 slope coefficient. As indicated in Table 7, the coefficient indicating cross-level moderation of learning ori-

[2] In addition to learning orientation and feedback availability, cognitive ability was tested as a moderator of the linear and curvilinear effects of developmental challenge on leadership skill development. Cognitive ability did not moderate the linear or curvilinear effect.

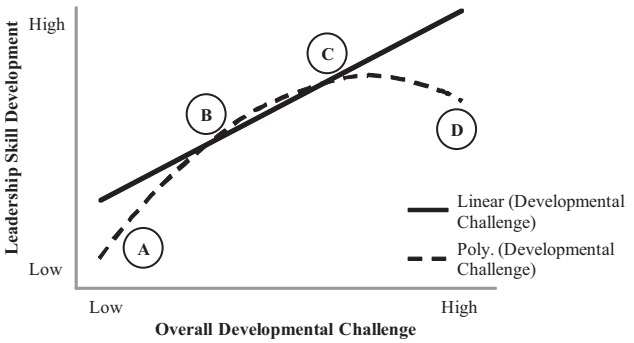

Figure 2. Relationship between overall developmental challenge and leadership skill development. The letters on the graph correspond to interview quotes about specific work experiences that fall at these points on the regression line (see Table 6). poly = polynomial.

entation on the curvilinear relationship between developmental challenge and leadership skill development was not significant ($\gamma_{21} = 0.30$, $p = .06$). Thus, Hypothesis 2 was not supported.

One potential reason why the test for cross-level moderation did not reach statistical significance is possible range restriction in our learning orientation measure ($M = 4.59$, $SD = 0.49$). Relative to prior research on learning orientation (e.g., VandeWalle, 1997; VandeWalle & Cummings, 1997), our sample was clustered at the higher end of the rating scale for learning orientation. In light of this range restriction, we plotted the cross-level interaction on an exploratory basis to see if the pattern of these data was at least consistent with our hypothesis. We used the full mixed-model to plot the relationship between developmental challenge and leadership skill development for high and low levels of learning orientation (defined as 1 and -1 standard deviations from the mean, respectively; Aiken & West, 1991). As illustrated in Figure 3, the pattern of the moderating effect for learning orientation was generally in the hypothesized direction. The relationship between developmental challenge and leadership skill development exhibited a predominantly positive, concave downward curve for individuals with a low learning orientation. Individuals with a high learning orientation did not experience these diminishing returns to the same degree, and this suggests that the moderating effect of learning orientation is likely in the hypothesized direction but is not statistically significant in the current data. We return to these data and their implications for future research in our discussion of the study's findings.

As indicated in Table 8, we found that access to feedback availability moderated the curvilinear relationship between developmental challenge and leadership skill development ($\gamma_{20} = 0.16$, $p < .05$). We plotted the form of this interaction in Figure 4. Consistent with Hypothesis 3, the relationship between developmental challenge and leadership skill development exhibited a predominantly positive, concave downward curve for individuals with less access to feedback. Individuals with greater access to feedback did not experience the same diminishing returns in leadership skill development. Thus, Hypothesis 3 was supported.

Exploratory Analysis: Differential Effects Across Leadership Skills

Thus far in our analyses, we have examined the impact of developmental challenge on an aggregate conceptualization of leadership skills. This aggregate approach is warranted in this case for three reasons. First, we have no a priori theoretical rationale for why developmental challenge would differentially affect the unique categories of leadership skills (cognitive, interpersonal, business, strategic). Second, prior research suggests that these leadership skill categories are all important for effective leadership and can be conceptualized under a single leadership skill domain (e.g., T. V. Mumford et al., 2007). Third, in the present study, the four leadership skill categories exhibit moderate-to-high intercorrelations (rs = .57–.72). Nonetheless, exploring the effects of developmental challenge across each category of leadership skills

Table 6
Accounts of Work Experiences Along the Developmental Challenge Continuum

Experience	Quote
A	"One of our client's plants fractured a head bearing during installation on our best selling SUV. They sent the bearing back to us for testing. My job was to figure out what the problem was with the product. After testing, it became clear that the product was fractured due to an issue during installation and not a faulty design—which I then had to report back to our senior management and the client. For me, this is run-of-the-mill stuff . . . . I spend about 30%–40% of my time on quality issues like this . . . it's a pretty routine problem."
B	"The shop floor manager went on vacation for 2 weeks, and I filled in. I had done this a few times before when he was gone, but this was the first time our president was away as well. I had to make all of the calls for two facilities. I had to get up to speed quickly and ensure resources were allocated appropriately. It was challenging but doable."
C	"We had just lost a big contract, but our client was having trouble getting their new supplier up and running. They asked if we would keep supplying parts through the first quarter. The problem was that we had already set in motion plans to close the plant where these parts were manufactured—since we had lost the contract. Working with my team and the client team, I led an effort to develop a solution so that we could continue supplying parts to this particular client. We ended up developing a solution that avoided a price increase and developed new business worth $2.6 million. As a result, that particular client has asked us to resubmit a proposal for their business. This was huge for us . . . . We ended up saving hundreds of jobs and gaining new business. For me, personally, the experience was developmental, because I was able to use my knowledge of the business and my relationship with client to get past a complex problem that none of us knew exactly how to handle . . . . That, in the end, helped our company grow."
D	"When I took over, the project had already been going on for 2 months. For me, it was a new client, industry, people, process—everything was new and everything was important for the company. I had never worked with this client, didn't have much credibility or influence, and didn't know enough about the client or the project to guide or challenge the process. I miscommunicated with the client; we ended up being very late on the deliverables . . . . There was just so much going on and no time to think."

Note. The letters in the Experience column correspond to specific points on the graph in Figure 2.

Table 7
Effects of Learning Orientation on Leadership Skill Development

Predictor	Coefficient	*SE*
Intercept (γ_{00})	3.35**	0.06
Gender (γ_{01})	−0.27	0.13
Age (γ_{02})	0.00	0.01
Ethnicity (γ_{03})	−0.02	0.04
Organizational tenure (γ_{04})	0.08**	0.02
Job tenure (γ_{05})	0.09**	0.03
Cognitive ability (γ_{06})	0.00	0.00
Learning orientation (γ_{07})	0.29†	0.15
Developmental challenge (γ_{10})	1.54**	0.33
Learning orientation (γ_{11})	−1.81†	0.91
Developmental challenge squared (γ_{20})	−0.15**	0.05
Learning orientation (γ_{21})	0.30†	0.16

Note. $n = 225$ (Level 1); $n = 60$ (Level 2). Ethnicity is coded such that Caucasian equals 1 and all other ethnicities equal 0. Gender is coded such that male equals 1.
† $p < .10$ (two-tailed). ** $p < .01$ (two-tailed).

Table 8
Effects of Feedback on Leadership Skill Development

Predictor	Coefficient	*SE*
Intercept (γ_{00})	3.33**	0.05
Gender (γ_{01})	−0.19	0.14
Age (γ_{02})	−0.01	0.01
Ethnicity (γ_{03})	0.00	0.04
Organizational tenure (γ_{04})	0.05*	0.02
Job tenure (γ_{05})	0.12**	0.03
Cognitive ability (γ_{06})	0.00	0.00
Feedback (γ_{07})	0.21**	0.08
Developmental challenge (γ_{10})	1.43**	0.31
Feedback (γ_{11})	−0.91*	0.40
Developmental challenge squared (γ_{20})	−0.14*	0.05
Feedback (γ_{21})	0.17*	0.07

Note. $n = 225$ (Level 1); $n = 60$ (Level 2). Ethnicity is coded such that Caucasian equals 1 and all other ethnicities equal 0. Gender is coded such that male equals 1.
* $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

might offer a more refined understanding of the developmental value of challenging work experiences.

In this section, we explore the linear and curvilinear effects of developmental challenge on each leadership skill category separately. As in our previous analyses, we controlled for age, gender, ethnicity, organizational tenure, job tenure, and cognitive ability. Our results suggest there may be some differential effects across the leadership skill categories. For cognitive leadership skills, the linear ($\gamma_{10} = 0.37$) and curvilinear ($\gamma_{20} = 0.04$) effects were not significant. For interpersonal leadership skills, developmental challenge exhibited the same diminishing returns pattern found with the aggregate conceptualization of leadership skill development ($\gamma_{10} = 2.07$, $\gamma_{20} = -0.24$, $p < .05$). The same diminishing returns pattern was found for business leadership skills ($\gamma_{10} = 1.87$, $\gamma_{20} = -0.20$, $p < .05$). Finally, we found a positive, linear relationship between developmental challenge and strategic leadership skill development ($\gamma_{10} = 1.48$, $p < .05$); the curvilinear term was in the direction of a diminishing returns pattern but did not reach statistical significance ($\gamma_{20} = -0.13$). We consider possible explanations for these results and their theoretical implications in our subsequent discussion of this study.

Discussion

Past theory and research has considered leadership primarily as a predictor of individual-, group-, and organizational-level outcomes. In fact, recent meta-analytic evidence suggests that individuals' leadership skills, styles, and behaviors are key predictors of subordinate productivity and satisfaction (DeGroot, Kiker, & Cross, 2000; Gastil, 1994), team performance (Burke et al., 2006; Judge, Piccolo, & Ilies, 2004), and organizational performance (Judge et al., 2004). Despite these promising findings, we know very little about the processes by which individuals develop the skills and capabilities necessary to lead effectively. As Avolio, Sosik, Jung, and Berson (2003) pointed out in their recent review of the leadership literature, "With all of the money spent on leadership development in organizations, one would think we now

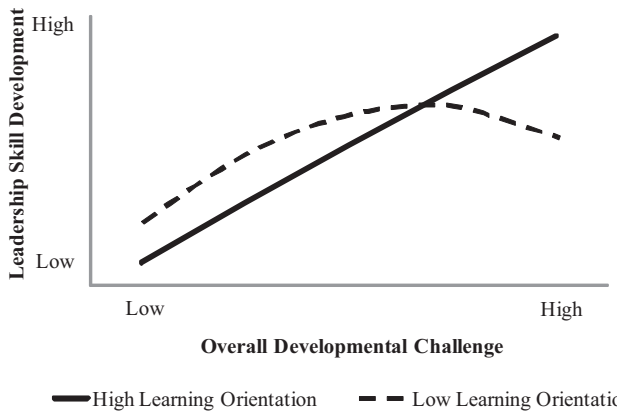

Figure 3. Moderating effect of learning orientation on the relationship between overall developmental challenge and leadership skill development.

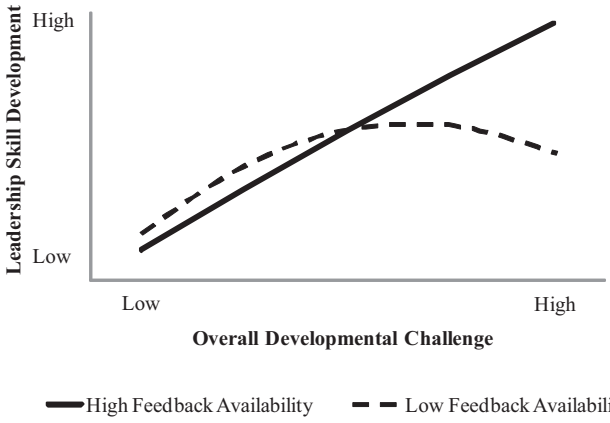

Figure 4. Moderating effect of feedback availability on the relationship between overall developmental challenge and leadership skill development.

know a lot about this area. Unfortunately, that is not the case" (p. 277).One area we know very little about is how individuals develop leadership skills from their experiences on the job. The present study addresses recent calls for more research on this topic (Avolio, 2004; Zaccaro, Mumford, Connelly, Marks, & Gilbert, 2000) by identifying key boundaries to the developmental value of experience and advancing our understanding of how and when learning orientation and access to feedback help promote leadership skill development.

Building on prior research that emphasizes the role of on-the-job experiences in promoting individual learning and development (McCall et al., 1988; McCauley et al., 1994), we developed a series of hypotheses about how leadership skill development is a function of the nature of the experience, person, and surrounding work context. Our results indicate that developmental challenge (a feature of the experience) is positively related to a work experience's impact on leadership skill development but only up to a certain point. The developmental value of a work experience begins to diminish after an optimal amount of developmental challenge is reached. In our exploratory analysis, we found that this pattern of diminishing returns was most apparent for interpersonal and business leadership skills and less so for cognitive or strategic leadership skills. A possible post hoc explanation for these exploratory findings is related to our particular sample. Participants in this study were primarily middle-level managers, with some senior-level executives. According to T. V. Mumford et al. (2007), cognitive skills are developed and required at lower levels in the organization, and so it might be the case that participants in this study had already developed a robust set of cognitive leadership skills and thus had less opportunity for developing those skills. Likewise, strategic leadership skills are most embedded in experiences that occur at very senior levels in the organization (T. V. Mumford et al., 2007), and it might be the case that many of our middle-level managers did not encounter work experiences that were overly challenging with respect to these strategic leadership skills; the result was a positive, linear effect for developmental challenge but only a weak curvilinear effect. In sum, the diminishing returns pattern found in this study offers a noteworthy refinement to prior theory and research, which has generally assumed that more challenging experiences lead to more leadership skill development (Brutus et al., 2000; Ohlott, 2004). In particular, the present study unveils several important boundary conditions to these relationships, both in terms of the optimal amount of developmental challenge and the ways in which the potential for diminishing returns can be offset.

We theorized and found empirical support for the ability of feedback to offset these diminishing returns. That is, our results suggest that individuals with access to feedback are less likely to experience the diminishing returns associated with high levels of developmental challenge. Access to feedback likely offsets the diminishing returns in leadership skill development by enhancing self-awareness, reducing individuals' uncertainties regarding performance and success, and helping reduce the stress associated with challenging work experiences—all of which enable individuals to focus their efforts on the task and learning (Ashford, 1986). That said, feedback is a multidimensional construct, and in this study, we considered only one of these dimensions (availability). Future research should examine how the sign, specificity, and/or frequency of feedback impact experiential learning and leadership skill development processes.

With respect to learning orientation, our original hypothesis was not supported, but the general pattern of our results was in the hypothesized direction. Prior research on learning orientation suggests that individuals with a strong learning orientation exhibit mastery-oriented response patterns when faced with challenging experiences (Dweck, 1986). Thus, individuals high in learning orientation should be less susceptible to the diminishing returns associated with extremely challenging experiences than are individuals without this orientation toward learning. The pattern of our results suggests this might be the case and that the potential for a strong learning orientation to offset the adverse developmental impact of overly challenging work experiences is worthy of further study. Our data displayed a restriction in range on learning orientation, which might explain why our test for cross-level moderation did not reach statistical significance. This range restriction is not altogether surprising, given that our sample consisted of individuals in a graduate management education program who might be expected to possess a higher level of learning orientation than would the general population of middle- and senior-level managers. We hope that the general pattern of our results will encourage future researchers to further investigate the role of learning orientation in leadership skill development using more diverse samples.

Theoretical Implications

Our findings have several theoretical implications that extend existing theory and establish an agenda for future research on leadership skill development. First, we redirect prior theory that assumes the greater the challenge in on-the-job experiences, the greater the learning and development that occur as a result of those experiences (Byham, Smith, & Pease, 2002). We do so by theorizing and providing empirical evidence in support of a diminishing returns model. In particular, we suggest that developmental challenge is beneficial up to a certain point, but after this point, the cognitive load and demands associated with extremely high levels of developmental challenge likely redirect energy and focus away from the learning process. We then extend our contribution by theorizing and providing evidence that these diminishing returns can be offset if individuals have access to feedback and, possibly, if they approach experiences with a learning orientation. In this respect, we identify an initial set of mechanisms that helps individuals cope with and overcome the cognitive demands associated with extremely challenging work experiences. In doing so, we open new avenues for future research.

One promising direction for future research would be to go beyond learning orientation and feedback availability to extend our understanding of how other personal characteristics and context factors shape the relationship between challenging work experiences and leadership skill development. It would be particularly interesting to study individual differences that impact what individuals see as challenging or how much developmental challenge one can withstand before becoming overwhelmed. Such differences might include an individual's ability to learn (Van Velsor, Moxley, & Bunker, 2004), locus of control (DuCette & Wolk, 1973; Rotter, 1966), self-efficacy (Bandura, 1997), or need for achievement (Lowell, 1952; McClelland, 1967). For example, individuals with a high ability to learn are willing to accept

responsibility for their own development, open to new ways of being, more likely to reflect on their experiences, and often more resilient in the face of complexity and uncertainty. We would expect these individuals to be more capable of learning from highly challenging experiences than are individuals who lack this ability to learn.

Likewise, social support from supervisors or peers has been shown to enhance on-the-job learning through increased motivation (Birdi, Allan, & Warr, 1997; Facteau, Dobbins, Russell, Ladd, & Kudisch, 1995), and it might be the case that social support is a key element in enabling individuals to maintain their focus and perspective in the face of challenging experiences. According to Moxley and Pulley (2004), social support "provides a sort of safety net so that when (individuals) stumble, they do not fall too far" (p. 187). In this sense, social support from supervisors or peers may be a critical element in offsetting the diminishing returns of developmental challenge.

The present study also extends existing theories of general work experience to the leadership development domain. Scholars have theorized that job performance and skill development are a function both of the quantity and the quality of experiences people have at work (Quinones, Ford, & Teachout, 1995; Tesluk & Jacobs, 1998). Yet, existing research has focused primarily on the quantity or amount of experience as a predictor of job performance (e.g., McEnrue, 1988) and has generally disregarded the quality dimension of experience. Moreover, this research has not examined skill development as an outcome of interest. Thus, the present study complements existing research by illustrating how the quality of one's experiences, in terms of developmental challenge, is an important predictor of leadership skill development. In fact, this is one of the first studies to empirically link the quality of one's experiences to leadership skill development. Despite this contribution, one question not addressed by this study is how developmental work experiences should be sequenced. Our findings clearly suggest that work experiences can be overwhelming and counterproductive if they reach levels of developmental challenge for which the individual is not ready. Future research could build on these findings and extend existing theory by examining how the quality dimension of work experience can be used to understand the optimal sequence of developmental work experiences. This research would be invaluable for organizations designing and implementing job rotational programs as a way to promote leadership skill development.

Findings from the present study have significant implications for existing theory and research related to on-the-job learning in general. For example, feedback has been positioned in the literature as one possible mechanism that promotes learning on the job (Ashford & Cummings, 1983; Halpern, 2004). Although findings from the present study support this proposition, our study also suggests that mechanisms such as feedback might be most valuable when individuals are engaged in experiences that are high in developmental challenge. For example, our results suggest that feedback availability does not have the same benefits when individuals are engaged in less challenging experiences. In this sense, current theory on how feedback and other related constructs influence learning processes should further consider how the nature of the work experience shapes the ultimate effect on learning and individual development.

Finally, in this study, we focused exclusively on leadership skill development, but it is likely that other forms of learning and development resulted from these experiences. Future research should expand the criterion domain and consider additional outcomes of experience-based leadership development. For example, recent literature has begun to examine how individuals develop their identity as a leader (Day & Harrison, 2007; DeRue, Ashford, & Cotton, 2009), and drawing on this literature, future research might examine how developmental experiences help shape individuals' leader identity.

Managerial Implications

Findings from the present study have several noteworthy implications for managerial practice and the design of leadership development systems in organizations. First and foremost, our diminishing returns model emphasizes the importance of deploying individuals to work experiences for which there is an optimal amount of developmental challenge for the individual. Organizations should compare an individual's current skills and capabilities to those required by the experience and then deploy the individual to experiences that challenge those skills and capabilities but do not overwhelm the individual. To some extent, organizations purposefully avoid placing individuals in work experiences that are well beyond their current skill set. Indeed, we expect the reason our data exhibit diminishing returns and not a full inverted-U pattern is that organizations can tolerate only so much risk when deploying individuals to challenging work experiences and, as a result, actively restrict the upper end of the developmental challenge continuum.

However, the fact that many of the individuals we studied did exhibit diminishing returns in leadership skill development also reveals an opportunity to improve the allocation of individuals to work experiences and/or the support offered to individuals during those experiences. From a managerial perspective, it is especially important to know when the challenge of an experience will overwhelm an individual. According to our study, an inflection point occurs when the overall developmental challenge of an experience reaches a score of 3.8 (out of 5). We posit this high level of developmental challenge if a single experience cognitively overloads the individual. Although we were unable to directly measure cognitive load, given the retrospective nature of our study and the inherent difficulties in measuring cognitive load in real time and across people (Sweller, 1994), the qualitative accounts recorded from our interviews support this assertion. Thus, the DCP measure that was used in this study, combined with our results, provides an assessment tool that organizations can use to measure the developmental challenge of an experience as a way of determining the potential impact of that experience on the person and important development outcomes. This is an especially important tool for helping managers decide how to allocate individuals to work experiences and how best to support the development of individuals on the job.

If future research finds that the lack of support received in our study for learning orientation was due to range restriction and that learning orientation can actually offset the diminishing returns of high developmental challenge, this will have implications for how organizations select individuals for experiences and how managers frame challenging work experiences to individuals. Although not

statistically significant, the general pattern of our results suggests that a strong learning orientation might be able to mitigate some of the diminishing returns associated with overly challenging experiences. As stated previously, this idea needs to be further examined in more diverse samples, but if this idea is confirmed in subsequent research, individuals' learning orientation might serve as one criterion upon which allocation and job assignment decisions are made. In addition, organizations might examine ways in which they can invoke or reinforce a learning orientation in individuals. Although we focused on learning orientation as an individual trait, research suggests that organizations can prime a learning orientation in individuals by establishing a collaborative environment (Pintrich, 2000), modeling task experimentation and the exploration of multiple learning strategies (Colquitt & Simmering, 1998), framing task-related instructions in terms of learning (Seijts & Latham, 2005), encouraging employees to attribute their failures to effort or strategy instead of ability (Dweck, 1986), and implementing learning-focused reward and feedback structures (Butler, 1987). All of these strategies emphasize that mistakes are an expected and acceptable part of the development process and that individuals should view their mistakes as cues of learning and development.

The present study also emphasizes the importance of organizational practices, programs, and policies that prepare and support individuals undertaking challenging work experiences. Our results suggest that organizations can facilitate experience-based leadership skill development by providing employees with greater access to feedback. It is likely that individuals will also benefit from other support mechanisms that reduce performance anxieties and evaluation uncertainties. For example, at the organization level, organizations should facilitate a culture and climate that are supportive of learning, openness to feedback, and experimentation (Noe, 1986). At the work-group level, individuals engaged in challenging work experiences need support from subordinates, peers, and supervisors (Ashford, 1986; Birdi et al., 1997; Karasek, 1979). These forms of support emerge through informal social networks as well as formal relationships. In fact, some scholars have suggested that helping individuals develop their informal support networks is one of the primary means by which organizations can enhance the developmental value of on-the-job experiences (Day, 2000). Finally, at the individual level, interventions that facilitate individual self-reflection and awareness (e.g., learning and reflection journals) promote learning on the job (Marsick, 1988; Morrison, 1996) and should be considered key components of organizational systems and practices designed to support experience-based leadership development. These support programs and practices are common aspects of organizational life, and our results suggest they are also vital elements of developing leaders via experience.

Strengths and Limitations

Notwithstanding the contributions noted above, there are several possible limitations to this study that should be noted. First, the present study relied on retrospective accounts of informal work experiences, both from the focal participant and from his or her supervisor. Retrospective accounts are subject to errors of recall and memory biases. These retrospective biases occur because people have limited, imperfect recall (Ericsson & Simon, 1980); are influenced by their implicit or espoused theories of the past (Duncan, 1979); and are subject to cognitive processes such as rationalization, self-presentation, simplification, attribution, or simple lapses of memory (Wolfe & Jackson, 1987). Although issues related to memory and recall bias are important limitations, there are several reasons why these biases are not a significant concern in the present research. First, research on experience-sampling methodologies has shown that retrospective reports converge with real-time reports of life events (Ptacek, Smith, Espe, & Raffety, 1994). Second, as a check for recall bias, we collected self-reports of leadership skill development; these ratings converged with those collected from supervisors. Third, one might expect retrospective biases to attenuate the within-person variance among the experiences. However, our results suggest that both focal participants and their supervisors sufficiently discriminated among experiences. Finally, this research was designed according to the guidelines offered by Huber and colleagues (Huber, 1985; Huber & Power, 1985) for minimizing memory and recall bias. In particular, all of the experiences examined in this study occurred within the last 12 months and were meaningful enough to be identified by the participant. Furthermore, all participants were directly involved in their respective experiences. As such, memory and recall bias was minimized in this research. Nonetheless, to address this limitation, researchers should use longitudinal research designs to assess in real time the pre–post changes in leadership skills that result from on-the-job work experiences.

Another limitation of this study involves the manner in which the information was gathered. In the interview phase, leaders were interviewed by D. Scott DeRue. It is possible that the focal participants biased responses in a way that made them appear more favorable. It is also possible that the underlying perspective or biases of the interviewer somehow influenced the individuals' responses. Some of these threats were minimized by the methods used to elicit information on the experiences (e.g., asking for both developmental and nondevelopmental experiences) and the methods used to summarize the experiences (e.g., written by D. Scott DeRue and then edited/corrected by the focal participants directly).

In spite of the noted limitations, the design of the current study had several strengths. First, the multilevel nature of this research addresses a limitation of existing research. Prior research on the developmental value of experience has focused on job-level experiences (e.g., Jackson & Wall, 1991; McCauley et al., 1994; Wall, Jackson, & Davids, 1992). This job-level perspective does not address the fact that two people in the same job often have different sets of developmental experiences and, as a result of those experiences, develop in different ways and at different rates. By conceptualizing and examining discrete experiences that happen within the context of one's job, the current research explicitly models within-job and within-person variance in developmental experiences that would not be considered at the job level.

Another important strength of this research was the study design. In this research we employed multiple methods (i.e., qualitative interview techniques to capture rich descriptions of discrete experiences, quantitative survey measures to collect data on the key study variables). Moreover, the quantitative survey data was collected from multiple sources and at different times. Learning orientation and access to feedback were collected first from the focal participants. After the qualitative interviews, the focal participants completed surveys on the developmental challenge of

each experience. In a subsequent survey, individuals' supervisors provided data on leadership skill development outcomes. By using multiple sources and multiple methods, we minimized common method variance as a potential explanation for the results and provided a more robust test of the study hypotheses.

Conclusion

This study provides an empirical investigation of how developmental challenge as a feature of discrete work experiences promotes leadership skill development. Because this study addressed the nonlinear effects of developmental challenge, our results offer a significant advance toward better predicting and explaining experiential learning and leadership development processes in organizations. Moreover, by linking the level of developmental challenge and leadership skill development to contextual factors, such as feedback availability, we explicitly show that leadership development is not simply a function of the experience, person, or context; rather, all three elements must be in place to facilitate the process of developing leaders via experience.

References

Ackerman, P. L. (1988). Determinants of individual differences during skill acquisition: Cognitive abilities and information processing. *Journal of Experimental Psychology, 117,* 288–318.

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Ames, C. (1984). Achievement attributions and self-instructions under competitive and individualistic goal structures. *Journal of Educational Psychology, 76,* 478–487.

Ashford, S. J. (1986). Feedback-seeking in individual adaptation: A resources perspective. *Academy of Management Journal, 29,* 465–487.

Ashford, S. J., & Cummings, L. L. (1983). Feedback as an individual resource: Personal strategies of creating information. *Organizational Behavior and Human Performance, 32,* 370–398.

Ausubel, D. P. (1968). *Educational psychology: A cognitive view.* New York: Holt, Rinehart, & Winston.

Avolio, B. J. (2004). Examining the full range model of leadership: Looking back to transform forward. In D. A. Day, S. J. Zaccaro, & S. M. Halpin (Eds.), *Leader development for transforming organizations.* Mahwah, NJ: Erlbaum.

Avolio, B. J., Sosik, J. J., Jung, D. I., & Berson, Y. (2003). Leadership models, methods, and applications: Small steps and giant leaps. In W. C. Borman, R. Klimoski, D. R. Ilgen, & B. Weiner (Eds.), *Handbook of psychology: Vol. 12. Industrial and organizational psychology* (pp. 277–307). New York: Wiley.

Baddeley, A. (1992). Working memory: The interface between memory and cognition. *Journal of Cognitive Neuroscience, 4,* 281–288.

Bagozzi, R. P., & Edwards, J. R. (1998). A general approach for representing constructs in organizational research. *Organizational Research Methods, 1,* 45–87.

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4,* 359–373.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Bentler, P. M., & Chou, C. (1987). Practical issues in structural modeling. *Sociological Methods and Research, 16,* 78–117.

Berlyne, D. E. (1960). *Conflict, arousal, and curiosity.* New York: McGraw-Hill.

Birdi, K., Allan, C., & Warr, P. (1997). Correlates and perceived outcomes of four types of employee development activity. *Journal of Applied Psychology, 82,* 845–857.

Boud, D., Keogh, R., & Walker, D. (1985). Promoting reflection in learning: A model. In D. Boud, R. Keogh, & D. Walker (Eds.), *Reflection: Turning experience into learning* (pp. 18–40). London: Kogan Page.

Brutus, S., Ruderman, M. N., Ohlott, P. J., & McCauley, C. (2000). Developing from job experiences: The role of organization-based self esteem. *Human Resource Development Quarterly, 11,* 367–380.

Bryk, A. S., & Raudenbush, S. W. (2001). *Hierarchical linear models: Applications and data analysis methods.* Thousand Oaks, CA: Sage.

Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E., & Halpin, S. A. (2006). What type of leadership behaviors are functional in teams? A meta-analysis. *Leadership Quarterly, 17,* 288–307.

Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different feedback conditions on motivational perceptions, interest, and performance. *Journal of Educational Psychology, 79,* 474–482.

Button, S. B., Mathieu, J. E., & Zajac, D. M. (1996). Goal orientation in empirical research: A conceptual and empirical foundation. *Organizational Behavior and Human Decision Processes, 67,* 26–48.

Byham, W. C., Smith, A. B., & Pease, M. J. (2002). *Grow your own leaders: How to identify, develop, and retain leadership talent.* Upper Saddle River, NJ: Prentice Hall.

Cassara, B. (1990). *Adult education in a multicultural society.* London: Routledge.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

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

Colquitt, J. A., & Simmering, M. J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. *Journal of Applied Psychology, 83,* 654–665.

Connelly, M. S., Gilbert, J. A., Zaccaro, S. J., Threlfall, K. V., Marks, M. A., & Mumford, M. D. (2000). Exploring the relationship of leadership skills and knowledge to leader performance. *Leadership Quarterly, 11,* 65–86.

Cope, J. (2003). Entrepreneurial learning and critical reflection: Discontinuous events as triggers for "higher-level" learning. *Management Learning, 34,* 429–450.

Cordes, C. L., & Dougherty, T. W. (1993). A review and an integration of research on job burnout. *Academy of Management Review, 18,* 621–656.

Cox, C. J., & Cooper, C. L. (1988). *High flyers: An anatomy of managerial success.* New York: Blackwell.

Day, D. V. (2000). Leadership development: A review in context. *Leadership Quarterly, 11,* 581–613.

Day, D. V., & Harrison, M. M. (2007). A multilevel, identity-based approach to leadership development. *Human Resource Management Review, 17,* 360–373.

DeGroot, T., Kiker, D. S., & Cross, T. C. (2000). A meta-analysis to review organizational outcomes related to charismatic leadership. *Canadian Journal of Administrative Sciences, 17,* 356–371.

DeRue, D. S., Ashford, S. J., & Cotton, N. C. (2009). Assuming the mantle: Unpacking the process by which individuals internalize a leader identity. In L. M. Roberts & J. E. Dutton (Eds.), *Exploring positive identities and organizations: Building a theoretical and research foundation* (pp. 213–232). New York: Taylor & Francis.

DeShon, R., & Gillespie, J. Z. (2005). A motivated action theory account of goal orientation. *Journal of Applied Psychology, 90,* 1096–1127.

Dewey, J. (1938). *Experience and education.* New York: Macmillan.

Dreeben, R., & Gamoran, A. (1986). Race, instruction, and learning. *American Sociological Review, 51,* 660–669.

DuCette, J., & Wolk, S. (1973). Cognitive and motivational correlates of generalized expectancies for control. *Journal of Personality and Social Psychology, 26,* 420–426.

Duncan, R. (1979). Qualitative research methods in strategic management. In D. E. Schendel & C. Hofer (Eds.), *Strategic management: A new view of business policy and planning.* Boston: Little, Brown.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41,* 1040–1048.

Dweck, C. S., & Leggett, E. L. (1988). A social–cognitive approach to motivation and personality. *Psychological Review, 95,* 256–273.

Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54,* 5–12.

Ericsson, K. A., & Simon, H. A. (1980). Verbal reports as data. *Psychological Review, 87,* 215–251.

Facteau, J. D., Dobbins, G. H., Russell, J. E. A., Ladd, R. T., & Kudisch, J. D. (1995). Influence of general perceptions of the training environment on pretraining motivation and perceived training transfer. *Journal of Management, 21,* 1–25.

Fiedler, F. E., & Garcia, J. E. (1987). *New approaches to effective leadership: Cognitive resources and organizational performance.* New York: Wiley.

Flanagan, J. C. (1954). The critical incident technique. *Psychological Bulletin, 51,* 327–358.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18,* 39–50.

Gastil, J. (1994). A meta-analytic review of the productivity and satisfaction of democratic and autocratic leadership. *Small Group Research, 25,* 384–410.

Gillen, D. J., & Carroll, S. J. (1985). Relationship of managerial ability to unit effectiveness in more organic versus more mechanistic departments. *Journal of Management Studies, 22,* 668–676.

Graham, J. L. (1983). Brazilian, Japanese, and American business negotiations. *Journal of International Business Studies, 14,* 47–61.

Halpern, D. F. (2004). The development of adult cognition: Understanding constancy and change in adult learning. In D. A. Day, S. J. Zaccaro, & S. M. Halpin (Eds.), *Leader development for transforming organizations* (pp. 125–152). Mahwah, NJ: Erlbaum.

Hilton, T., & Berglund, G. (1974). Sex differences in mathematics achievement: A longitudinal study. *Journal of Education Research, 67,* 231–237.

Hofmann, D., Griffin, M. A., & Gavin, M. B. (2000). The application of hierarchical linear modeling to organizational research. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multi-level theory, research, and methods in organizations.* San Francisco: Jossey-Bass.

Huber, G. P. (1985). Temporal stability and response-order biases in participant descriptions of organizational decisions. *Academy of Management Journal, 28,* 943–950.

Huber, G. P., & Power, D. J. (1985). Retrospective reports of strategic-level managers: Guidelines for increasing their accuracy. *Strategic Management Journal, 6,* 171–180.

Ilgen, D. R., Fisher, C. D., & Taylor, M. S. (1979). Consequences of individual feedback on behavior in organizations. *Journal of Applied Psychology, 64,* 349–371.

Jackson, P. R., & Wall, T. D. (1991). How does operator control enhance performance of advanced manufacturing technology? *Ergonomics, 34,* 1301–1311.

Jacobs, T. O., & Jaques, E. (1987). Leadership in complex systems. In J. Zeidner (Ed.), *Human productivity enhancement* (pp. 7–65). New York: Praeger.

Judge, T. A., Piccolo, R. F., & Ilies, R. (2004). The forgotten ones? The validity of consideration and initiating structure in leadership research. *Journal of Applied Psychology, 89,* 36–51.

Kanfer, R., & Ackerman, P. L. (1989). Motivation and cognitive abilities: An integrative/aptitude–treatment interaction approach to skill acquisition. *Journal of Applied Psychology, 74,* 657–690.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24,* 285.

Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations.* New York: Wiley.

Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin, 119,* 254–284.

Knowles, M. (1975). *Self-directed learning.* Chicago: Follet.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice-Hall.

Kreft, I., & de Leeuw, J. (1998). *Introducing multilevel modeling.* London: Sage.

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods, 3,* 186–207.

Lau, A. W., & Pavett, C. M. (1980). The nature of managerial work: A comparison of public- and private-sector managers. *Group & Organization Studies, 5,* 453–466.

Licht, B. G., & Dweck, C. S. (1984). Determinants of academic achievement: The interaction of children's achievement orientations with skill area. *Developmental Psychology, 20,* 628–636.

Liu, X., Spybrook, J., Congdon, R., & Raudenbush, S. W. (2005). Optimal design for longitudinal and multilevel research (Version 1.56) [Computer software]. New York: William T. Grant Foundation.

London, M., & Mone, E. M. (1999). Continuous learning. In D. R. Ilgen & E. D. Pulakos (Eds.), *The changing nature of performance: Implications for staffing, motivation, and development* (pp. 119–153). San Francisco: Jossey-Bass.

Lowell, E. L. (1952). The effect of need for achievement on learning and speed of performance. *Journal of Psychology, 33*(3), 1–40.

Mahoney, T. A., Jerdee, T. H., & Carroll, S. J. (1965). The job(s) of management. *Industrial Relations, 4,* 97–110.

Maki, R. H. (1998). Testing predictions over text material. In D. J. Hacker, J. Dunlosky, & H. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 117–144). Mahwah, NJ: Erlbaum.

Marsick, V. J. (1988). Learning in the workplace: The case for reflectivity and critical reflectivity. *Adult Education Quarterly, 38,* 187–198.

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

Maurer, T. J. (2001). Career-relevant learning and development, worker age, and beliefs about self-efficacy for development. *Journal of Management, 27,* 123–140.

Maybery, M., Bain, J., & Halford, G. (1986). Information processing demands of transitive interference. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 12,* 400–413.

McCall, M. W. (1998). *High flyers: Developing the next generation of leaders.* Boston: Harvard Business School Press.

McCall, M. W. (2004). Leadership development through experience. *Academy of Management Executive, 18,* 127–130.

McCall, M. W., Lombardo, M. M., & Morrison, A. M. (1988). *The lessons of experience: How successful executives develop on the job.* Lexington, MA: Lexington Books.

McCall, M. W., & Hollenbeck, G. P. (2002). *Developing global executives: The lessons of international experience.* Boston: Harvard Business School Press.

McCauley, C. D. (2001). Leader training and development. In S. J. Zaccaro & R. J. Klimoski (Eds.), *The nature of organizational leadership* (pp. 347–383). San Francisco: Jossey-Bass.

McCauley, C. D., Ohlott, P. J., & Ruderman, M. N. (1999). *Job challenge profile: Facilitator's guide.* San Francisco: Jossey-Bass.

McCauley, C. D., Ruderman, M. N., Ohlott, P. J., & Morrow, J. E. (1994). Assessing the developmental components of managerial jobs. *Journal of Applied Psychology, 79,* 544–560.

McCauley, C. D., & Van Velsor, E. (Eds.) (2004). *The Center for Creative Leadership handbook of leadership development* (2nd ed.). San Francisco: Jossey-Bass.

McClelland, D. C. (1967). *Achieving society.* New York: Free Press.

McEnrue, M. P. (1988). Length of experience and the performance of managers in the establishment phase of their careers. *Academy of Management Journal, 31,* 175–185.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63,* 81–97.

Mintzberg, H. (1983). *Power in and around organizations.* Englewood Cliffs, NJ: Prentice-Hall.

Morgeson, F. P. (2005). The external leadership of self-managing teams: Intervening in the context of novel and disruptive events. *Journal of Applied Psychology, 90,* 497–508.

Morgeson, F. P., & Campion, M. A. (2003). Work design. In W. C. Borman, D. R. Ilgen, & R. Klimoski (Eds.), *Handbook of psychology: Vol. 12. Industrial and organizational psychology* (pp. 423–452). New York: Wiley.

Morgeson, F. P., & DeRue, D. S. (2006). Event criticality, urgency, and duration: Understanding how events disrupt teams and influence team leader intervention. *Leadership Quarterly, 17,* 271–287.

Morgeson, F. P., & Humphrey, S. E. (2006). The Work Design Questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology, 91,* 1321–1339.

Morrison, K. (1996). Developing reflective practice in higher degree students through a learning journal. *Studies in Higher Education, 21,* 317–332.

Morrison, R. F., & Brantner, T. M. (1992). What enhances or inhibits learning a new job: A basic career issue. *Journal of Applied Psychology, 77,* 926–940.

Moxley, R. S., & Pulley, M. L. (2004). Hardships. In C. McCauley & E. V. Velsor (Eds.), *The Center for Creative Leadership handbook of leadership development* (2nd ed., pp. 183–203). San Francisco: Jossey-Bass.

Mumford, M. D., Marks, M. A., Connelly, M. S., Zaccaro, S. J., & Reiter-Palmon, R. (2000). Development of leadership skills: Experience and timing. *Leadership Quarterly, 11,* 87–114.

Mumford, M. D., Peterson, N. G., & Childs, R. A. (1999). Basic and cross-functional skills. In N. G. Peterson, M. D. Mumford, W. C. Borman, P. R. Jeanneret, & E. A. Fleishman (Eds.), *An occupational information system for the 21st century: The development of O*NET* (pp. 49–70). Washington, DC: American Psychological Association.

Mumford, T. V., Campion, M. A., & Morgeson, F. P. (2007). The leadership skills strataplex: Leadership skill requirements across organizational levels. *Leadership Quarterly, 18,* 154–166.

Nicholls, J. G. (1976). Effort is virtuous but it's better to have ability: Evaluative responses to perceptions of effort and ability. *Journal of Research in Personality, 10,* 306–315.

Nicholls, J. G. (1984). Conceptions of ability and achievement motivation. In R. Ames & C. Ames (Eds.), *Research on motivation in education.* New York: Academic Press.

Noe, R. A. (1986). Trainees' attributes and attitudes: Neglected influences on training effectiveness. *Academy of Management Review, 11,* 736–749.

Noe, R. A., Wilk, S. L., Mullen, E. J., & Wanek, J. E. (1997). Employee development: Construct validation issues. In J. K. Ford (Ed.), *Improving training effectiveness in work organizations* (pp. 153–189). Mahwah, NJ: Erlbaum.

Ohlott, P. J. (2004). Job assignments. In C. McCauley & E. V. Velsor (Eds.), *The Center for Creative Leadership handbook of leadership development* (2nd ed., pp. 151–182). San Francisco: Jossey-Bass.

Ohlott, P. J., Ruderman, M. N., & McCauley, C. D. (1994). Gender differences in managers' developmental job experiences. *Academy of Management Journal, 37,* 46–67.

O'Leonard, K. (2007). *The corporate learning factbook: Statistics, benchmarks, and analysis of the U.S. corporate training market.* Oakland, CA: Bersin & Associates.

Pintrich, P. R. (2000). An achievement goal theory perspective on issues in motivation terminology, theory, and research. *Contemporary Educational Psychology, 25,* 92–104.

Pollock, E., Chandler, P., & Sweller, J. (2002). Assimilating complex information. *Learning and Instruction, 12,* 61–86.

Ptacek, J. T., Smith, K. E., Espe, K., & Raffety, B. (1994). Limited correspondence between daily coping reports and retrospective coping recall. *Psychological Assessment, 6,* 41–49.

Quinones, M. A., Ford, J. K., & Teachout, M. S. (1995). The relationship between work experience and job performance: A conceptual and meta-analytic review. *Personnel Psychology, 48,* 887–910.

Raudenbush, S. W., & Liu, X. F. (2000). Statistical power and optimal design for multisite randomized trials. *Psychological Methods, 5,* 199–213.

Robinson, G. S., & Wick, C. W. (1992). Executive development that makes a business difference. *Human Resource Planning, 15,* 63–76.

Rogers, C. R. (1969). *Freedom to learn.* Columbus, OH: Merrill.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80,* 1–28.

Sarason, I. G. (1984). Stress, anxiety, and cognitive interference: Reactions to tests. *Journal of Personality and Social Psychology, 46,* 929–938.

Scott, W. E. (1966). Activation theory and task design. *Organizational Behavior and Human Performance, 1,* 3–30.

Seijts, G. H., & Latham, G. P. (2005). Learning versus performance goals: When should each be used? *Academy of Management Executive, 19,* 124–131.

Severiens, S. E., & Ten Dam, G. T. M. (1994). Gender differences in learning styles: A narrative review and quantitative meta-analysis. *Higher Education, 27,* 487–501.

Singer, J. D. (1998). Using SAS PROC MIXED to fit multilevel models, hierarchical models, and individual growth models. *Journal of Educational and Behavioral Statistics, 23,* 323–355.

Sutcliffe, K. M., & Weick, K. E. (2008). Information overload revisited. In G. P. Hodgkinson & W. H. Starbuck (Eds.), *Oxford handbook of organizational decision making* (pp. 56–75). Oxford, England: Oxford University Press.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12,* 257–285.

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and Instruction, 4,* 295–312.

Taylor, J. G., & Smith, P. C. (1956). An investigation of the shapes of learning curves for industrial motor tasks. *Journal of Applied Psychology, 40,* 142–149.

Tesluk, P. E., & Jacobs, R. R. (1998). Toward an integrated model of work experience. *Personnel Psychology, 51,* 321–355.

VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement, 57,* 995–1015.

VandeWalle, D., & Cummings, L. L. (1997). A test of the influence of goal orientation on the feedback-seeking process. *Journal of Applied Psychology, 82,* 390–400.

VandeWalle, D., Ganesan, S., Challagalla, G. N., & Brown, S. P. (2000). An integrated model of feedback-seeking behavior: Disposition, context, and cognition. *Journal of Applied Psychology, 85,* 996–1003.

van Dyck, C., Frese, M., Baer, M., & Sonnentag, S. (2005). Organizational error management culture and its impact on performance: A two-study replication. *Journal of Applied Psychology, 90,* 1228–1240.

van Merrienboer, J. J. G., & Sweller, J. (2005). Cognitive load theory and

complex learning: Recent developments and future directions. *Educational Psychology Review, 17,* 147–175.

Van Velsor, E., Moxley, R. S., & Bunker, K. A. (2004). The leader development process. In C. D. McCauley & E. Van Velsor (Eds.), *The Center for Creative Leadership handbook of leadership development* (2nd ed., pp. 204–233). San Francisco: Jossey-Bass.

Vicere, A. A., & Fulmer, R. M. (1998). *Leadership by design.* Boston: Harvard Business School Press.

Wall, T. D., Jackson, P. R., & Davids, K. (1992). Operator work design and robotics system performance: A serendipitous field study. *Journal of Applied Psychology, 77,* 353–362.

Wick, C. W. (1989). How people develop: An in-depth look. *HR Report, 6,* 1–3.

Wolfe, J., & Jackson, C. (1987). Creating models of the strategic decision-making process via participant recall: A free simulation examination. *Journal of Management, 13,* 123–134.

Zaccaro, S. J. (2001). *The nature of executive leadership: A conceptual and empirical analysis of success.* Washington, DC: American Psychological Association.

Zaccaro, S. J., Mumford, M. D., Connelly, M. S., Marks, M. A., & Gilbert, J. A. (2000). Assessment of leader problem-solving capabilities. *Leadership Quarterly, 11,* 37–64.

Appendix

Sample Experiences

Performance level	Low developmental value	High developmental value
Low performance	Improperly handled a difficult interpersonal situation in front of a client. "Bob just drives me crazy . . . he doesn't understand what's going on most of the time and then he loses his temper when things don't go his way. This particular time was embarrassing because it happened in front of a client, and I feel responsible because I didn't listen to his concerns, which made him even more upset."	Responsible for company audit process but was unable to implement required changes. "This experience was hugely developmental for me because I learned I am often not quick enough to delegate responsibility. I'm used to doing stuff on my own, but sometimes I need to delegate more . . . and this experience clearly helped me learn that despite our difficulties."
High performance	Led project for transitioning fixed asset accounting system from Oracle to SAP. "This stuff was old hat for me. I have been doing similar transitions globally since 2004, and we have standardized processes in place for doing this. I just have to guide the right people through the process and make sure they understand the new system. I didn't feel like this experience was that developmental because it was so routine."	Stood in for the company's CFO at last year's quarterly review meetings. "Prior to this experience, I had never even been to a quarterly review meeting. I had just helped the CFO prepare for the meetings. To have a chance not only to see what goes on in those meetings but to actually participate in those meetings with senior management gave me a whole new appreciation for how this place works, developed my ability to influence senior management, and made me more confident in my skills."

Note. The experiences described here are at least one standard deviation away from the mean for self-ratings of performance and supervisor ratings of leadership skill development.

Received July 30, 2008
Revision received January 12, 2009
Accepted January 15, 2009 ■