Received: 22 July 2020 | Revised: 9 September 2021 | Accepted: 11 September 2021

DOI: 10.1111/peps.12482

PERSONNEL PSYCHOLOGY WILEY

ORIGINAL ARTICLE

Examining the indirect effects of embodied learning on adaptability: The mediating roles of challenge stressors and psychological capital

Jean S. K. Lee | **Emily M. David**

Department of Organizational Behavior and Human Resource Management, China Europe International Business School (CEIBS), Pudong New District, Shanghai, PR China

Correspondence
Emily M. David, Department of Organizational Behavior and Human Resource Management, China Europe International Business School (CEIBS), 699 Hongfeng Road, Pudong New District, Shanghai, 201206, PR China.
Email: edavid@ceibs.edu

Abstract

We examined the efficacy of embodied learning for augmenting leader psychological capital—a latent construct reflecting hope, optimism, self-efficacy, and resilience. To do so, we leveraged the literature on embodied cognition and the challenge-hindrance stressor framework to better understand how involving both the body and mind during learning (i.e., embodied learning) can lead to heightened perceptions of challenge stressors, which then result in greater psychological capital. We also expected that higher levels of psychological capital relate to greater subsequent adaptability on the job. We tested these predictions in two quasi-experimental field studies. Study 1 included a sample of 141 executive MBA students and Study 2 included a sample of 163 working managers. In both studies, the disembodied learning condition consisted of classroom training. The embodied learning condition included an outdoor adventure training component (including an 88 km hiking race and various team challenges) conducted in the Gobi Desert in Study 1 and in a nature park in Study 2. The results of the first study revealed that participants in the embodied learning group experienced higher post-learning psychological capital than those in the disembodied learning group and that psychological capital mediated the relationship between learning approach and peer-rated adaptability 6 months later. Study 2 replicated the positive relationship between embodied learning and post-learning psychological capital and extended it by showing that challenge stressors mediated this relationship.

KEYWORDS
embodied learning, psychological capital, challenge stressors, outdoor training, adventure training

1 | INTRODUCTION

Criticism regarding the effectiveness of leadership training programs provided by business schools and training companies alike is growing as they often fail to improve leader performance (e.g., Alajoutsijärvi et al., 2015; Pfeffer & Fong, 2002). The experiential learning approach—which is a hands-on and physical process of learning by doing—has become popular and its adoption in business education programs has been advocated by the Association to Advance Collegiate Schools of Business (AACSB; Hibbert et al., 2017). Unfortunately, little is known about the underlying mechanisms that drive this approach, particularly the impact of incorporating the body into the learning experience.

Drawing from recent trends in cognitive psychology, which has undergone a theoretical shift from traditional cognitivism to embodied cognition, scholars and educators have begun to emphasize the importance of engaging both the body and mind during learning (Lindgren & Johnson-Glenberg, 2013). Research on the impact of physical activity on organizational (e.g., healthcare cost savings; Wang et al., 2004) and employee outcomes (e.g., energy recovery; Heaphy & Dutton, 2008) is also on the rise. Despite these developments, scholars have only recently started to speculate about the theoretical underpinnings of increased bodily involvement in executive education and at work (Calderwood et al., 2021; Gärtner, 2013).

Based on traditional cognitivism, traditional pedagogy primarily posits that learning is a function of mind, which is regarded as an abstract information processor that functions separately from the body. Learning typically focuses on abstract thinking, leaving the role of the body comparatively overlooked (Kiefer & Trumpp, 2012; Kontra et al., 2012). Such a purely cognitive lens is often "unquestioningly adopted, as it is embedded in many of the theories used in the field of management education" (Springborg & Ladkin, 2018, p. 533). Although traditional cognitive practices can be useful (e.g., critical reflection, Alvesson & Willmott, 1992), some scholars have flagged serious limitations of only involving the mind during learning (e.g., Wilson, 2002).

In response to these concerns, some education scholars have applied the principals of embodied cognition to pedagogical practices (Nguyen & Larson, 2015). This approach suggests that the mind, body, and environment are dynamically intertwined in the physical and mental act of knowledge construction (Shapiro, 2014) and that learning occurs through the seamless integration of one's sensory-motor system (Lord & Shondrick, 2011). The sports psychology literature has also documented that embodied cognition lends itself to personal growth. For example, programs featuring both mental and physical challenges (e.g., mountain biking-based program, Dirt Divas; Whittington et al., 2016; sailing-based program, Adventure Education Programme; Scarf et al., 2018) have been linked to heightened resilience and self-esteem. Scholars have also highlighted that physical strain results in growth when people can find meaning in these experiences (Howells & Fletcher, 2015).

Under certain contexts, learning may be linked to stress (Vogel & Schwabe, 2016). In general, learning that is associated with complex skill acquisition, high stakes, and/or time pressure may be particularly stressful. Not all stress is detrimental, however. According to Cavanaugh et al. (2000), the two primary types of stressors are: (a) *challenge stressors* or beneficial obstacles that result in learning and development (e.g., broad job scope or time pressure) and (b) *hindrance stressors* or factors that thwart personal growth and goal attainment (e.g., organizational politics, red tape, or role ambiguity). Both stressors may be generated by learning, but we expect that embodied learning—which features both physical and mental involvement—increases participants' perceptions of challenge stressors compared with disembodied learning, leading to heightened personal growth.

Supporting this idea, Nguyen and Larson (2015, p. 336) contended that in courses with socially based content such as leadership, embodied learning experiences "often reveal ways of learning and knowing seldom considered and push learners to explore beyond conventional boundaries imposed through normative academic discourses." Moreover, exerting the body as well as the mind sometimes involves physical pain, strain, and tension that may increase perceptions of challenge and yield deeper emotional responses that can be leveraged into development (Howells & Fletcher, 2015). People often register stressful or challenging environmental elements with their bodies in a way that results in learning, growth, and new understandings (Harquail & Wilcox King, 2010). Activating the body can also lead to an increased ability to cope, less rumination (Bernstein & McNally, 2018), and positive reappraisal in the face of ambiguity (Perchtold-Stefan et al., 2020), further suggesting that learners engaging both their minds and bodies may view the increased stressors in a positive and developmental light. Although studies have shown that challenge stressors may increase exhaustion and strain in the moment, the experience of these stressors leads to increased personal capabilities over time (van den Broeck et al., 2010), including greater resilience (Crane & Searle, 2016).

In this research, we hope to demonstrate that embodied learning enhances psychological capital by increasing challenge stressors and that psychological capital consequently enhances people's adaptability in their work environment. We propose that embodied learning may be particularly efficacious for augmenting leader psychological capital. The importance of positive psychology constructs for understanding leadership processes has become evident through evidence such as the fact that leaders high in psychological capital report greater well-being (Baron et al., 2016), perform better at work (Avey et al., 2011), and are viewed by subordinates as more energizing and effective (Rego et al., 2019).

Furthermore, we expect that those higher in psychological capital may be more flexible to changing circumstances and exhibit higher adaptability as they are positive, confident in their ability to overcome challenges, generate various alternatives to achieve their goals, and recover quickly following setbacks (Luthans, Youssef, et al., 2007). This is particularly true as changing technology, widespread globalization, epidemiological outbreaks, and frequent mergers and acquisitions render the business landscape increasingly more volatile, uncertain, complex, and ambiguous (VUCA; Miska et al., 2020). In fact, only 28% of HR professionals felt that the leaders in their organization were high quality and capable to handle today's VUCA world (Global Leadership Forecast, 2021). Thus, understanding the types of learning methods that foster the psychological competences required for effectively reacting to dynamic and adverse environments is important (Seibert et al., 2017).

In summary, we aim to assess the indirect effect of embodied learning on psychological capital via challenge stressors and the indirect effect of embodied learning on adaptability via psychological capital by conducting two quasi-experimental studies. In each, we compare the effects of an embodied learning course (experimental group) with a disembodied classroom-based course (control group). By doing so, our research contributes to the literature in several ways. First, our approach of leveraging embodied learning to bolster psychological capital complements and extends documented methods of augmenting this personal capacity. Several scholars have demonstrated the efficacy of disembodied learning methods such as short workshops and online tools to enhance psychological capital (e.g., Dello Russo & Stoykova, 2015; Luthans et al., 2006, 2014). We contend that adding physical tasks to these methods through the application of embodied learning may lead to an even more dramatic growth in psychological capital. Our studies also contribute to the literature examining organizational applications of embodied cognition. Many scholars have argued that incorporating embodied cognition can help enhance the understanding of work-related phenomena (Harquail & Wilcox King, 2010; Lee et al., 2012; Springborg & Ladkin, 2018). However, none that we know of have empirically tested the notion that incorporating the body has more beneficial effects on developing executive competencies than disembodied learning.

Second, our studies aim to add to the list of positive outcomes associated with psychological capital (Dawkins et al., 2013; Newman et al., 2014) by linking it to adaptability at work. In measuring adaptability 6 months after the embodied learning experience, we hope to illustrate that the effects of psychological capital are more durable than previously documented. By demonstrating links to adaptability, we also help to inform how organizations may best groom leaders to thrive in an increasingly dynamic world.

Third, we contribute to the psychological capital and stress literatures by examining challenge stressors as a mediating mechanism between embodied learning and psychological capital. By examining how challenge stressors associated with embodied learning lead to psychological capital, we hope to increase our understanding of which types of stressors can be beneficial for leader development and how best to induce them. In doing so, we help answer the call of Luthans and Youssef-Morgan (2017) for a better understanding of *how* psychological capital can be fostered.

2 | THEORY AND HYPOTHESES

2.1 | Traditional and embodied learning

Traditional cognitive theory is deeply influenced by Cartesian dualism that dichotomizes the mind and body, each of which is relegated mutually exclusive functions aligned with their distinct natural characteristics (Schultz & Schultz, 2015). The mind is immaterial and lacks physical substance, but is capable of thought and other cognitive processes. Conversely, the body possesses common characteristics with all physical matter. Traditional cognitivists hold two basic assumptions. First, that cognitive processes are similar to computer processes, and therefore, humans can be seen as information processing systems (Bickhard, 2008). Specifically, humans' sensory organs are the input devices of the external stimuli and translate these stimuli into neural signals; the mind then serves as the central processing unit that manipulates the signals received from the sensory organs (Shapiro, 2014). Second, cognition is regarded as a function of the human mind and the physical body is the hardware (Gärtner, 2013). Thus, according to this perspective, the body and the external environment are of little importance to cognition.

Based on these assumptions, traditional learning pedagogy views cognitive processes as nothing more than manipulating symbols in the mind. For example, perception is seen as the process of building up abstract mental representations of the world by processing information received from the sensory organs (Wilson, 2002). These symbols can be accessed and retrieved through memory to arrive at conclusions and decisions (Taylor et al., 2009). Knowledge is a system of representations that are organized by certain schemas and rules (Huber, 1991). Finally, learning is the process by which the mind manipulates the symbols received from the physical organs and reorganizes them into knowledge (Huber, 1991).

Yet traditional learning pedagogy has been challenged by recent scholars (e.g., Shapiro, 2014) who have begun to champion the importance of the body in shaping human minds (Wilson, 2002). These proponents of embodied cognition have contended that cognitive processes are deeply rooted in the body's interaction with the world (Wilson, 2002). The fundamental assumption of embodied cognition is that the mind has to be understood within the context of the body's physical interactions with the external environment (Wilson, 2002). This is because the body plays a significant role in how humans perceive, comprehend, and behave during the learning process. This school of thought promotes two basic tenets. First, embodied cognition emphasizes the impact of the body and its actions on cognitive processes (Goldman & de Vignemont, 2009). For example, scholars have documented the body's impact on biochemical systems (Heaphy & Dutton, 2008) and neural activities (Lee et al., 2012). Second, cognition is viewed as an activity situated in a specific physical context (Wilson, 2002).

Scholars have noted that the sensory-motor system and its interaction with the environment have a beneficial effect on subsequent memory recall and that people's bodies and actions play an important role in shaping the cognitive processes associated with learning (Kiefer & Trumpp, 2012). For example, Engelkamp et al. (2004) showed that neurophysiological recordings of brain activity illustrate that the motor areas are only activated for self-performed actions during learning, suggesting that the action representations recorded during the learning phase can reactivate and facilitate memory retrieval. Embodied experiences can also influence individuals' sensemaking processes in a desirable way, as physical actions create more raw ingredients for understanding by generating stimuli and providing instantaneous feedback. Involving both the body and mind, then, enhances cognitive understanding as situated within past embodied experiences. Collectively, this literature suggests that "body activity can be an important catalyst for generating learning" (Lindgren & Johnson-Glenberg, 2013, p. 445).

2.1.1 | Embodied learning and psychological capital

As we argue below, at least some of the effects of embodied learning may be transmitted via increased psychological capital. Psychological capital is a "higher-order construct derived from a constellation of motivational and behavioral tendencies associated with: self-efficacy ('having confidence to take on and put in the necessary effort to succeed at challenging tasks'); optimism ('making a positive attribution about succeeding now and in the future'); hope ('persevering towards goals and, when necessary, redirecting paths to goals'); and resiliency ('when beset by problems and adversity, sustaining and bouncing back and even beyond to attain success')" (Dawkins et al., 2015, p. 927). Scholars have reported strong evidence of within-person variability in psychological capital (Peterson et al., 2011), supporting its psychometric characterization as a state-like characteristic (Dawkins et al., 2013). Quantifying the extent to which psychological capital can be augmented, Luthans and Youssef-Morgan (2017) suggested that at least 40% of one's psychological capital is malleable. These findings suggest that psychological capital can be developed.

Scholars examining the development of psychological capital have focused on promoting positive thinking patterns and challenging deep-seated assumptions of individuals (Luthans et al., 2006, 2008). Building on this prior work, we posit that embodied learning leads to higher levels of psychological capital than disembodied learning. Supporting this idea, the embodied cognition literature has emphasized that body positions and sensations can underlie chronic mood states and overall well-being (Wilson, 2002). For example, rising, rhythmic movements have been linked to happiness whereas downward, sinking movements are associated with sadness (Shafir et al., 2016). In relation to psychological capital specifically, one study has shown that dance/movement therapy, a therapeutic intervention aimed at leveraging mind–body integration through creative expression, significantly increases resilience in participants living with chronic pain (Shim et al., 2017). In addition, Howells and Fletcher (2015) conducted a qualitative study of Olympic swimming champions and found that they needed to combine physical adversity with cognitive meaning and interpersonal support to experience growth. Underscoring the importance of bodily involvement in their personal development, the athletes reported that they "hated standing on the third-place podium" or "coming up short on the last lap" when explaining how they felt about past races. Such physical sensations compound the mental frustration they experienced, imparting potent lessons that are likely to live long in one's memory as embodied learning is encoded situationally (Kiefer & Trumpp, 2012). Rather than enabling people to simply outperform their peers on an assignment, embodied learning experiences can also bolster optimistic mindsets given the associated release of endorphins (Berger & Motl, 2000). In sum, we expect embodied learning experiences to result in more psychological capital than disembodied learning experiences.

2.2 | Embodied learning, psychological capital, and adaptability

Moreover, we suggest that embodied learning may have downstream effects that extend beyond increased psychological capital. Adaptability, defined as the ability to alter one's behaviors in response to or in anticipation of uncertainty-laden environments (Jundt et al., 2015), may be one such effect. Adaptability is important outcome given that it is a significant contributor to both individual and organizational success in today's world (Bhattacharya et al., 2005;

Jundt et al., 2015). Scholars have suggested that effective adaptability may be particularly crucial for leaders as it helps them to react to different managerial situations, conform to different types of roles, manage crises, and take advantage of emerging opportunities (Yukl & Mahsud, 2010). Therefore, organizations would want to develop competences that foster leader adaptability.

Based on our arguments above about the impact of embodied learning on psychological capital, we propose that embodied learning may be one way to indirectly augment adaptability. A recent cross-disciplinary review examined the potential impact of employee physical activity on work behavior (Calderwood et al., 2021) and concluded that bodily involvement provides several specific physical, affective, and cognitive resources that aid employees to complete work tasks well. To support their proposed theoretical framework, Calderwood et al. (2021) referred to findings in the sports science literature showing that physical activity has a positive impact on attention, cognitive processing speed, multitasking, decision making, and memory (Raichlen & Alexander, 2017). Based on these findings, we expect that embodied learning experiences, which are more likely to feature complex tasks, time demands, and high stakes, lead to higher levels of adaptability at work than disembodied learning experiences.

Specifically, we expect that embodied learning grows psychological capital, which can then yield greater adaptability at work. Psychological capital is recognized as one of the most valuable personal resources available to employees (Avey et al., 2009). Employees high in psychological capital are better and more adaptable performers given that they have positive expectations about future outcomes, can generate various alternatives to achieve their goals, and recover quickly following negative experiences (Luthans, Avolio, et al., 2007). Moreover, the relationship between psychological capital and task performance is robust and replicated on a variety of professions, including financial advisors (Peterson et al., 2011) and R&D scientists (Gupta & Singh, 2014).

We expect that psychological capital mediates the relationship between embodied learning and adaptability at work for several reasons. For one, leaders higher in psychological capital may be better able to anticipate barriers and problems in a fast-changing environment (Strauss et al., 2015) and may demonstrate the ability to generate alternative pathways to achieve their goals (Peterson & Byron, 2008). They may also adjust more positively to life transitions (Carver & Connor-Smith, 2010) given their heightened optimism and confidence. Finally, we expect that leaders with higher levels of psychological capital may be more resilient in the face of negative changes and therefore respond better to dynamic environments (Luthans & Youssef-Morgan, 2017) given their advanced coping skills (Hobfoll et al., 2003) and ability to bounce back quickly after facing adversity (Luthans, Youssef, et al., 2007). In sum, we expect that embodied learning provides more challenging and memorable learning experiences that increase personal psychological capital. This competency then results in greater adaptability back at work. Accordingly, we propose:

Hypothesis 1: Embodied learning is positively and indirectly related to adaptability at work through psychological capital.

2.3 | Embodied learning and challenge stress

To further examine the underlying mechanism through which embodied learning impacts psychological capital, we leverage the education literature about learning and stress. This body of work suggests that, under certain circumstances, learning can be linked to stress and anxiety (Vogel & Schwabe, 2016). For example, Yusoff (2011) identified six distinct stressors that occur in learning environments, including academics, interpersonal factors, intrapersonal factors, instructor styles, instructor characteristics/behaviors, and group or social factors. Relatedly, many studies have documented the increased anxiety and strain that learners experience when they are faced with excessive demands (Låftman et al., 2013), and are subjected to high-stakes testing (Banks & Smyth, 2015). Consolidating these findings, we conclude that learning may be perceived as stressful when the tasks being learned are complex and/or when time pressure is involved. Thus, we argue that embodied learning that involves these features may be perceived as stressful.

Although both factors related to the context of learning (e.g., deadlines, competition, testing, workload) and potential byproducts of learning (e.g., negative feedback, looming change, future consequences) may induce stress, not all stressors associated with learning are negative. Aligned with classic conceptualizations of eustress or beneficial stress (Crum et al., 2013), we expect learning that increases perceptions of challenge stressors rather than hindrance stressors is likely to build psychological fortitude and positive habits in learners. A few studies have supported this notion. For example, LePine et al. (2004) found that although challenge stressors in learning environments increase learning motivation and performance, hindrance stressors in the same context negatively impact motivation and performance. In addition, Travis et al. (2020) found that when learners encountered challenge stressors such as complexity, time pressure, and high stakes, they earned higher GPAs, but when they were faced with hindrance stressors such as ambiguous expectations and unfairness, they earned lower GPAs. The differential effects of distinct types of stress are important to note in light of evidence showing that challenge stressors build resilience, whereas hindrance stressors detract from it (Crane & Searle, 2016).

We posit that embodied learning is more likely to propagate challenge stressors than disembodied learning. Specifically, we expect this because embodied learning situations typically (even if not always) involve tasks that feature demanding time pressure, task complexity, and high stakes, and, as we explain below, the combination of these should increase the chances that participants will perceive events as challenging. Although disembodied learning situations may also be designed to include such factors, we contend that they are more likely to occur in embodied experiences.

For example, evidence from the studies in the sports science and embodied cognition areas have underscored why embodied learning shapes participant interpretations of stress in positive ways (Gnam et al., 2019; Sliter et al., 2014). Physical activity is often cast as a factor that serves to alter stress perceptions (Sliter et al., 2014), with the exercise literature noting that it serves as both a stressor (Hackney, 2006) and a factor that enhances stress reactivity (e.g., lowering blood pressure and releasing neurochemicals that help people remain calm in the face of stress, Salmon, 2001). Most relevant for the present study, Gnam et al. (2019) made a strong case that physical exercise may help people appraise stressful events as challenging and controllable (akin to challenge stressors) rather than hindering or constraining (akin to hindrance stressors). To support this notion, they pointed to prior work showing that physical activity leads to enhanced self-efficacy (Long, 1993) and resilience (Childs & de Wit, 2014) that make stressful events appear more manageable and developmental.

Further, supporting our contention that embodied learning is associated with challenge perceptions, we note that the work outcomes of physical activity summarized by Calderwood et al. (2021) are almost exclusively positive in nature. For example, scholars have linked the joint involvement of body and mind with increased productivity (Gubler et al., 2018) and job satisfaction (Daley & Parfitt, 1996), both of which have been positively correlated with challenge stressors (Crawford et al., 2010; Podsakoff et al., 2007). Moreover, bodily involvement's ability to alter reactions to and perceptions of stress (Salmon, 2001) is important in light of studies showing that viewing stress as enhancing rather than debilitating results in greater cortisol reactivity and feedback-seeking behavior (Crum et al., 2013). In addition, the tasks of embodied learning often exert more time pressure on participants than those of disembodied learning (Baer & Oldham, 2006). As speed is one of the most important objective performance metrics for physical tasks, these physical and mental challenges can increase the level of difficulty and the amount of challenge stressors perceived by the participants. Hypothetically discussing how one may survive harsh environments during the "desert survival" exercise in the classroom requires mainly mental effort, but physically thriving in the desert or an outdoor field requires both physical and mental effort. Thus, the level of challenge stressors is heightened in the latter experience.

Based on the arguments above, we hypothesize that embodied learning will lead to heightened psychological capital via increased perceptions of challenge stressors. Prior studies have indicated that challenge stressors are positively related to other important employee outcomes including self-esteem (Widmer et al., 2012), motivation, commitment to the organization (Cavanaugh et al., 2000; Podsakoff et al., 2007), and performance (LePine et al., 2005). Scholars have identified two possible ways to explain the favorable effects of challenge stressors: motivation and affect (Widmer et al., 2012). In terms of motivation, people tend to regard challenge stressors as changeable and developmental. Therefore, people facing challenge stressors are motivated to learn and grow from these experiences (LePine et al., 2004). Mastering challenges is indicative of psychological capital; it demonstrates people's knowledge and capability to achieve their goals (*hope*). Embracing challenges also satisfies motives of positive self-esteem and improves *self-efficacy* (Grebner et al., 2010). In addition, Crane and Searle (2016) found that challenge stressors help build *resilience* over time as individuals can engage in personal growth following complex, time-bound, and high stakes experiences. Scholars have also noted that "challenge stressors could induce positive emotions" (LePine et al., 2005, p. 765) and make people be *optimistic* about what will happen in the future as they will likely take credit for goal achievement rather than attributing it to luck (Hayes & Weathington, 2007). Together, these various pathways lead to increases in the high-order construct of psychological capital for embodied learning participants. In conclusion, we hypothesize that:

Hypothesis 2: Embodied learning is positively and indirectly related to psychological capital through perceived challenge stressors.

3 | METHOD

To test our hypotheses, we conducted two complementary field studies with Study 1 testing Hypothesis 1 and Study 2 testing Hypothesis 2.

3.1 | Study 1

3.1.1 | Research context

We adopted a longitudinal quasi-experimental design in Study 1 that consisted of two groups of executive MBA (EMBA) students enrolled in a top business school in Shanghai, China. The experimental group consisted of students in an embodied leadership course that was conducted in the Gobi Desert in the northwest region of China. The control group consisted of students who enrolled in a more traditional disembodied and classroom-based leadership course conducted on campus. Both courses were conducted over 4 consecutive days in the fall semester of 2018. This research was approved by the Institutional Review Board (IRB) at China Europe International Business School (CEIBS; #699-003; "Embodied Learning and Psychological Capital"). Each course consisted of two sections, with approximately 55–60 students in each section, and were co-taught by two faculty members. The first author was involved in both courses. These two courses adopt distinct teaching approaches, allowing us to conduct a natural quasi-experiment, in which we can compare the relative impact and effectiveness of embodied versus disembodied learning.

Our study's design was quasi-experimental, as randomly assigning participants into control and experimental groups was impossible. Despite the fact that individual-level demographic factors—such as gender, age, educational level, and tenure—are not related to psychological capital (Avey et al., 2010), we still took several steps to keep as many of these variables as possible fixed. The instructor was the same for experimental and control groups, demographics in the two groups were broadly similar, and the learning objectives and course requirements were similar.

3.1.2 | Commonalities and differences between the experimental and control groups

Both courses seek to enhance students' understanding of teams and leadership, and to acquire knowledge and soft skills related to leading teams and organizations, and both courses are designed to achieve the AACSB learning outcomes specified by the program curriculum. The course objectives are to understand organizational behavior theories, explore effective leadership traits and behaviors (e.g., positive mindset) when managing teams and conflict, and develop capabilities in managing change. Although psychological capital is not explicitly discussed in the courses so as to avoid priming the participants in this dimension, one of the course objectives is to increase students' self-awareness and acquire leadership capabilities. In addition, a major portion of the course requirement is to work on group-based tasks, either when analyzing cases or engaging in physical challenges. Both courses have built-in mutual feedback and reflection sessions among the group members and with the coaches. Finally, participants in both conditions are evaluated on both their individual and group performance on quizzes, group presentations, and competitions.

There are also a few notable distinctions in the pedagogical design of the two courses. First, the disembodied leadership course is conducted indoors on campus whereas the embodied course is conducted outdoors in the Gobi Desert. The different environments and exercises also require different levels of body involvement, though the theoretical frameworks, concepts covered, and learning objectives are similar. Participants in the embodied course were required to pass a physical test conducted by professionals and sign a health declaration and consent form. A professional outdoor team and medical staff were engaged to provide logistic support, safety, and first-aid throughout the entire course. The introduction and last day of class (a total of 1.5 days) were conducted in a hotel training room near the Gobi Desert and participants spent 2.5 days hiking and camping in the desert during the interim period. The disembodied learning control group had 4 full days of classes on campus and stayed in on-campus housing, spending time together after class at dinners and networking events. Thus, the exposure to fellow classmates was roughly equivalent across the two conditions.

Second, the disembodied course adopts largely cognitive learning methods such as case studies, 360-degree assessments, and in-class exercises like role play. The embodied course, by contrast, requires students to use both their body and mind to successfully achieve the assigned goals. In addition to trekking for about 30 km per day, students were required to complete physical challenges such as walking blindfolded, crossing a river, and carrying sand bags, as well as the mental tasks of job rotation, hiring, and firing group members. Third, in the disembodied course, instructors conducted class lectures on theories and concepts with case study illustrations. In the embodied course, the instructors facilitated embodied activities, encouraging reflection and theorizing from the participants' learning. Table 1 shows a more detailed comparison of the two learning conditions.

3.1.3 | Sample

All students, 111 in the disembodied learning group (control) and 120 in the embodied learning group (experimental), were invited to participate in surveys before the start of the class to report their demographics and initial psychological capital levels (T1) and 1 month after the class to re-assess their psychological capital levels (T2). Six months after the class (T3), coworkers were invited to rate the focal participants' adaptability at work. In the final sample, 41 (37% response rate) participants in the disembodied course and 100 (83% response rate) participants in the embodied course completed surveys at all three time-points, leaving a total usable sample of 141 participants.

The average age of the participants in the embodied learning (experimental group) was 39.81 years old ($SD = 4.02$) and 84.7% were men. The majority worked in private Chinese companies (63%), 18% were entrepreneurs, 9% worked in international companies, 8% worked in state-owned organizations, and 1% did not indicate where they worked. These companies reflected a variety of industries (i.e., 19% in IT, 14% in finance, and 14% in manufacturing). The average age of participants in the disembodied learning group (control group) was 41.55 years old ($SD = 4.31$) and 80.5% were men. The majority worked in private Chinese companies (65.8%), 9.8% were entrepreneurs, 12.2% worked in international companies, and 12.2% worked in state-owned organizations. They also reflected a variety of industries (e.g., 31.7% in manufacturing, 17.1% in finance, and 9.8% in healthcare).

TABLE 1 Comparison of the disembodied leaning and embodied learning conditions

	Disembodied learning	Embodied learning
Learning environment	• Stationary setting with a large classroom setting and break-out discussion rooms.	• Introduction and wrap-up sessions conducted in large classroom setting (e.g., hotel training room). • Embodied exercises conducted outdoors in Gobi Desert (Study 1) and park (Study 2).
Role of instructors	• Conduct class sessions on leadership and team theories and concepts.	• Facilitate experiential activities that foster leadership and team learnings.
Learning instruments/exercises	• **Lectures** on organizational behavior and leadership theories. • **Case studies** on leadership styles and leading change in organizations. • **Mental simulation exercises** on team communication and conflict (e.g., desert survival group simulation). • **Group discussion and presentation** on effective leadership approaches when managing change. • **360-degree and personal assessments and group coaching** on leaders' personality traits and self-awareness.	• **Mini lectures** to introduce leadership theories and concepts of teamwork, communication, and conflict. • **Daily trek** hiking 88 km in 3 days. • **Physical and mental tasks** that increase the cumulative challenges faced by the team, such as blind walk, carrying sandbags, exchanging and firing team members, and crossing rivers. • **Team reflection and sharing** on daily experiences and performance. • **Personal feedback** to individual member on their strengths and weaknesses based on their performance.
Role of participants	• Participate in lectures and group discussions. • Engage in role play, simulation exercises, group discussion, and presentation. • Complete group assignments (e.g., case analyses).	• Complete both physical and mental challenges in the 88 km trek. • Work as a team for team tasks and provide peer feedback to team members. • Participate in group sharing on daily experiences.

3.1.4 | Measures

We administered all surveys in Chinese. All measures were translated from English into Chinese following Brislin's (1970) translation-back-translation procedure. The original English questionnaires were sent to a professional translator to translate the items into Chinese. The Chinese questionnaires were then back-translated to English by a Chinese graduate student who was not involved in the studies. Finally, the back-translated questionnaires were carefully examined by the two authors including a native English speaker. Any concerns and discrepancies were resolved through discussion before the official start of the studies.

Embodied versus disembodied learning

Participation in the control group (disembodied learning) was coded as 0, and participation in the experimental group (embodied learning) was coded as 1.

Psychological capital

Psychological capital was measured both before and after the courses using the 12-item short version of the psychological capital questionnaire (PCQ-12; Luthans, Avolio, et al., 2007 for the PsyCap measure). Participants were asked to rate the items on a 6-point scale ranging from *strongly disagree* (1) to *a strongly agree* (6). The sample items include "I can think of many ways to reach my current work goals," "I always look on the bright side of things regarding my job," and "I usually take stressful things at work in stride." The PCQ-12 has undergone extensive validation efforts and has been used in a number of studies, with its predictive validity replicated among participants from countries around the world, including China (e.g., Wernsing, 2014). To emphasize the malleable nature of the construct, the instructions highlighted that participants should respond based on how they were feeling "right now." The reliability coefficient was .86.

Adaptability

Adaptability was measured using peer ratings solicited 6 months after the end of the courses. Participants were asked to invite three colleagues to complete a 5-item ($\alpha = .85$) scale developed and validated by Krischer and Witt (2010) and used in recent studies (e.g., Lavigne et al., 2019; sample item = "He/She adapts readily to changing rules or requirements"). Respondents answered these questions on a 5-point scale ranging from 1 (*weak*, bottom 10%) to 5 (*best*, top 10%).

Control variables

To assess the equivalence of the two groups on more stable manager characteristics, we also measured baseline levels of emotional stability, openness to experience, and demographic characteristics (sex and age) at Time 1 and controlled for these in our analysis. These factors are important to control for given that demographic factors have been linked to individual adaptability (O'Connell et al., 2008) and in light of significant meta-analytical links between personality and adaptability (Huang et al., 2014). Most importantly, we wanted to control for the impact of individual differences in our model because more adventurous and less-anxious managers could have been more likely to join and/or benefit from the Gobi Desert embodied learning experience. Emotional stability and openness to experience were measured using 10-items each from Goldberg et al.'s (2006) scale from the International Personality Item Pool. Respondents rated items on a 5-point scale ranging from *strongly disagree* (1) to *a strongly agree* (5). Emotional stability contains 10 items ($\alpha = .83$), and a sample item is "I get stressed out easily." Openness to experience contains 10 items ($\alpha = .72$), and a sample item is "I have a vivid imagination." Finally, we also accounted for baseline levels of psychological capital captured at Time 1 to parse out the psychological capital attributable to the learning condition.

3.1.5 | Manipulation check

In developing our theoretical framework, we posited that although both embodied and disembodied learning feature mental challenges, only embodied learning features additional physical challenges. To investigate whether the level of body involvement actually differed between the two groups, we conducted a manipulation check to compare the levels of three physiological variables (maximum heart rate, steps walked, and calories burned) in the two learning conditions. Data were collected from participants in each condition (for experimental group, $N = 105$, for control group, $N = 110$). Participants were asked to wear the fitness tracker at the beginning of each day's course and report the three physiological measures at the end of each day's course. We then calculated the average value of these physiological variables. We conducted Mann–Whitney U test to compare the differences between the averages of the experimental and control groups. The results show that the level of all three physiological variables were significantly different between two groups (maximum heart rate: $U = 1774$, $p < .01$; steps walked: $U = .00$, $p < .01$; calories burned: $U = .00$, $p < .01$), suggesting that the level of body involvement is significantly higher for participants in the experimental group than participants in the control group.

3.2 | Results

The means and standard deviations for each variable by different sections are shown in Table 2 and the overall descriptive statistics and correlation matrix for Study 1 are shown in Table 3. Given that we used a quasi-experimental approach, we sought to test for equivalence in emotional stability, openness to experience, gender, and age at T1 between the two groups using ANOVA. As displayed in Table 4, the results of the ANOVA analyses showed only one significant difference between two groups, in age, $F(1, 136) = 5.12$, $p = .03$, with the disembodied learning group being slightly older (embodied group $M = 39.81$, $SD = 4.02$; disembodied group $M = 41.55$, $SD = 4.31$). For gender, $F(1, 137) = .37$, $p = .55$, emotional stability, $F(1, 139) = .26$, $p = .61$, and openness to experience, $F(1, 139) = 1.30$, $p = .26$, no significant differences were noted between the two groups. In addition, the initial level of psychological capital in the disembodied learning group was slightly higher than that of the embodied learning group, although not at a statistically significant level, $F(1, 139) = 3.25$, $p = .07$.

To test whether the embodied learning condition increased psychological capital more than disembodied learning, we used independent sample T-test to assess equivalence of the growth in overall psychological capital (T2–T1) between the experimental and control groups. Increments in overall psychological capital ($t = -4.89$, $p < .01$) were significantly different between the two groups. Specifically, the growth in overall psychological capital was larger for the embodied learning group than for the disembodied learning group.

To test the indirect effect of embodied learning on adaptability at work via post-learning psychological capital (H1), we conducted linear regression and mediation analyses. As shown in Table 5, embodied learning was positively related to post-learning psychological capital (B = .29, $p < .01$) and post-learning psychological capital, in turn, was positively related to adaptability (B = .15, $p = .02$) when controlling for the main effect of learning condition. To further test the mediating effect of post-learning psychological capital, we bootstrapped 5000 samples to obtain a 95% bias-corrected confidence interval. The results showed that the indirect effect of learning condition on adaptability via post-learning psychological capital was positive and significant ($ab = .04$, 95% CI = [.003, .180]), supporting H1.

3.3 | Discussion of Study 1

Despite the positive findings, Study 1 has several serious limitations. First, students were not randomly assigned to the experimental and control groups, which might have biased the results. For example, the experimental group might

TABLE 2 Comparison of the means and standard deviations across different sections and groups in Studies 1 and 2

	Study 1								Study 2			
	Embodied group				Disembodied group							
	Section 1A		Section 1B		Section 2A		Section 2B		Embodied group		Disembodied group	
Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Gender	1.16	.37	1.14	.35	1.25	.44	1.08	.28	1.38	.49	1.27	.45
Age	40.22	4.23	39.39	3.80	41.67	3.74	41.31	5.47	39.12	6.38	37.7	5.16
Emotional stability	3.25	.64	3.39	.60	3.35	.86	3.47	.57	3.13	.60	3.23	.39
Openness to experience	3.81	.53	3.73	.53	3.73	.55	3.49	.55	3.56	.54	3.53	.43
T1 PsyCap	4.99	.47	4.96	.56	5.17	.43	5.08	.42	3.98	.45	3.95	.36
T2 PsyCap	5.66	.66	5.74	.38	5.42	.43	5.43	.48	4.12	.41	4.19	.40
PsyCap growth	.67	.79	.78	.60	.25	.40	.35	.31	.14	.36	.24	.39
Challenge stressors									2.23	.68	2.92	.66
Hindrance stressors									2.09	.55	2.20	.53

Abbreviation: PsyCap, psychological capital.

TABLE 3 Means, standard deviations, and correlation matrix of Study 1 variables

Variables	*M*	*SD*	1	2	3	4	5	6	7	8
1. Learning Condition[a]	.71	.46								
2. Gender[b]	1.17	.37	–.05							
3. Age	40.31	4.17	–.19*	–.16						
4. Emotional stability	3.34	.67	–.04	–.05	.08					
5. Openness to experience	3.73	.54	.10	.04	–.12	.06				
6. PsyCap T1	5.02	.50	–.15	–.03	.10	.34**	.36**			
7. PsyCap T2	5.62	.52	.25**	–.03	–.01	.10	.33**	.18*		
8. PsyCap growth	.60	.65	.31**	.00	–.08	–.18*	–.01	–.62**	.67**	
9. Adaptability	4.82	.35	.24**	–.07	–.03	.07	.11	.10	.28**	.14

Note: [a]0 = *control group*, 1 = *experimental group*; [b]1 = *male*, 2 = *female*.
Abbreviation: PsyCap, psychological capital.
$^{*}p < .05$, $^{**}p < .01$.

TABLE 4 Results for the analysis of variance (ANOVA) tests to demonstrate the initial equivalence of the experimental and control groups in Studies 1 and 2

		ANOVA (Study 1)				
		Sum of squares	*df*	Mean square	*F*	Sig.
Gender	Between groups	.05	1	.05	.37	.55
	Within groups	19.14	137	.14		
	Total	19.19	138			
Age	Between groups	86.39	1	86.39	5.12	.03
	Within groups	2293.22	136	16.86		
	Total	2379.60	137			
Emotional stability	Between groups	.12	1	.12	.26	.61
	Within groups	62.18	139	.45		
	Total	62.29	140			
Openness to experience	Between groups	.38	1	.38	1.30	.26
	Within groups	40.41	139	.29		
	Total	40.79	140			
PsyCap T1	Between groups	.79	1	.79	3.25	.07
	Within groups	33.67	139	.24		
	Total	34.45	140			

(Continues)

TABLE 4 (Continued)

		ANOVA (Study 2)				
		Sum of squares	*df*	Mean square	*F*	Sig.
Gender	Between groups	.46	1	.46	2.11	.15
	Within groups	35.31	161	.22		
	Total	35.77	162			
Age	Between groups	86.30	1	86.30	2.56	.11
	Within groups	5428.78	161	33.72		
	Total	5515.08	162			
Emotional stability	Between groups	.42	1	.42	1.63	.20
	Within groups	41.65	161	.26		
	Total	42.07	162			
Openness to experience	Between groups	.06	1	.06	.24	.62
	Within groups	38.12	161	.24		
	Total	38.18	162			
PsyCap T1	Between groups	.02	1	.02	.13	.72
	Within groups	26.43	161	.16		
	Total	26.46	162			
BMI	Between groups	10.88	1	10.88	.89	.35
	Within groups	1970.63	161	12.24		
	Total	1981.51	162			

Abbreviation: PsyCap, psychological capital.

TABLE 5 Regression analysis of learning condition on adaptability via psychological capital (Study 1)

	Challenge stressor				Adaptability							
	Model 1				Model 2				Model 3			
	B	*SE*	*β*	*p*	B	*SE*	*β*	*p*	B	*SE*	*β*	*p*
(Constant)	3.42**	.67		.00	4.26**	.49		.00	3.76**	.52		.00
Gender	.02	.12	.01	.87	–.07	.09	–.07	.39	–.08	.08	–.08	.36
Age	.01	.01	.07	.42	.00	.01	.00	.98	.00	.01	–.01	.89
Emotional stability	.04	.07	.05	.59	.01	.05	.02	.82	.01	.05	.01	.90
Openness to experience	.25**	.09	.26	.00	.03	.06	.05	.62	–.01	.06	–.01	.92
T1 PsyCap	.11	.10	.10	.27	.07	.07	.09	.36	.05	.07	.07	.48
Learning condition	.29**	.10	.26	.00	.20**	.07	.25	.01	.16*	.07	.20	.03
T2 PsyCap									.15*	.06	.22	.02

Abbreviation: PsyCap, psychological capital.
*$p < .05$, **$p < .01$.

have experienced a Pygmalion effect (i.e., a self-fulfilling policy that occurs when positive expectations of others lead to high performance, McNatt & Judge, 2004), whereby they were believed or assumed to be elite executives who were well-equipped to meet the physical challenges they would face and lived up to these expectations. Similarly, the control group might have experienced a Galatea effect (i.e., a self-fulfilling prophecy when there are negative self-expectations, which lead to poor performance). Both effects were possible in the study because the experimenter was not blind to the hypotheses and may have inadvertently treated the groups differently. Second, the lack of random assignment resulted in the disembodied group beginning with appreciably higher levels of psychological capital than the embodied group. This might have created a ceiling effect whereby the embodied learning group showed greater increases in psychological capital simply because they started off at lower levels, which are easier to elevate (rather than because they were exposed to embodied learning methods).

Third, given that the study was not conducted in a controlled environment, the two groups differed in several respects. As one example, the novelty of the Gobi Desert environment might also have independent effects on the students in the experimental group that were unrelated to embodied learning (e.g., strong affect from observing the scenery). Another example is potentially the different physical health levels across the groups could have affected the outcomes. In addition, the poorer response rate of the control group in T3 (6 months after of the study) might have affected the results. This might have occurred due to the participants' busy schedules or less enthusiastic support for the study as compared with those taking part in the Gobi experience. Finally, we did not measure the possible mechanisms that might explain *why* embodied learning helped grow psychological capital. These shortcomings all present alternative explanations for our findings that warrant further explanation. To address some of these limitations, we designed Study 2 using a sample of working managers.

3.4 | Study 2

3.4.1 | Research context

In Study 2, we approached several alumni companies of the same business school featured in Study 1 to invite them to participate in our study. An invitation letter explaining the purpose and requirements of the study was sent to the CEOs. We successfully enlisted six companies in three provinces of China (five in the manufacturing industry and one in real estate) that allowed us to recruit their managers for participation in our study. The CEOs agreed to allow us to invite middle and senior managers of their organizations to participate in the replication study. With the CEOs' support, we worked closely with the HR directors to solicit 184 volunteers for the study.

The HR directors of the companies were requested to work with the first author to organize a joint leadership training camp and to invite senior and middle level managers from various subsidiaries to register for the program. They were aware of the research agenda of the leadership camp but were not aware of the research hypotheses. Their roles were mainly in providing administrative and logistical support. Each company took around 3 weeks to complete the enrollment process. At this point, the name list was compiled and provided to the research team, who randomly assigned the participants into either Group A (control group) or Group B (experimental group). All the registered participants were required to take a physical health test before final confirmation to the program. Group A participants then received course outline and materials similar to the classroom (disembodied learning) group in Study 1. Likewise, Group B participants received course outline and materials similar to the Gobi (embodied learning) group in Study 1.

The control and experimental group experiences were conducted 1 week apart in November 2020 and took place in the same hotel in a rural area of Shanghai. This data collection was approved by the IRB at CEIBS as an extension of the original project (#699-003; "Embodied Learning and Psychological Capital") given the largely identical scales and protocols. The same learning objectives, theories, mental activities (e.g., case analysis, desert survival simulation), and physical challenges (e.g., long-distance hiking) were replicated from Study 1. The control group participated in a 3-day leadership course conducted exclusively in a hotel meeting room using a disembodied learning approach. By contrast, the experimental group also participated in a 3-day leadership course, which employed an embodied approach featuring a mix of mental (e.g., theoretical overview, feedback, and reflection with coaches) and physical challenges that took place either in the same hotel meeting room or in a nature park 30 min away from the hotel. The opening session (a theoretical lecture and overview) and closing session (reflection and integration with theory) were conducted in the same hotel meeting room for both the control and experimental groups. This left only 2 days of physical activities for the experimental group, thereby providing a more robust test of the efficacy of embodied learning than Study 1. Aside from the location, we made every effort to keep as many other variables as possible fixed between the two conditions: the key instructor was the same for both groups (the other instructors and coaches did not know the hypotheses), and the number of contact hours was identical across both conditions. Participants in both groups were required to do equivalent hours of group reflection with coaches in the evening. Students all stayed overnight together in the hotel. The learning objectives and task requirements were similar across conditions, and team competitive elements (e.g., quizzes, group exercises) were incorporated into the disembodied learning experience as well as the embodied one.

3.4.2 | Sample

Owing to various reasons such as scheduling conflicts, travel plans, and job changes, 15 people withdrew 2 weeks before the commencement of the study. All participants were also required to go through a physical health check-up by professional experts to ensure that they met the minimum physical requirements to engage in strenuous exercise (e.g., long distance hiking). This also helped ensure that participants of both groups were of similar physical fitness prior to study. After the physical screening test, another six managers who had health issues (e.g., heart problems) were excluded from participating in the study. The final sample consisted of 163 (88.5% response rate) middle and senior level managers: 81 were assigned to the experimental group (embodied learning) and 82 to the control group (disembodied learning). In the experimental group, 72% of the participants were male, and the average age was 37.67 years ($SD = 5.16$). For the control group, 62% of the managers were male, and the average age was 39.12 years ($SD = 6.38$).

All managers were asked to complete a self-rated survey 2 weeks before the start of the course to assess their demographics and psychological capital (T1), each day after the class during the 3-day study to gauge their challenge and hindrance stressor perceptions (T2), and 1 month after the class to re-assess their psychological capital levels (T3).

3.4.3 | Measures

Psychological capital

Psychological capital was measured both before and after the courses using the same questionnaire as Study 1 (PCQ-12; $\alpha = .87$; Luthans, Avolio, et al., 2007 for the PsyCap measure). Participants were asked to rate the items on a 5-point scale ranging from *strongly disagree* (1) to *a strongly agree* (5).

Challenge and hindrance stressors

Challenge and hindrance stressors were measured with 11 items developed by Cavanaugh et al. (2000) that have been widely used in previous studies (e.g., Cavanaugh et al., 2000; LePine et al., 2004; Min et al., 2015). Six items measured challenge stressors ($\alpha = .92$; sample item: “The complexity of tasks given to me.”) and five items measured hindrance stressors ($\alpha = .76$; sample item: “The degree to which politics rather than performance affected team decisions.”). Participants were asked to measure the experiences and the stressful events that happened during each day of the study and responses were reported on a 5-point Likert-type scale ranging from 1 (*produce no stress*) to 5 (*produce great deal of stress*). We then computed the final score by averaging the 3 days’ scores.

Controls

We included the same personality and demographic controls featured in Study 1. We also added the control variable of body mass index (BMI) as a proxy for physical fitness given that research has shown that greater fitness impacts stress reactivity (Jackson & Dishman, 2006). BMI was calculated by dividing participants' weight in kilograms by their height in meters squared. We also controlled for positive and negative affect over the course of the 3-day learning experience because emotion is likely to impact individuals' perception of stressors (Arnold et al., 2017). Affect was measured by using the 20-items PANAS scale (Watson et al., 1988), including 10 items measuring positive affect (α = 1.00; sample items: "excited," "inspired") and 10 items measuring negative affect (α = 1.00; sample items: "upset," "nervous"). Respondents were asked to rate their current state on a 5-point Likert-type scale ranging from 1 (*not at all*) to 5 (*extremely*) at the end of each day. The final score was calculated by averaging participants' three self-rated daily scores.

3.4.4 | Manipulation check

Following the same method as Study 1, we conducted the manipulation check to investigate whether the level of body involvement differs in the experimental group versus the control group. The results of Mann–Whitney *U* test showed that the level of all three physiological variables were different between the disembodied and embodied groups (maximum heart rate: $U = 1199$, $p < .01$; steps walked: $U = .00$, $p < .01$; calories burned: $U = 136$, $p < .01$), suggesting that the level of body involvement was significantly higher for participants in the experimental group than those in the control group.

3.5 | Results

The mean and standard deviation for each variable by different groups are shown in Table 2, and the overall intercorrelation matrix is shown in Table 6. Although we randomly assigned the participants into two groups, we conducted the ANOVA test to confirm that the initial levels of the study variables were equivalent between the experimental and control groups. As shown in Table 4, no significant differences were noted between the two groups in gender, $F(1, 161) = 2.11$, $p = .15$, age, $F(1, 161) = 2.56$, $p = .11$, emotional stability, $F(1, 161) = 1.63$, $p = .20$, openness to experience, $F(1, 161) = .24$, $p = .62$, Time 1 psychological capital, $F(1, 161) = .13$, $p = .72$, or BMI, $F(1, 161) = .89$, $p = .35$.

To test H2, which proposed that challenge stressors mediate the impact of learning condition on post-learning psychological capital, we first conducted a linear regression analysis. The results shown in Table 7 reveal that H2 was not supported. Specifically, the relationship between learning mode and challenge stressors was positive and significant (B = .71, $p < .01$), but the relationship between challenge stressors and post-training psychological capital was insignificant (B = .05, $p = .29$). We then conducted an additional analysis that included hindrance stressors as a control given the high correlation between the two forms of stress. The results shown in Table 8 revealed that learning condition positively impacted the perceptions of challenge stressors (B = .67, $p < .01$) and that the effect of challenge stressors on psychological capital was positive and significant (B = .11, $p = .047$) when controlling for hindrance stressors. This indicates that challenge stressors mediated the relationship between embodied learning and post-learning psychological capital only when controlling for hindrance stressors. The findings showed that it was not challenge stressors in its entirety that mediate the effects of learning mode on psychological capital, but rather it was those aspects of challenge stressors that are not shared with hindrance stressors. To further confirm the mediating effect, we used a bias-corrected bootstrapping test as recommended by Hayes (2018). We bootstrapped 5000 samples to obtain a 95% bias-corrected confidence interval for indirect effect. The results showed that the indirect effect of embodied learning on psychological capital via challenge stressors was positive and significant while controlling for hindrance stressors ($ab = .07$, 95% CI = [.002, .147]).

TABLE 6 Means, standard deviations, and correlation matrix of Study 2 variables

Study 2	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Treatment[a]	.50	.50											
2. Age	38.40	5.84	−.13										
3. Gender[b]	1.33	.47	−.11	.01									
4. ES	3.18	.51	.10	.18*	.01								
5. Openness	3.54	.49	−.04	−.01	−.01	.10							
6. BMI	23.60	3.50	−.07	.07	−.38**	−.11	−.09						
7. CST	2.58	.75	.46**	−.07	−.04	−.18*	−.07	.08					
8. HST	2.14	.54	.10	−.07	−.15	−.20*	−.12	.18*	.59**				
9. PA	3.31	.56	.24**	.13	−.05	.11	.22**	−.04	.01	−.02			
10. NA	1.63	.47	.10	−.21**	−.17*	−.32**	.06	.06	.36**	.43**	−.06		
11. PsyCap T1	3.97	.40	−.03	.16*	−.07	.29**	.36**	−.04	−.22**	−.16*	.35**	−.11	
12. PsyCap T2	4.16	.41	.09	.12	.01	.19*	.29**	−.07	−.04	−.17*	.29**	−.11	.57**

Note: [a]0 = *control group*, 1 = *experimental group*; [b]1 = *male*, 2 = *female*.
Abbreviations: CST, challenge stressors; ES, emotional stability; HST, hindrance stressors; NA, negative affect; Openness, openness to experience; PA, positive affect; PsyCap, psychological capital.
$^{*}p < .05$, $^{**}p < .01$.

TABLE 7 Regression analysis of learning condition on psychological capital via challenge stressors without controlling for hindrance stressors (Study 2)

	Challenge stressor				T2 PsyCap							
	Model 1				Model 2				Model 3			
	B	*SE*	*β*	*p*	B	*SE*	*β*	*p*	B	*SE*	*β*	*p*
(Constant)	1.83*	.85		.03	1.65	.47		.00	1.56**	.47		.00
Gender	.15	.11	.09	.20	.04	.06	.05	.52	.03	.06	.04	.60
Age	.01	.01	.09	.20	.00	.01	.04	.54	.00	.01	.04	.61
Emotional stability	–.13	.11	–.09	.21	–.02	.06	–.02	.78	–.01	.06	–.01	.87
Openness to experience	.01	.11	.01	.91	.08	.06	.10	.16	.08	.06	.10	.16
BMI	.02	.02	.11	.12	–.00	.01	–.02	.82	–.00	.01	–.03	.72
Positive affect	–.04	.10	–.03	.69	.04	.05	.05	.48	.04	.05	.06	.46
Negative affect	.47**	.11	.30	.00	–.05	.06	–.06	.41	–.07	.07	–.08	.26
T1 PsyCap	–.27	.14	–.15	.06	.52**	.08	.52	.00	.53**	.08	.53	.00
Learning condition	.71**	.10	.48	.00	.09	.06	.11	.13	.05	.07	.07	.41
Challenge stressor									.05	.04	.09	.29

Abbreviations: PsyCap, psychological capital.
$^{*}p < .05$, $^{**}p < .01$.

TABLE 8 Regression analysis of learning condition on psychological capital via challenge stressors (Study 2)

	Challenge stressor				T2 PsyCap							
	Model 1				Model 2				Model 3			
	B	*SE*	*β*	*p*	B	*SE*	*β*	*p*	B	*SE*	*β*	*p*
(Constant)	.75	.73		.31	1.74**	.47		.00	1.67**	.47		.00
Gender	.17	.10	.11	.08	.04	.06	.05	.55	.02	.06	.02	.75
Age	.01	.01	.08	.19	.00	.01	.05	.52	.00	.01	.03	.66
Emotional stability	–.11	.09	–.07	.24	–.02	.06	–.02	.75	–.01	.06	–.01	.90
Openness to experience	.09	.09	.06	.32	.08	.06	.09	.20	.07	.06	.08	.26
Hindrance stressors	.68**	.09	.49	.00	–.06	.06	–.08	.27	–.13*	.07	–.18	.04
BMI	.01	.01	.05	.44	–.00	.01	–.01	.94	–.00	.01	–.01	.84
Positive affect	–.07	.08	–.06	.37	.04	.05	.06	.44	.05	.05	.07	.36
Negative affect	.16	.10	.10	.13	–.02	.07	–.03	.75	–.04	.07	–.04	.57
T1 PsyCap	–.20	.12	–.11	.10	.51**	.08	.51	.00	.53**	.08	.53	.00
Learning condition	.67**	.09	.45	.00	.09	.06	.11	.11	.02	.07	.03	.77
Challenge stressors									.11*	.05	.19	.047

Abbreviations: PsyCap, psychological capital.
*$p < .05$, **$p < .01$.

4 | GENERAL DISCUSSION

The purpose of these studies was to test our prediction that embodied learning experiences will lead to greater psychological capital that results in higher adaptability at work than disembodied learning experiences. To test these hypotheses, we conducted two quasi-experimental studies comparing the effects of embodied and disembodied learning groups using survey data collected at multiple time points. Together, the results revealed that embodied learning had a stronger positive impact on psychological capital than disembodied learning even when controlling for pre-course levels of psychological capital. Moreover, post-learning psychological capital mediated the relationship between learning condition and peer-rated adaptability at work 6 months after the conclusion of the course. The replication in our second study that applied random assignment underscored the robustness of using embodied learning to elevate executive psychological capital. In Study 2, the participants began with quite similar levels of psychological capital in each group, with the disembodied group being slightly lower in this dimension. This provides initial evidence to dispel the alternative explanation of the ceiling effect found in Study 1.

Finally, and to better explain how embodied learning exerts positive effects, we demonstrated that challenge stressors significantly mediated the relationship between learning condition and post-learning psychological capital. Importantly, we found that the mediating effect of challenge stressors was significant only when hindrance stressors were taken into account. The overlapping portion of challenge and hindrance stressors is likely the momentary anxiety and discomfort associated with most stressful situations. By removing this shared variance, we were able to isolate only the developmental and growth-related aspects of challenge stressors, thereby increasing its predictive power. We invite future studies to more clearly identify the specific types of stressful experiences that result in personal growth.

Our findings may have significant implications for the development of leader psychological capital. In alignment with prior theoretical work on the benefits of embodied pedagogy (Nguyen & Larson, 2015; Wilson, 2002), we provide empirical evidence showing that involving both the body and mind during learning results in heightened psychological capital than mental stimulation alone. To illustrate how these effects unfold, we provide further evidence that embodied learning increases perceptions of challenge stressors more than disembodied learning. This finding helps expand the field's understanding of what types of learning may be stressful, and, perhaps more interestingly, when these stressors may prove to be beneficial for learners. Although additional challenge stressors may be burdensome in the moment (van den Broeck et al., 2010), we show that they ultimately result in heightened personal growth in the form of psychological capital and adaptability at work.

4.1 | Theoretical implications

Our research complements the literature in several meaningful ways. First, although numerous scholars have emphasized the importance of embodied learning in fields such as education (Lindgren & Johnson-Glenberg, 2013) and sports psychology (Howells & Fletcher, 2015), to our knowledge, we are among the first to apply embodied learning to the growth of psychological capital in business leaders. In light of a global business landscape that is increasingly characterized by VUCA characteristics (Global Leadership Forecast, 2021), new learning methods are required. Our findings provide evidence that embodied learning (which often features a blend of time-bound, complex, and high-stakes tasks) can increase perceptions of challenge stressors that, in turn, fuel psychological capital. Drawing from the embodied view of cognition, we hypothesized and found that embodied learning is comparatively more effective than disembodied learning for growing participants' levels of psychological capital and durably enhancing their adaptability over time.

Second, this research examines the potential role of challenge stressors as an explanatory mechanism through which embodied learning results in psychological capital and increased adaptability. In doing so, we suggest that times of stress may be key periods of developmental readiness for employees. These findings build upon extant evidence that exposure to challenge stressors is positively related to time-lagged psychological resilience (Crane & Searle, 2016) by demonstrating similar positive effects on overall psychological capital. We extend these findings and help advance the understanding of the mixed effects of psychological capital and stress documented in the literature (Newman et al., 2014) by demonstrating that the additional incorporation of physical tasks with mental exertion may be particularly useful for helping infuse the benefits of increased challenge stressors into one's muscle memory. We recommend that managers should be mindful of structuring the types and quantity of challenge stressors in employee environments, and, in particular, may structure their learning experiences to be immersive and feature physical challenges that result in greater personal growth. However, managers should also be cognizant of both the amount of stressors present (given positive meta-analytic links to psychological strain and counterproductive work behavior, Mazzola & Dissel-horst, 2019) and individual differences in employee ability to leverage challenge stressors (e.g., negative effects were found among people with low levels of conscientiousness, Abbas & Raja, 2019).

4.2 | Practical implications

Increasing criticism on the effectiveness of executive training and education has called for innovative pedagogy. Executive education, in particular, places a higher emphasis on behavioral and mindset change. Our findings provide important implications for executive training and development as well as management education. First, we build on prior work documenting the effectiveness of short-term, disembodied workshops to develop psychological capital (e.g., Dello Russo & Stoykova, 2015; Luthans et al., 2006, 2014) by showing that although these are effective, perhaps embodied learning featuring physical challenges may result in more perceived challenge stressors that yield more robust and durable growth. To support this claim, we collected data at various time-points in each study, with the first study showing that adaptability stemming from psychological capital persisted 6 months after the embodied learning intervention. In light of the growing suggestion that traditional methods of leadership development provided by business schools and training companies fail to improve leader performance (e.g., Alajoutsijärvi et al., 2015; Pfeffer & Fong, 2002), we encourage organizations to consider their return on investment when selecting a development program and to choose the methods (i.e., embodied learning) that may best prepare leaders to adapt to changing new realities.

Our examination of psychological capital's impact on adaptability also has implications for promoting desirable outcomes in organizations. That is, a manager's adaptability is important in the current VUCA world because organizations are more likely to gain a competitive advantage if its leaders are able to move quickly and effectively adapt to changing and dynamic environments. Our findings suggest that individuals can benefit by taking part in embodied learning activities as these have positive effects on psychological capital, which aids their adaptability.

In addition, we encourage organizations to incorporate embodied learning into their own management development and training programs. Although devising a training in the Gobi Desert or a similar adverse environment may be unattainable for many organizations, the results of our second study suggest that even a reduced number of physical challenges (i.e., the equivalent of 2 days) conducted in an outdoor park may also result in psychological capital growth. By showing that increased challenge stressor perceptions account for these effects, we recommend that managers and training professionals ensure that participants are being sufficiently challenged in terms of time pressure, job scope, complexity, and high stakes tasks to help foster psychological capital.

4.3 | Limitations and directions for future research

This research has several limitations that should be addressed in future studies. First, we note that replication of these findings is important given that the primary instructor of both conditions was not entirely blind to the hypotheses and intended differences between the two conditions. Although the learning experiences heavily relied on professional coaches and teaching assistants that were unaware of the research objectives, there might have been different emphases placed on psychological capital between the two conditions (even if unintentionally). Thus, we encourage replication using instructors that are not part of the research team. In addition, although the results provided initial support for our hypothesized model, both studies were conducted in a single country (i.e., China). Studies in a country with more or less affinity for physical activity might have yielded different results. Despite this limitation, we note that we tested parts of our model across two distinct samples (i.e., EMBA students and working managers) and physical settings (i.e., Gobi Desert/University classroom and park/hotel conference room), suggesting that the effects of embodied learning are replicable across a variety of contexts. Nevertheless, more research is needed to assess the generalizability of our findings.

Another limitation of our research approach is that we could not completely parse out the effects of being in an outdoor environment (both in the Gobi Desert and the nature park) with the effects of embodied learning. This is an important consideration in light of evidence that certain adverse outdoor environments (e.g., hot and dry climates) can increase employee strain (Methner & Eisenberg, 2018) and that outdoor adventure tasks can induce both physical and psychosocial stressors that increase neuroendocrine responses (Bunting et al., 2000). We encourage other studies to examine how bodily involvement conducted inside sport centers or indoor stadiums (e.g., involving climbing walls, obstacle courses, or stationary bicycles) may impart similar or differential effects on the learning process in the absence of natural features like scenery and sunlight. In addition, both of our embodied learning conditions featured difficult tasks and time pressure, which may be requisites for perceiving learning as stressful and therefore serve as unmeasured boundary conditions of our studies. We encourage future research to more formally examine these boundary conditions.

There are also limitations related to the conditions and duration of the effects of embodied learning as well the feasibility of employing such interventions. For example, the physical and mental challenge stressors faced by the embodied learning participants lasted 2.5 days in Study 1 and 2 days in Study 2. Although perceiving greater challenge stressors led to psychological capital growth, the upper limit for strain before positive effects stop accruing is unclear. Many of the stressors facing employees can last months or longer, and there may be a point at which these challenges no longer build psychological capital (and may even detract from it). In addition, smaller firms may lack the resources to design and sponsor embodied learning experiences. We note that participants engaged in disembodied learning also reported a slight increase in psychological capital on average and that prior research has demonstrated the viability of disembodied methods for building psychological capital (Dello Russo & Stoykova, 2015; Luthans et al., 2006, 2014). We encourage future research to investigate the impact of long-term exposure to stressors on psychological capital levels and suggest that managers engage in careful cost-benefit analyses when deciding among different psychological capital development methods.

We also call for more studies that examine whether embodied learning can be applied to augment other desirable work competencies and behaviors besides adaptability, including job engagement and leadership behaviors. In addition, although we theorize that the blend of physical and mental challenges featured in embodied learning result in greater challenge stressors than mental challenges alone (i.e., disembodied learning), we do not know what percentage of physical versus mental content is ideal for personal growth. Our second study (which features fewer physical exercises and a less harsh environment) provides evidence that even limited quantities of physical challenges may still exert notable effects. Still, we encourage future research to more carefully parse out the ideal physical to mental ratio for increasing psychological capital. Finally, future research should replicate and extend our findings by simultaneously testing the sequential mediation of embodied learning on adaptability and objective task performance through challenge stressors and psychological capital.

5 | CONCLUSION

Our studies add to the understanding of the psychological mechanisms through which embodied learning may grow psychological capital. Embodied learning spurs increased perceptions of challenge stressors, which then augment psychological capital and subsequent adaptability better than disembodied learning. These findings give empirical weight to prior theoretical musings about the benefits of challenging both the mind and body during learning. Despite its effectiveness in fostering psychological capital, the application of embodied learning has been underutilized in executive education and leadership development. We conclude by encouraging the application of embodied learning when developing psychological fortitude.

ACKNOWLEDGMENTS

We would like to thank Mary Uhl-Bien, Xue Zheng, An-Chih (Andrew) Wang, and our editor, Shaul Oreg, for their invaluable feedback. We would also like to thank Dongjie Xu and Huanxin Liu for their support in the data collection and analyses.

DATA AVAILABILITY STATEMENT

Although the data are not publicly available, the authors are available to answer any questions about the analyses or methodology.

ORCID

Jean S. K. Lee https://orcid.org/0000-0002-7869-6218
Emily M. David https://orcid.org/0000-0003-3473-4267

REFERENCES

Abbas, M., & Raja, U. (2019). Challenge-hindrance stressors and job outcomes: The moderating role of conscientiousness. *Journal of Business and Psychology*, *34*(2), 189–201. https://doi.org/10.1007/s10869-018-9535-z

Alajoutsijärvi, K., Juusola, K., & Siltaoja, M. (2015). The legitimacy paradox of business schools: Losing by gaining? *Academy of Management Learning & Education*, *14*(2), 277–291. https://doi.org/10.5465/amle.2013.0106

Alvesson, M., & Willmott, H. (1992). On the idea of emancipation in management and organization studies. *Academy of Management Review*, *17*(3), 432–464. https://doi.org/10.5465/amr.1992.4281977

Arnold, R., Fletcher, D., & Daniels, K. (2017). Organisational stressors, coping, and outcomes in competitive sport. *Journal of Sports Sciences*, *35*(7), 694–703. https://doi.org/10.1080/02640414.2016.1184299

Avey, J. B., Avolio, B. J., & Luthans, F. (2011). Experimentally analyzing the impact of leader positivity on follower positivity and performance. *The Leadership Quarterly*, *22*, 282–294. https://doi.org/10.1016/j.leaqua.2011.02.004

Avey, J. B., Luthans, F., & Jensen, S. M. (2009). Psychological capital: A positive resource for combating employee stress and turnover. *Human Resource Management*, *48*(5), 677–693. https://doi.org/10.1002/hrm.20294

Avey, J. B., Luthans, F., Smith, R. M., & Palmer, N. F. (2010). Impact of positive psychological capital on employee well-being over time. *Journal of Occupational Health Psychology*, *15*(1), 17–28. https://doi.org/10.1037/a0016998

Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. *Journal of Applied Psychology*, *91*(4), 963–970. https://doi.org/10.1037/0021-9010.91.4.963

Banks, J., & Smyth, E. (2015). 'Your whole life depends on it': Academic stress and high-stakes testing in Ireland. *Journal of Youth Studies*, *18*(5), 598–616. https://doi.org/10.1080/13676261.2014.992317

Baron, R. A., Franklin, R. J., & Hmieleski, K. M. (2016). Why entrepreneurs often experience low, not high, levels of stress: The joint effects of selection and psychological capital. *Journal of Management*, *42*(3), 742–768. https://doi.org/10.1177/0149206313495411

Berger, B. G., & Motl, R. W. (2000). Exercise and mood: A selective review and synthesis of research employing the profile of mood states. *Journal of Applied Sport Psychology*, *12*(1), 69–92. https://doi.org/10.1080/10413200008404214

Bernstein, E. E., & McNally, R. J. (2018). Exercise as a buffer against difficulties with emotion regulation: A pathway to emotional wellbeing. *Behaviour Research and Therapy*, *109*, 29–36. https://doi.org/10.1016/j.brat.2018.07.010

Bhattacharya, M., Gibson, D. E., & Doty, D. H. (2005). The effects of flexibility in employee skills, employee behaviors, and human resource practices on firm performance. *Journal of Management*, *31*(4), 622–640. https://doi.org/10.1177/0149206304272347

Bickhard, M. H. (2008). Is embodiment necessary? In P. Calvo & A. Gomila (Eds.), *Handbook of Cognitive Science* (pp. 27–40). Elsevier.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-cultural Psychology*, *1*(3), 185–216. https://doi.org/10.1177/135910457000100301

Bunting, C. J., Tolson, H., Kuhn, C., Suarez, E., & Williams, R. B. (2000). Physiological stress response of the neuroendocrine system during outdoor adventure tasks. *Journal of Leisure Research*, *32*(2), 191–207. https://doi.org/10.1080/00222216.2000.11949913

Calderwood, C., ten Brummelhuis, L. L., Patel, A. S., Watkins, T., Gabriel, A. S., & Rosen, C. C. (2021). Employee physical activity: A multidisciplinary integrative review. *Journal of Management*, *47*(1), 144–170. https://doi.org/10.1177/0149206320940413

Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, *61*, 679–704. https://doi.org/10.1146/annurev.psych.093008.100352

Cavanaugh, M. A., Boswell, W. R., Roehling, M. V., & Boudreau, J. W. (2000). An empirical examination of self-reported work stress among US managers. *Journal of Applied Psychology*, *85*(1), 65–74. https://doi.org/10.1037/0021-9010.85.1.65

Childs, E., & de Wit, H. (2014). Regular exercise is associated with emotional resilience to acute stress in healthy adults. *Frontiers in Physiology*, *5*, 161. https://doi.org/10.3389/fphys.2014.00161

Crane, M. F., & Searle, B. J. (2016). Building resilience through exposure to stressors: The effects of challenges versus hindrances. *Journal of Occupational Health Psychology*, *21*(4), 468–479. https://doi.org/10.1037/a0040064

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*(5), 834–848. https://doi.org/10.1037/a0019364

Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology*, *104*(4), 716–733. https://doi.org/10.1037/a0031201

Daley, A. J., & Parfitt, G. (1996). Good health—Is it worth it? Mood states, physical well-being, job satisfaction and absenteeism in members and non-members of a British corporate health and fitness club. *Journal of Occupational and Organizational Psychology*, *69*(2), 121–134. https://doi.org/10.1111/j.2044-8325.1996.tb00604.x

Dawkins, S., Martin, A., Scott, J., & Sanderson, K. (2013). Building on the positives: A psychometric review and critical analysis of the construct of psychological capital. *Journal of Occupational and Organizational Psychology*, *86*(3), 348–370. https://doi.org/10.1111/joop.12007

Dawkins, S., Martin, A., Scott, J., & Sanderson, K. (2015). Advancing conceptualization and measurement of psychological capital as a collective construct. *Human Relations*, *68*(6), 925–949. https://doi.org/10.1177/0018726714549645

Dello Russo, S., & Stoykova, P. (2015). Psychological capital intervention (PCI): A replication and extension. *Human Resource Development Quarterly*, *26*(3), 329–347. https://doi.org/10.1002/hrdq.21212

Engelkamp, J., Seiler, K. H., & Zimmer, H. D. (2004). Memory for actions: Item and relational information in categorized lists. *Psychological Research*, *69*(1-2), 1–10. https://doi.org/10.1007/s00426-003-0160-7

Gärtner, C. (2013). Cognition, knowing and learning in the flesh: Six views on embodied knowing in organization studies. *Scandinavian Journal of Management*, *29*(4), 338–352. https://doi.org/10.1016/j.scaman.2013.07.005

Global Leadership Forecast, DDI. (2021). https://www.ddiworld.com/global-leadership-forecast-2021

Gnam, J. P., Loeffler, S. N., Haertel, S., Engel, F., Hey, S., Boes, K., Woll, A., & Strahler, J. (2019). On the relationship between physical activity, physical fitness, and stress reactivity to a real-life mental stressor. *International Journal of Stress Management*, *26*(4), 344–355. https://doi.org/10.1037/str0000113

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality*, *40*(1), 84–96. https://doi.org/10.1016/j.jrp.2005.08.007

Goldman, A., & de Vignemont, F. (2009). Is social cognition embodied? *Trends in Cognitive Sciences*, *13*(4), 154–159. https://doi.org/10.1016/j.tics.2009.01.007

Grebner, S., Elfering, A., & Semmer, N. K. (2010). The success resource model of job stress. In P. L. Perrewé & D. C. Ganster (Eds.), *New developments in theoretical and conceptual approaches to job stress* (pp. 61–108). Bingley, UK: Emerald.

Gubler, T., Larkin, I., & Pierce, L. (2018). Doing well by making well: The impact of corporate wellness programs on employee productivity. *Management Science*, *64*(11), 4967–4987. https://doi.org/10.1287/mnsc.2017.2883

Gupta, V., & Singh, S. (2014). Psychological capital as a mediator of the relationship between leadership and creative performance behaviors: Empirical evidence from the Indian R&D sector. *The International Journal of Human Resource Management*, *25*(10), 1373–1394. https://doi.org/10.1080/09585192.2013.870311

Hackney, A. C. (2006). Stress and the neuroendocrine system: The role of exercise as a stressor and modifier of stress. *Expert Review of Endocrinology & Metabolism*, *1*(6), 783–792. https://doi.org/10.1586/17446651.1.6.783

Harquail, C. V., & Wilcox King, A. (2010). Construing organizational identity: The role of embodied cognition. *Organization Studies*, *31*(12), 1619–1648. https://doi.org/10.1177/0170840610376143

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York: The Guilford Press.

Hayes, C. T., & Weathington, B. L. (2007). Optimism, stress, life satisfaction, and job burnout in restaurant managers. *The Journal of Psychology*, *141*(6), 565–579. https://doi.org/10.3200/JRLP.141.6.565-580

Heaphy, E. D., & Dutton, J. E. (2008). Positive social interactions and the human body at work: Linking organizations and physiology. *Academy of Management Review*, *33*(1), 137–162. https://doi.org/10.5465/amr.2008.27749365

Hibbert, P., Beech, N., & Siedlok, F. (2017). Leadership formation: Interpreting experience. *Academy of Management Learning & Education*, *16*(4), 603–622. https://doi.org/10.5465/amle.2015.0243

Hobfoll, S. E., Johnson, R. J., Ennis, N., & Jackson, A. P. (2003). Resource loss, resource gain, and emotional outcomes among inner city women. *Journal of Personality and Social Psychology*, *84*(3), 632–643. https://doi.org/10.1037/0022-3514.84.3.632

Howells, K., & Fletcher, D. (2015). Sink or swim: Adversity-and growth-related experiences in Olympic swimming champions. *Psychology of Sport and Exercise*, *16*, 37–48. https://doi.org/10.1016/j.psychsport.2014.08.004

Huang, J. L., Ryan, A. M., Zabel, K. L., & Palmer, A. (2014). Personality and adaptive performance at work: A meta-analytic investigation. *Journal of Applied Psychology*, *99*(1), 162–179. https://doi.org/10.1037/a0034285

Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organization Science*, *2*(1), 88–115. https://doi.org/10.1287/orsc.2.1.88

Jackson, E. M., & Dishman, R. K. (2006). Cardiorespiratory fitness and laboratory stress: A meta-regression analysis. *Psychophysiology*, *43*(1), 57–72. https://doi.org/10.1111/j.1469-8986.2006.00373.x

Jundt, D. K., Shoss, M. K., & Huang, J. L. (2015). Individual adaptive performance in organizations: A review. *Journal of Organizational Behavior*, *36*(S1), S53–S71. https://doi.org/10.1002/job.1955

Kiefer, M., & Trumpp, N. M. (2012). Embodiment theory and education: The foundations of cognition in perception and action. *Trends in Neuroscience and Education*, *1*(1), 15–20. https://doi.org/10.1016/j.tine.2012.07.002

Kontra, C., Goldin-Meadow, S., & Beilock, S. L. (2012). Embodied learning across the life span. *Topics in Cognitive Science*, *4*(4), 731–739. https://doi.org/10.1111/j.1756-8765.2012.01221.x

Krischer, M., & Witt, L. A. (2010, April). Achieving adaptive performance in the workplace: The compensatory effects of general mental ability and adaptive leadership. Presented at annual meeting of the Society for Industrial and Organizational Psychology, Atlanta.

Låftman, S. B., Almquist, Y. B., & Östberg, V. (2013). Students' accounts of school-performance stress: A qualitative analysis of a high-achieving setting in Stockholm, Sweden. *Journal of Youth Studies*, *16*(7), 932–949. https://doi.org/10.1080/13676261.2013.780126

Lavigne, K. N., Whitaker, V. L., Jundt, D. K., & Shoss, M. K. (2019). When do job insecure employees adapt to change? *Career Development International*, *25*(3), 271–286. https://doi.org/10.1108/CDI-03-2019-0083

Lee, N., Senior, C., & Butler, M. J. (2012). The domain of organizational cognitive neuroscience: Theoretical and empirical challenges. *Journal of Management*, *38*(4), 921–931. https://doi.org/10.1177/0149206312439471

LePine, J. A., LePine, M. A., & Jackson, C. L. (2004). Challenge and hindrance stress: Relationships with exhaustion, motivation to learn, and learning performance. *Journal of Applied Psychology*, *89*(5), 883–891. https://doi.org/10.1037/0021-9010.89.5.883

LePine, J. A., Podsakoff, N. P., & LePine, M. A. (2005). A meta-analytic test of the challenge stressor-hindrance stressor framework: An explanation for inconsistent relationships among stressors and performance. *Academy of Management Journal*, *48*(5), 764–775. https://doi.org/10.5465/AMJ.2005.18803921

Lindgren, R., & Johnson-Glenberg, M. (2013). Emboldened by embodiment: Six precepts for research on embodied learning and mixed reality. *Educational Researcher*, *42*(8), 445–452. https://doi.org/10.3102/0013189/13511661

Long, B. C. (1993). A cognitive perspective on the stress-reducing effects of physical exercise. In P. Seraganian (Ed.), *Exercise psychology: The influence of physical exercise on psychological processes* (pp. 339–357). New York, NY: Wiley.

Lord, R. G., & Shondrick, S. J. (2011). Leadership and knowledge: Symbolic, connectionist, and embodied perspectives. *The Leadership Quarterly*, *22*(1), 207–222. https://doi.org/10.1016/j.leaqua.2010.12.016

Luthans, B. C., Luthans, K. W., & Avey, J. B. (2014). Building the leaders of tomorrow: The development of academic psychological capital. *Journal of Leadership & Organizational Studies*, *21*(2), 191–199. https://doi.org/10.1177/1548051813517003

Luthans, F., Avey, J. B., Avolio, B. J., Norman, S. M., & Combs, G. M. (2006). Psychological capital development: Toward a micro-intervention. *Journal of Organizational Behavior*, *27*(3), 387–393. https://doi.org/10.1002/job.373

Luthans, F., Avolio, B. J., Avey, J. B., & Norman, S. M. (2007). Positive psychological capital: Measurement and relationship with performance and satisfaction. *Personnel Psychology*, *60*(3), 541–572. https://doi.org/10.1111/j.1744-6570.2007.00083.x

Luthans, F., Norman, S. M., Avolio, B. J., & Avey, J. B. (2008). The mediating role of psychological capital in the supportive organizational climate-employee performance relationship. *Journal of Organizational Behavior*, *29*(2), 219–238. https://doi.org/10.1002/job.507

Luthans, F., Youssef, C. M., & Avolio, B. J. (2007). Psychological capital: Investing and developing positive organizational behavior. *Positive Organizational Behavior*, *1*(2), 9–24. https://doi.org/10.4135/9781446212752.n2

Luthans, F., & Youssef-Morgan, C. M. (2017). Psychological capital: An evidence-based positive approach. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*(1), 339–366. https://doi.org/10.1146/annurev-orgpsych-032516-113324

Mazzola, J. J., & Disselhorst, R. (2019). Should we be "challenging" employees?: A critical review and meta-analysis of the challenge-hindrance model of stress. *Journal of Organizational Behavior*, *40*(8), 949–961. https://doi.org/10.1002/job.2412

McNatt, D. B., & Judge, T. A. (2004). Boundary conditions of the Galatea effect: A field experiment and constructive replication. *Academy of Management Journal*, *47*(4), 550–565. https://doi.org/10.2307/20159601

Methner, M., & Eisenberg, J. (2018). Evaluation of heat stress and heat strain among employees working outdoors in an extremely hot environment. *Journal of Occupational and Environmental Hygiene*, *15*(6), 474–480. https://doi.org/10.1080/15459624.2018.1456663

Min, H., Kim, H. J., & Lee, S. (2015). Extending the challenge–hindrance stressor framework: The role of psychological capital. *International Journal of Hospitality Management*, *50*, 105–114. https://doi.org/10.1016/j.ijhm.2015.07.006

Miska, C., Economou, V., & Stahl, G. K. (2020). Responsible Leadership in a VUCA World. In M. E. Mendenhall, M. Žilinskaitė, G. K. Stahl, & R. Clapp-Smith (Eds.), *Responsible Global Leadership* (pp. 11–28). Routledge.

Newman, A., Ucbasaran, D., Zhu, F. E. I., & Hirst, G. (2014). Psychological capital: A review and synthesis. *Journal of Organizational Behavior*, *35*(S1), S120–S138. https://doi.org/10.1002/job.1916

Nguyen, D. J., & Larson, J. B. (2015). Don't forget about the body: Exploring the curricular possibilities of embodied pedagogy. *Innovative Higher Education*, *40*(4), 331–344. https://doi.org/10.1007/s10755-015-9319-6

O'Connell, D. J., McNeely, E., & Hall, D. T. (2008). Unpacking personal adaptability at work. *Journal of Leadership & Organizational Studies*, *14*(3), 248–259. https://doi.org/10.1177/1071791907311005

Perchtold-Stefan, C. M., Fink, A., Rominger, C., Weiss, E. M., & Papousek, I. (2020). More habitual physical activity is linked to the use of specific, more adaptive cognitive reappraisal strategies in dealing with stressful events. *Stress and Health*, *36*(3), 274–286. https://doi.org/10.1002/smi.2929

Peterson, S. J., & Byron, K. (2008). Exploring the role of hope in job performance: Results from four studies. *Journal of Organizational Behavior*, *29*(6), 785–803. https://doi.org/10.1002/job.492

Peterson, S. J., Luthans, F., Avolio, B. J., Walumbwa, F. O., & Zhang, Z. (2011). Psychological capital and employee performance: A latent growth modeling approach. *Personnel Psychology*, *64*(2), 427–450. https://doi.org/10.1111/j.1744-6570.2011.01215.x

Pfeffer, J., & Fong, C. T. (2002). The end of business schools? Less success than meets the eye. *Academy of Management Learning & Education*, *1*(1), 78–95. https://doi.org/10.2307/40214102

Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: A meta-analysis. *Journal of Applied Psychology*, *92*(2), 438–454. https://doi.org/10.1037/0021-9010.92.2.438

Raichlen, D. A., & Alexander, G. E. (2017). Adaptive capacity: An evolutionary neuroscience model linking exercise, cognition, and brain health. *Trends in Neurosciences*, *40*(7), 408–421. https://doi.org/10.1016/j.tins.2017.05.001

Rego, A., Yam, K. C., Owens, B. P., Story, J. S., Pina e Cunha, M., Bluhm, D., & Lopes, M. P. (2019). Conveyed leader PsyCap predicting leader effectiveness through positive energizing. *Journal of Management*, *45*(4), 1689–1712. https://doi.org/10.1177/0149206317733510

Salmon, P. (2001). Effects of physical exercise on anxiety, depression, and sensitivity to stress: A unifying theory. *Clinical Psychology Review*, *21*(1), 33–61. https://doi.org/10.1016/S0272-7358(99)00032-X

Scarf, D., Kafka, S., Hayhurst, J., Jang, K., Boyes, M., Thomson, R., & Hunter, J. A. (2018). Satisfying psychological needs on the high seas: Explaining increases self-esteem following an adventure education programme. *Journal of Adventure Education and Outdoor Learning*, *18*(2), 165–175. https://doi.org/10.1080/14729679.2017.1385496

Schultz, D. P., & Schultz, S. E. (2015). *A history of modern psychology*. Cengage Learning.

Seibert, S. E., Sargent, L. D., Kraimer, M. L., & Kiazad, K. (2017). Linking developmental experiences to leader effectiveness and promotability: The mediating role of leadership self-efficacy and mentor network. *Personnel Psychology*, *70*(2), 357–397. https://doi.org/10.1111/peps.12145

Shafir, T., Tsachor, R. P., & Welch, K. B. (2016). Emotion regulation through movement: Unique sets of movement characteristics are associated with and enhance basic emotions. *Frontiers in Psychology*, *6*, 1–15. https://doi.org/10.3389/fpsyg.2015.02030

Shapiro, L. (2014). *The Routledge handbook of embodied cognition*. New York: Routledge.

Shim, M., Johnson, R. B., Gasson, S., Goodill, S., Jermyn, R., & Bradt, J. (2017). A model of dance/movement therapy for resilience-building in people living with chronic pain. *European Journal of Integrative Medicine*, *9*, 27–40. https://doi.org/10.1016/j.eujim.2017.01.011

Sliter, M., Kale, A., & Yuan, Z. (2014). Is humor the best medicine? The buffering effect of coping humor on traumatic stressors in firefighters. *Journal of Organizational Behavior*, *35*(2), 257–272. https://doi.org/10.1002/job.1868

Springborg, C., & Ladkin, D. (2018). Realising the potential of art-based interventions in managerial learning: Embodied cognition as an explanatory theory. *Journal of Business Research*, *85*(April), 532–539. https://doi.org/10.1016/j.jbusres.2017.10.032

Strauss, K., Niven, K., McClelland, C. R., & Cheung, B. K. (2015). Hope and optimism in the face of change: Contributions to task adaptivity. *Journal of Business and Psychology*, *30*(4), 733–745. https://doi.org/10.1007/s10869-014-9393-2

Taylor, C. A., Lord, C. G., & Bond, C. F., Jr. (2009). Embodiment, agency, and attitude change. *Journal of Personality and Social Psychology*, *97*(6), 946–962. https://doi.org/10.1037/a0017421

Travis, J., Kaszycki, A., Geden, M., & Bunde, J. (2020). Some stress is good stress: The challenge-hindrance framework, academic self-efficacy, and academic outcomes. *Journal of Educational Psychology*, *112*(8), 1632–1643. https://doi.org/10.1037/edu0000478

van den Broeck, A., De Cuyper, N., De Witte, H., & Vansteenkiste, M. (2010). Not all job demands are equal: Differentiating job hindrances and job challenges in the Job Demands-Resources model. *European Journal of Work and Organizational Psychology*, *19*(6), 735–759. https://doi.org/10.1080/13594320903223839

Vogel, S., & Schwabe, L. (2016). Learning and memory under stress: Implications for the classroom. *NPJ Science of Learning*, *1*(1), 1–10. https://doi.org/10.1038/npjscilearn.2016.11

Wang, F., McDonald, T., Champagne, L. J., & Edington, D. W. (2004). Relationship of body mass index and physical activity to health care costs among employees. *Journal of Occupational and Environmental Medicine*, *46*(5), 428–436. https://doi.org/10.1097/01.jom.0000126022.25149.bf

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Wernsing, T. (2014). Psychological capital: A test of measurement invariance across 12 national cultures. *Journal of Leadership & Organizational Studies*, *21*(2), 179–190. https://doi.org/10.1177/1548051813515924

Whittington, A., Aspelmeier, J. E., & Budbill, N. W. (2016). Promoting resiliency in adolescent girls through adventure programming. *Journal of Adventure Education and Outdoor Learning*, *16*(1), 2–15. https://doi.org/10.1080/14729679.2015.1047872

Widmer, P. S., Semmer, N. K., Kälin, W., Jacobshagen, N., & Meier, L. L. (2012). The ambivalence of challenge stressors: Time pressure associated with both negative and positive well-being. *Journal of Vocational Behavior*, *80*(2), 422–433. https://doi.org/10.1016/j.jvb.2011.09.006

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, *9*(4), 625–636. https://doi.org/10.3758/bf03196322

Yukl, G., & Mahsud, R. (2010). Why flexible and adaptive leadership is essential. *Consulting Psychology Journal: Practice and Research*, *62*(2), 81–93. https://doi.org/10.1037/a0019835

Yusoff, M. S. B. (2011). The validity and reliability of secondary school stressor questionnaire (3SQ) in identifying stressor among adolescents in secondary school. *International Medical Journal*, *18*(2), 99–105. https://doi.org/10.1016/j.ijosm.2010.11.003

How to cite this article: Lee, J., & David, E. M. (2022). Examining the indirect effects of embodied learning on adaptability: The mediating roles of challenge stressors and psychological capital. *Personnel Psychology*, *75*,707–737. Advance online publication. https://doi.org/10.1111/peps.12482