
Experimental Analysis of a Web-Based Training Intervention to Develop Positive Psychological Capital

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Psychological capital with components of hope, self-efficacy, optimism, and resiliency has recently emerged as a core construct in taking positive psychology to the workplace. A distinguishing feature is that it is “state-like” and thus open to development. We analyze whether such psychological capital can be developed through a highly focused, 2-hour web-based training intervention. Using a pretest, posttest experimental design (n = 187 randomly assigned to the treatment group and n = 177 to the control group), we found support that psychological capital can be developed by such a training intervention.

Although the importance of positivity has been given attention through the years, only recently has it been proposed as a new (or at least renewed) lens to focus study on organizational behavior (Cameron, Dutton, & Quinn, 2003; Luthans, 2002a, 2002b; Luthans & Youssef, 2007; Luthans, Youssef, & Avolio, 2007; Nelson & Cooper, 2007; Roberts, 2006; Turner, Barling, & Zacharatos, 2002; Wright, 2003). Drawn from the recent positive psychology movement (Peterson, 2006; Peterson & Seligman, 2004; Seligman & Csikszentmihalyi, 2000; Snyder & Lopez, 2002) and to differentiate from the more macro-oriented positive organizational scholarship (Cameron & Caza, 2004; Cameron et al., 2003; Spreitzer & Sonenshein, 2004), Luthans (2002b: 59) has defined *positive organizational behavior* as “the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today’s workplace.”

As indicated in this definition, the specific criteria to determine positive capacities include being based on theory and research with valid measurement (to differentiate from the popular positive

personal development literature and techniques), and also being state-like. This “state-like” criterion means that the capacity must be malleable and open to development, as opposed to trait-like, relatively fixed, as is found in widely recognized Big Five personality characteristics (Mount & Barrick, 1995); core self-evaluations (self-esteem, generalized efficacy, locus of control, and emotional stability; Judge & Bono, 2001); or positive affectivity (Watson, Clark, & Tellegen, 1988). The psychological resources that have been determined to best meet these definitional criteria of positive organizational behavior are hope, efficacy, optimism, and resilience (Luthans, 2002a; Luthans & Youssef, 2007; Luthans, Youssef, & Avolio, 2007).

Theory development (Luthans & Avolio, 2008; Luthans & Youssef, 2004; Luthans & Youssef, 2007; Luthans, Youssef, & Avolio, 2007) and accumulating research (Avey, Wernsing, & Luthans, 2008; Avey, Patera, & West, 2006; Luthans, Avolio, Avey, & Norman, 2007; Luthans, Avey, Clapp-Smith, & Li, 2008; Luthans, Avolio, Walumbwa, & Li, 2005) indicate that the identified positive organizational behavior states may represent a single latent, core factor termed *psychological capital*, or simply Psy-

Cap. PsyCap is defined as "an individual's positive psychological state of development and is characterized by: (1.) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2.) making a positive attribution (optimism) about succeeding now and in the future; (3.) persevering toward goals, and when necessary, redirecting paths to goals (hope) in order to succeed; and (4.) when beset by problems and adversity, sustaining and bouncing back and even beyond (resiliency) to attain success" (Luthans, Youssef, & Avolio, 2007: 3).

Although research studies are demonstrating the impact that PsyCap may have on performance (Luthans, Avolio et al., 2007; Luthans, Avey et al., 2008; Luthans et al., 2005; Luthans, Norman et al., 2008; Youssef & Luthans, 2007), satisfaction and/or commitment (Larson & Luthans, 2006; Luthans, Avolio et al., 2007; Luthans, Norman et al., 2008; Youssef & Luthans, 2007) and absenteeism (Avey, Patera, & West, 2006), to date there has only been practical guidelines and unpublished preliminary evidence that it can be developed through the proposed Psychological Capital Intervention (PCI) model (see Luthans, Avey, Avolio, Norman, & Combs, 2006; Luthans, Youssef, & Avolio, 2007). In particular, development and empirical assessment of PsyCap through a technology (i.e., Internet) mediated intervention has not been attempted.

Explicit in this web-based intervention model is the focus on the developmental nature of each component (i.e., hope, self-efficacy, optimism, and resilience), as well as when combined, development of the underlying core construct of PsyCap. We propose this web-based PsyCap intervention represents a conceptual and pragmatic progression from teaching and training principles delivered face-to-face that have traditionally focused on developing human capital (who you are in terms of knowledge, experience, and skills) to expanding to the development of the more recently recognized psychological capital (who you are and what you can become; Luthans, Luthans, & Luthans, 2004; Luthans, Youssef, & Avolio, 2007).

We propose the time has come to focus training interventions on developing positive psychological state-like capacities, such as PsyCap, that can be constructed and operationalized for web delivery. Such web-based interventions can take advantage of the benefits of speed, convenience, cost, and effectiveness in the field of leadership and human resource development. The purpose of this study is to test the feasibility and effectiveness of such a development strategy by addressing the following research question: "Can the four psychological resources of hope, efficacy, optimism, and

resilience as indicators of the core factor of psychological capital be developed in a highly focused, short duration, web-based intervention?"

THEORETICAL FOUNDATION

The theory building for the four positive states and the core construct of PsyCap have been covered in detail elsewhere (e.g., see Luthans, 2002a, 2002b; Luthans & Avolio, 2008; Luthans, Avolio et al., 2007; Luthans & Youssef, 2007; Luthans, Youssef, & Avolio, 2007). However, for the purposes of this study, we will briefly summarize this theoretical foundation and then concentrate more on the developmental potential of PsyCap through a short web-based training intervention.

The Hope State

Although each of the four identified states underlying PsyCap are commonly used in everyday language, in the field of positive psychology, they are characterized by a strong theoretical foundation, considerable research, and valid measures. For example, Snyder and colleagues have defined hope as a "positive motivational state [italics added] based on an interactively derived sense of successful (a) agency (goal directed energy) and (b) pathways (planning to meet goals)" (Snyder, Irving, & Anderson, 1991: 287). Thus, hope consists of three major conceptual foundations: agency, pathways, and goals. Specifically, hope is the aggregate of the agency, or goal-directed determination/willpower, and the pathways, the ways to achieve goals (Snyder et al., 1991). The willpower-and-pathways thinking operates in a combined iterative process in order to generate hope (Snyder, 2000).

Although sometimes presented as dispositional, the developmental capacity of hope has been clearly supported (Snyder, 2000; Snyder et al., 1991; Snyder et al., 1996). For example, in clinical applications, there is evidence that hope can be learned through an intentional focus on solution-based training interventions (Snyder, 1994), and more recently, Snyder and colleagues (2000, 2002) have demonstrated the developmental nature of state hope across multiple studies using a goal-based framework. Based on this body of research, we posit that hope can also be developed in organizational participants through a carefully designed (described in the following Methods section) web-based training intervention.

The Efficacy State

Self-efficacy, or "one's conviction (or confidence) about his or her abilities to mobilize the motiva-

tion, cognitive resources or courses of action needed to successfully execute a specific task within a given context" (Stajkovic & Luthans, 1998: 66) is based on Bandura's (1986, 1997) social cognitive theory. His widely recognized sources of efficacy development include task mastery, vicarious learning or modeling, social persuasion, and psychological or physiological arousal.

First, when employees successfully execute a given task, they have enacted task mastery over that particular task, increasing self-efficacy. Second, employees' efficacy may be increased when they vicariously learn by watching relevant others accomplish the task (i.e., modeling processes). This source of efficacy development has foundations in Bandura's (1986) social learning theory with an emphasis on the modeling process. Third, when relevant, respected others (e.g., managers or peers) express confidence in the employee's ability to execute a given task or provide positive feedback on progress, efficacy is enhanced. Fourth, efficacy is developed through psychological and physiological arousal, or the belief that one is mentally and/or physically fit to accomplish the task. Each source of efficacy can be considered a strategy for use in a web-based training intervention whereby participants may learn to be efficacious in task- or domain-specific applications.

The Optimism State

Similar to hope, optimism is commonly discussed, but in positive psychology, Seligman (1998) utilizes an attribution or explanatory style to understand it. He defines *optimists* as those who make internal, stable, and global attributions regarding positive events (e.g., goal achievement), but attribute external, unstable, and specific reasons for negative events (e.g., a missed deadline). Carver and Scheier (2002) offer complementary work with distinct theoretical underpinnings utilizing an expectancy framework noting, "optimists are people who expect good things to happen to them; pessimists are people who expect bad things to happen to them" (2002: 231).

Like hope, optimism has been theorized to have both trait-like and, more applicable to this theoretical foundation for PsyCap, state-like characteristics. For example, Seligman (1998) demonstrates the developmental nature of optimism with his concept of "learned optimism." This argument was suggested many decades ago as Beck (1967) provided theory and research on developing optimistic expectations in clinical patients. In addition, although often associated with dispositional optimism, Carver and Scheier (2002) have recently dis-

cussed plausible change in an optimistic direction and propose the need of intervention strategies to portray the developmental nature of optimism. Overall, optimism development has been used in clinical interventions, practitioner-oriented leadership books, and has been theorized and researched by widely recognized positive psychologists. Thus, we propose that the optimism of organizational participants can be open to development in a web-based training intervention.

The Resilience State

Resilience, the fourth state-like construct determined to meet the criteria of psychological capital, is identified in positive psychology as one's ability, when faced with adversity, to rebound or "bounce back" from a setback or failure (Block & Kremen, 1996; Masten et al., 1985). It has been traditionally focused on "at risk" youth who succeed despite severe odds and adversity. Positive emotions have been shown empirically to enhance resilience in the face of negative events (Tugade, Fredrickson, & Barrett, 2004). As this dynamic learning process of resilience focuses on positive adaptation, developmental interventions serving to maximize assets or resources and minimize risk factors (Masten, 2001; Masten & Reed, 2002) provide successful strategies for resilience-focused interventions (Bonanno, 2005; Luthans, Vogelgesang, & Lester, 2006; Schoon, 2006) that can be incorporated into a web-based training intervention.

The Psychological Capital Core Construct

The theory and research on a higher order, core construct of psychological capital (PsyCap) comprised of hope, efficacy, optimism, and resilience has been supported by recent research (Luthans, Avolio et al., 2007). The identification of such second-order factors has become increasingly common in organizational behavior research. Examples include transformational leadership comprised of idealized influence, individualized consideration, intellectual stimulation, and inspirational motivation (Avolio, Bass, & Jung, 1999); empowerment comprised of meaning, competence, self-determination, and impact (Spreitzer, 1995); and core self-evaluations consisting of self-esteem, generalized efficacy, locus of control, and emotional stability (Judge & Bono, 2001).

The conceptual independence and discriminant validity of hope, optimism, efficacy, and resilience have been theoretically presented (e.g., see Luthans, Avolio et al., 2007; Snyder, 2002) and empirically demonstrated (e.g., Avey et al., 2006; Bry-

ant & Cvenegros, 2004; Carifio & Rhodes, 2002; Luthans, Avolio et al., 2007; Magaletta & Oliver, 1999; Youssef & Luthans, 2007) in the positive psychology and positive organizational behavior literature. In addition, allied theoretical support for PsyCap as a second-order core construct can be found in psychological resources theory (see Hobfoll, 2002) and Fredrickson's (2001) broaden-and-build theory of positive emotions. Law, Wong, and Mobley (1998) have also suggested that multidimensional constructs such as psychological resources, or, in this case psychological capital, may be better understood in terms of an underlying core factor. This is especially evident when constructs are highly related yet integrated with each other. For example, faced with a setback, if highly resilient employees with the ability to bounce back are also self-efficacious and highly hopeful, they will be motivated to persist and put forth the required effort to overcome the problem, as well as pursue alternate pathways in order to return to their original level or beyond where they were before the adverse event. Moreover, those high in optimism may have a positive perspective in general, but combined with efficacy and hope, may also have the persistence to pursue many alternative pathways when necessary to achieve their optimistic expectations and goals.

Related support for PsyCap as a core construct can also be drawn from the broaden-and-build theory. Fredrickson provides both theoretical and empirical evidence that positive emotions trigger "upward spirals" of broader thinking, functioning, and well-being (Fredrickson & Joiner, 2002). These processes act in a combinatorial way with each other to effect what she refers to as "broaden-and-build." PsyCap is proposed to also act in such an integrated, interactive, and broadening way with its factors of hope, efficacy, optimism, and resiliency in the motivated and motivating pursuit of success and desirable organizational outcomes (see Luthans, Avolio et al., 2007; Luthans & Youssef, 2007; Luthans, Youssef, & Avolio, 2007).

ON-LINE INTERVENTION TECHNOLOGY

Besides the theoretical and research foundation for psychological capital, a brief review of on-line intervention technology is also needed as background for the study. The greatly increased demand of web-based products, service, and treatment delivery carries over to human resource development. Analogously, Seligman and colleagues recently called for the advancement of positive interventions in clinical applications that can "supplement traditional interventions that relieve suffering and may

someday be the practical legacy of positive psychology" (Seligman, Steen, Park, & Peterson, 2005: 410).

Despite the continuous technological advancements and increased knowledge surrounding Internet interventions in clinical psychology (e.g., see Ritterband et al., 2003), except for Seligman et al.'s (2005) work on the learned properties of happiness and optimism, little work has focused on on-line positivity interventions, and none has been applied to the development of PsyCap. However, an increasingly suggested supplement for traditional interventions has been the use of the Internet as a viable media and, especially relevant to this study's training intervention, with the direct focus on developing positivity and the flourishing of individuals in both the academic classroom and the workplace.

Much debate has surfaced in the past 20 years in the learning and education scholarly community with regard to the attributes and effectiveness of various media on learning. For example, many years ago Clark (1983) made the claim that there are no learning benefits gained from the media, but rather the media is a vehicle that only delivers, not "causes," learning. Furthermore, he posited that it is the instructional methods that cause learning, not the media (Clark, 1994). Despite the controversial arguments around the issue of whether media impacts learning, there is general agreement that media and its attributes have significant influences on the cost and speed of learning, and relevant to the on-line intervention used in the present study, that "only the use of adequate structural methods will influence learning" (Clark, 1994: 27). The intent of the web-based delivery of the PsyCap intervention used in this study was not only to take advantage of the ease of implementation, delivery, cost, and accessibility, but to focus on the structural methods used to impact learning and development of PsyCap.

In the last decade, with dramatically increasing use of on-line methods to deliver education, training, and interventions, a number of studies have examined its effectiveness. Recent meta-analytic results of these studies indicate that web-based instruction may in some ways be as effective, or for certain types of learning more effective, than traditional face-to-face classroom instruction (Sitzmann, Kraiger, Stewart, & Wisher, 2006). Specifically, equivalent support for face-to-face and web-based delivery was found for trainee satisfaction and procedural knowledge, but for learning, declarative knowledge the web-based approach was more effective (Sitzmann et al., 2006). Such findings

support the use of the on-line PsyCap training intervention.

Ritterband and colleagues (2003) provide some specific steps that Internet interventions should follow to be effective. These guidelines include personalization and a multimedia approach. The PsyCap training intervention in the present study followed these suggestions by utilizing personalized animation, detailed PowerPoints, and personalized exercises coupled with video commentary by a facilitator (one of the researchers). The intent was to maximize the learning and development of PsyCap (more specific details of the intervention are provided in the procedures section that follows). A meta-analysis by Bernard and colleagues (2004) on distance education also supports the use of our multimedia approaches. This meta-analysis found that non-interactive video was one of the top predictors of learning and achievement and provides further support for the use of supplementary visual materials (Bernard et al., 2004).

Beyond the potential advantages to learning and development, the use of web-based interventions in research provides other significant benefits. For example, Internet data collection allows for the direct downloading of data, which decreases the risk of human error. A larger, more distinct advantage of Internet interventions is the cost effectiveness and the potential of vast accessibility. Despite these recognized advantages, considerable debate has recently surfaced regarding the use of the Internet for research purposes. For example, Gosling and colleagues (2004) addressed the bias controversies of Internet research and concluded that Internet data can be just as diverse as traditional methods of research. They argue that participants in web-based studies are no more psychologically disturbed, and are no less likely to take the study seriously than those participating in traditional research methods. These types of findings support the delivery of experimental interventions via the Internet.

The rapid development of technology and increased sophistication in delivering various methods enabled the present study to adequately leverage and operationalize PsyCap developmental models such as the recently proposed PCI (psychological capital intervention) model (see Luthans, Avey et al., 2006; Luthans, Youssef, & Avolio, 2007) for quicker adaptation and implementation at a fraction of both the time and cost of traditional training interventions, and also have more ready accessibility. For example, clinical and behavioral development programs have recently surfaced with Internet applications. These include a broad

spectrum of behavioral health programs, such as tobacco cessation and hypnotherapy (Jerome et al., 2000). Given the emergence of technological sophistication in Internet delivery, learning, development, data collection, and accessibility, we propose that PsyCap as a core construct can be developed through a web-based intervention by drawing on the recognized developmental guidelines of each PsyCap component (i.e., hope, efficacy, optimism, and resilience).

Based on the theory building and research to date on psychological capital and the emergence of technologically sound Internet, web-based delivery of experimental interventions, we derive the following hypothesis for this study to test:

Hypothesis: Psychological capital as a core positive construct can be developed in employees through a short, highly focused web-based intervention structured around the recognized developmental guidelines of the four PsyCap components (hope, efficacy, optimism, and resilience).

METHODS

This study used a pretest, posttest control group experimental design utilizing a heterogeneous sample of 364 working adults representing a wide cross-section of industries including manufacturing, service, sales, and government. The sample size for the treatment group included 187 participants, and the control group included 177 participants. Participants were recruited through university contacts and then were sent an e-mail by the researchers for participation in an on-line "positive leadership training" session. Respondents were randomly assigned to either the control or treatment group through a private and secure survey generator. A slight majority (59%) of the participants were in nonmanagement roles, but a significant amount (41%) were first-level supervisors or higher. Additional demographics of the sample included a mean age of 32.2 years and an average job tenure of 12.1 years. The majority of participants were Caucasian (88.5%) with 5.8% unreported, 3.3% Asian, 1.4% African-American, and Hispanic and Native American groups comprising less than 1% of the total sample. The majority of the participants had an associate's degree or higher. A third of the total participants had obtained a bachelor's degree and 11% had a master's or doctorate degree.

Intervention Procedures and Treatment

All participants were sent a URL, which led them to the initial intervention web page. Here they registered using their e-mail address and were provided an 8-digit random identification code used for aligning pre- and postmeasures. Following this registration, participants completed all survey measures for Time 1 and were then randomly assigned to either a 45-minute positive PsyCap intervention (treatment group) or a decision-making exercise that included the same time duration and multimedia techniques (control group). All aspects of the intervention were completed on-line, that is, data collection, delivery, and content of both the treatment and control conditions. One week after completion of the first training session, all participants (both treatment and control groups) were sent a final URL, which took them to the second 45-minute session. Three days after the second session, the final PsyCap survey (Time 2) was administered on-line to both treatment and control groups.

The implementation of the intervention for the treatment group included two on-line sessions each beginning after participants logged onto the website. In the first session, the facilitator (one of the researchers used for all sessions in both the treatment and control conditions) focused on the introduction of the positive capacities of resilience and efficacy. This video presentation included definitions coupled with a general explanation of how each capacity is applicable in the workplace in general and their job in particular. The web-based delivery format was a narrated PowerPoint presentation embedded in Flash animation. This Flash technology provided a medium for creating and presenting the basic information in videolike format. In addition, flash files were embedded within the presentation. These files allowed participants to view short video clips from popular movies that the facilitator used as examples of resilience and efficacy in dramatized settings.

The final phase of the first session was used for participants to consider personal work-related situations in their organizations. Specifically, participants were asked to consider challenging work situations for which they felt "stuck" or "in a bind" in terms of resilient processes, resilience thinking, and efficacious thoughts and behavior. For example, participants were asked to write down what circumstances at work were within or outside of their direct control. Next, participants were asked to list a series of actions they could take based on those circumstances that were within their direct control. This process allowed participants to cre-

ate specific courses of action for the work situations they previously termed challenging and that lacked a course of action.

To put closure on the first session, the Flash presentation was stopped, and participants were prompted to engage in self-reflection exercises. These reflection exercises included specific techniques that cued participants to focus on past thoughts, emotions, and behaviors. In addition, the exercises cued their intentions for future steps and actions to take during these challenging situations. Upon completion of these written reflection exercises, the Flash presentation was resumed, and the facilitator concluded with a summary that included the PsyCap components' definitions, a reminder of what was learned, and how to apply what was learned about these positive capacities to their jobs by using the same techniques that they had just practiced in the exercises. The intent of this conclusion was to facilitate the transfer of the training to the participants' jobs.

The second session for the treatment group emphasized the development of hope and optimism. As Snyder (2000) argues that people are inherently task or goal oriented, or always trying to accomplish something, considering personal goals was the starting point for session two. In a narrated Flash presentation, the same facilitator discussed the importance of personal values, the realistic challenge of accomplishing tasks and goals, and then directed participants to write down several tasks they would like to accomplish that were realistically challenging, applicable to the workplace, and personally valuable. Again drawing from Snyder's (2000) work on hope development, the facilitator used, and indicated to the participants, the term *goal* to mean an objective, task, or something an individual wants to accomplish. After discussion and examples of what constitutes a realistically challenging goal and how to determine if the goal was personally valuable, participants chose one of the several goals they had previously listed as the framework for the remainder of this second session.

It is important to note that the adjectives of "realistically challenging" and "personally valuable" in terms of goals are quite subjective. A methodology or manipulation check to ensure goals were framed in this manner was not possible here. However, the facilitator made a very deliberate effort to provide a clear discussion of these goal characteristics and many examples were given. As important, Snyder (2000) has demonstrated in his clinical work that framing goals as both personally valuable and realistically challenging increases the

motivating agentic capacity of individuals, that is, the "will power" component of hope.

The facilitator then directed the participants to take the goals that were realistically challenging and break them down into smaller goals. This is what Snyder (2000) refers to as "stepping." This process of dividing large goals into smaller more manageable ones was also designed to increase the agentic capacity of hope. The participant could see that the overarching goal was more attainable through small "subgoals," which in turn affects the willpower dimension of hope. The idea here was that as goals appear to be more attainable, general expectations of success in the applicable area (the participant's area of responsibility) are increased, thus influencing participant's levels of optimism and hope, but also their self-efficacy. Most directly, however, optimism was targeted in this technique as participants practiced identifying positive outcomes and successful activities that would lead to personal goal attainment. The increased positive expectations about those outcomes were intended to contribute to developing optimism for achieving success. In addition, when participants practice developing strategies to attain personal goals, negative expectations may be reduced, and thus, positively influence optimism.

The goal of this second session was for each participant to have attained some degree of task mastery (efficacy building) through identification of a personally valuable goal then parceling this goal into more manageable subgoals. The pathways component of hope was influenced by the identification and generation of multiple pathways to accomplish the same goal, as well as creating contingency plans for overcoming potential obstacles and problems.

The overall objective of this web-based intervention consisting of the two sessions focused on an integrated developmental strategy for all four PsyCap state-like capacities in an effort to enhance the overall PsyCap of participants in the treatment group. The intervention consisted of distinct, yet in many ways similar, sessions for overall PsyCap development.

The control group, on the other hand, received an alternate, very different—but still relevant to leadership and human resource development—decision-making exercise. After the control participants, who were blind to their condition, linked to a website, the same facilitator used similar procedures as the treatment training intervention to take them through the decision exercise using Flash animation on video. The facilitator emphasized the importance of reflection and thinking through choices in the first session and then in the second

session provided feedback of what others had done and why on this exercise. Based on this feedback, the participants were then allowed to reflect and change their choices. After completion of this exercise, the facilitator provided the control participants suggested solutions and discussed the implications the exercise had for effective decision making.

PsyCap Measure

Psychological capital was measured both pre- and postintervention using the 24-item PsyCap questionnaire (PCQ; Luthans, Avolio et al., 2007; Luthans, Youssef, & Avolio, 2007). The items used in this PCQ were originally drawn from published validated scales commonly used in positive psychology. These individual scales have also been used in previous studies in the workplace (e.g., Peterson & Luthans, 2003, Luthans et al., 2005; Youssef & Luthans, 2007). Six items in this PCQ represented each of the four components that make up PsyCap. These items were adapted for the workplace from the following standard scales: (1.) Hope (Snyder et al., 1996); (2.) Resilience (Wagnild & Young, 1993); (3.) Optimism (Scheier & Carver, 1985); and (4.) Efficacy (Parker, 1998).

The entire 24-item PCQ is published in Luthans, Youssef, and Avolio (2007: 237–238). Some sample items for each subscale include the following: "I feel confident helping to set targets/goals in my work area" (efficacy); "If I should find myself in a jam at work, I could think of many ways to get out of it" (hope); "I always look on the bright side of things regarding my job" (optimism); and "I usually manage difficulties one way or another at work" (resiliency). To emphasize the "state-like" nature of the measure, the participants were asked to respond by describing "how you may think about yourself right now." Then all responses for the PCQ were anchored on a 6-point Likert scale: 1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *somewhat agree*, 5 = *agree*, and 6 = *strongly agree*. Each PsyCap component demonstrated acceptable reliability in this study (efficacy = .92, hope = .87, resilience = .83, optimism = .77), as well as overall PsyCap (.93).

Although acceptable psychometric properties and support for the construct validity of this PCQ have been demonstrated (see Luthans, Avolio et al., 2007), because it is a relatively recent scale, confirmatory factor analysis of the PCQ considering PsyCap as a second-order factor was conducted in the present study as well. The 6 items were set for each component to load on their respective component. Each of the four components

was then set to load on to the PsyCap factor. All of the item loadings were significant ($p < .01$) on their respective latent factor as well as each component loading on the second-order factor PsyCap. Results of the CFA were as follows: SRMR = .048, RMSEA = .054, CFI = .958. Based on Hu and Bentler's (1999) recommendations of SRMR $< .08$, RMSEA $< .06$ and CFI $> .95$, results from the CFA suggest strong fit for the second-order factor model. Overall, the CFA results support that the four PsyCap components do represent an underlying latent, core construct of overall PsyCap.

RESULTS

The results of the study are shown in Table 1. Given the focus of the analysis on mean differences within the treatment and control groups, ANOVA and ANCOVA were determined to be the appropriate statistical techniques. In addition to ANOVA and ANCOVA, we calculated confidence intervals, effects sizes, and binomial effect size displays (BESD). Although random assignment to treatment and control groups promotes initial equivalence between the groups, before conducting the analyses, initial equivalence was determined by an ANOVA between the levels of PsyCap of the treatment and control groups. Based on a nonsignificant result ($p = .256$), we concluded random assignment was indeed effective in establishing initial equivalence between the two groups, as no significant differences were found between their levels of PsyCap.

Effect sizes were also calculated for the mean differences observed between treatment and control groups. Specifically, as shown in Table 2, the effect size for the difference from Time 1 to Time 2 for the treatment group was $d = .191$ ($r = .095$). The effect size for the difference from Time 1 to Time 2 for the control group was $d = -.042$ ($r = -.084$). In addition to ANOVA, we conducted an ANCOVA for

TABLE 1
ANOVAs to Validate Initial Equivalence Between Treatment and Control Conditions

Source	Treatment M	Control M	F test	p value
PsyCap at Time 1	4.61	4.69	0.738	.391
Age	32.18	32.85	0.043	.836
Gender	1.48	1.50	0.093	.761
Job Level	1.96	1.87	0.364	.547
Ethnicity ^a	1.06	1.07	0.024	.877
Education	2.58	2.50	0.773	.380

^a Given the majority of participants were Caucasian, ethnicity was dummy coded Caucasian (1) and non-Caucasian (2).

TABLE 2
Means, ANOVA, Effect Sizes, and Confidence Intervals for PsyCap

	Treatment	Control
Mean Time 1 (SD)	4.58 (.610) ^a	4.69 (.591)
Mean Time 2 (SD)	4.70 (.643)	4.64 (.605)
p value	.016	.061
Effect Size d	.191	-.042
Effect Size r	.095	-.083
95% CI	+/- .084 (.035 - .204)	+/- .058 (-.003 - .114)

^a The group means from the treatment group in Table 1 are slightly different than Table 2 given mortality from Time 1 to Time 2.

a more rigorous test of mean differences. Specifically, PsyCap data at Time 2 were compared between the treatment and control conditions, controlling for PsyCap at Time 1. The analyses focused on the difference between the two groups as a result of group (treatment or control) assignment, controlling for any effects of the previous PsyCap scores. In addition to controlling for the effect of PsyCap at Time 1, we also included the covariates of age, gender, job level, ethnicity, and education. Results shown in Table 3 suggest that the group variable (treatment or control conditions) was a significant predictor of PsyCap at Time 2 ($p < .001$), whereas age, gender, job level, ethnicity, and education were not ($p > .05$).

Binomial effect size display (BESD; Rosenthal & Rubin, 1982) is a practical method that demonstrates the anticipated utility of a given developmental intervention and uses the effect size r in its calculation. This statistic is useful because "computing a BESD to show just how much of a difference we make by applying the knowledge we produce can relieve feelings of importance that are likely to be aroused by effect sizes expressed in terms of the proportion of variance explained" (Eden, 2002: 845). The BESD provides the researcher with a range of values that highlight the antici-

TABLE 3
ANCOVA Controlling for PsyCap at Time 1, Demographic and Job Variables

Variables	F value	p value
PsyCap at Time 1	605.958	.000
Age	1.029	.312
Ethnicity	.691	.407
Job Level	.495	.482
Education	.146	.703
Gender	.735	.392
Randomly Assigned Group (Treatment or Control)	6.551	.011

pated success rate of the developmental intervention for those participants in the treatment group by calculating one half of the treatment effect size added to .5 for the treatment group and subtracted it from .5 for the control group.

Given that each participant was randomly assigned to either the treatment or control group, it would be expected that participants in both the treatment and control groups have an equal chance of increasing their PsyCap apart from the intervention (e.g., day-to-day life or work events). This equal chance of success, apart from the intervention, is an assumption when calculating BESD. The observed treatment effect size was $r = .095$. Applying the formula for BESD, the display range was .452 to .548. The implication of this BESD range is that participants without this PsyCap intervention will score above average on the PsyCap instrument 45.2% of the time, whereas participants receiving the intervention will score above average on the PsyCap instrument 54.8% of the time.

DISCUSSION

The purpose of this study was to determine whether a short web-based training intervention could be effective in human resource development of PsyCap. Specifically, our research question was whether a training intervention focused on efficacy, hope, optimism, and resilience as indicators of a second-order, core factor of PsyCap could be effectively developed in a 2-hour on-line training intervention. Through a pretest, posttest control group experimental design, the treatment group did experience a significant increase in their PsyCap, while the randomly assigned control group that went through a different, but relevant intervention, did not show a significant increase in their PsyCap. In addition, results of the ANCOVA demonstrated that the PsyCap intervention positively developed PsyCap, as the group variable predicted PsyCap at Time 2 while controlling for pre-PsyCap scores, demographics, and job level. Overall, the results of this experimental study provide at least initial support that the psychological capital of a broad cross-section of organizational participants can be developed through a short web-based training intervention.

Beyond this beginning support for the effectiveness of this type of an approach to human resource development of PsyCap, the study also provides additional evidence of PsyCap being a higher order, core construct. Building on previous work in psychological resource, core self-evaluation, and broaden-and-build theories in positive psychology and organizational behavior, confirmatory factor

analyses here builds on previous research support for a second-order, core construct of PsyCap indicated by self-efficacy, hope, resilience, and optimism.

A notable strength in the internal validity of this study was the random assignment of participants into treatment and control groups. The major benefit of random assignment is that it assumes initial equivalence on all potentially confounding variables in the study, and analysis of the Time 1 levels of PsyCap showed no significant difference between experimental and control groups. In terms of external validity, the heterogeneous nature of the sample provides support for generalizing the results. Specifically, the effects for a web-based PsyCap intervention may not be limited to one particular organization, industry, or demographic group, as multiple organizations, industries, and demographics were represented within the study sample. However, although the study utilized random assignment to conditions, it was not possible to generate random selection of participants. Therefore, even though the participants for the study came from a wide variety of organizations, job levels, and types, they could be a unique subset of the population and thus this could be a threat to the external validity of the study findings. Overall, given the strengths of the pretest, posttest control group design and the diverse cross-sectional sample, the results can generally rule out alternative explanations. Yet, some potential limitations still need to be noted.

Limitations

As opposed to the internal and external validity threats to the study findings, most of the potential limitations are concerned with the web-based intervention. First, this study did not compare this web-based intervention to a typical face-to-face classroom or training intervention. Thus, we can not say nor do we intend to imply that this web-based training intervention works as well, better, or worse than a face-to-face intervention in developing PsyCap. The results simply suggest that web-based delivery for the PsyCap intervention may be effective. However, when considering web-based versus traditional face-to-face training interventions, the Sitzmann et al. (2006) meta-analysis noted in the introductory discussion did find that web-based approaches such as used in this study may be as, or even more, effective than traditional face-to-face delivery of an intervention. However, from a pedagogical standpoint, future research comparing face-to-face with web-based delivery of PsyCap training would be beneficial.

Another potential limitation was that the study design did not permit individual components in the development process to be measured and assessed. Thus, it is possible that some components of the training worked better than others. A related limitation is that specific facets of PsyCap were not provided separate programs. For example, literature on goal setting supports the idea that more challenging goals may increase self-efficacy (Locke & Latham, 1990). Given it was not possible in this study design to obtain multiple measures of PsyCap taken at multiple time points throughout the intervention, overall PsyCap development may have been related to goal-setting effects through increased self-efficacy.

Still another limitation is that the only outcome variable in this study was PsyCap. While previous research has demonstrated a positive relationship between PsyCap and important outcomes such as performance (e.g., Luthans, Avey et al., 2008; Luthans, Avolio et al., 2007; Luthans et al., 2005; Luthans, Norman et al., 2008), satisfaction and/or commitment (Larson & Luthans, 2006; Luthans, Avolio et al., 2007; Luthans, Norman et al., 2008), and absenteeism (Avey et al., 2006), the specific learning, behaviors, or outcomes were not obtained from this specific study. Thus, the effect of this web-based PsyCap training intervention study results can not be extended beyond developing PsyCap.

In terms of limitations to the actual value of implementing such PsyCap training, although the BESD results provide support for the potential utility for increasing participant PsyCap, it cannot substitute for a cost-benefit analysis. While the study results do provide at least initial support that the intervention was able to increase PsyCap, and previous research does support that PsyCap is related to performance outcomes, a cost-benefit analysis would need to be calculated to determine the appropriateness of the intervention in a specific context. This may also be considered as return on development (ROD) for the PsyCap intervention. Utility analysis has demonstrated such an ROD for PsyCap (e.g., see Luthans, Avey et al., 2006; Luthans, Youssef, & Avolio, 2007).

Each limitation provides areas for future research. For example, intervention designs may seek to target one or more facets of PsyCap in an effort to identify if one component can be more easily developed than others. Future researchers may also seek to examine more detailed planned comparisons by having differing lengths of training, forms of interface, and types of technology, such as Flash animation.

Implications

Our results here have some practical implications not only for developing PsyCap per se, but also for leadership and human resource development. They suggest that web-based developmental interventions focused on participants' hope, efficacy, optimism, resilience, and overall PsyCap may be accomplished in a relatively inexpensive and convenient, yet effective, manner. And once again, given the recent research showing a positive relationship between PsyCap and performance, a PsyCap development intervention may be able to influence performance and other desired outcomes.

Besides the implications surrounding PsyCap development is the potential advantageous role that information technology may play in leadership and human resource development. As computers and the Internet have become key tools for research and practice in the field of psychology (e.g., see Barak, 1999; Jerome, DeLeon, James, Folen, Earles, & Gedney, 2000), this study's results help contribute to the growing case for the use of this technology in leadership and human resource development. For example, the virtual context for this intervention indicates that this type of technology may be used to deliver development and training across the globe simultaneously or sequentially. Given that we are now in a "flat world" (Friedman, 2005) global environment where virtual teams and multinational corporations are the norm, the need for virtual training can be expected to increase and perhaps, as Seligman and colleagues (2005) have noted for positive psychology, be the legacy of applying positive organizational behavior interventions.

In addition to the implications for leadership and human resource development, web-based applications to medical care—especially to remote parts of the world (i.e., telemedicine)—and web-based interventions for both psychological and behavioral clinical treatments are being increasingly recognized and implemented (Ritterband et al., 2003). We propose that such technological innovations will escalate and be made even more user-friendly. The use of web-based interventions will continue to gain in popularity not only in global business, academic, medical, and clinical applications, but also in the training and development efforts in today's and especially future workplaces.

CONCLUSION

The recent wave of negative publicity stemming from corporate and geopolitical problems high-

lights the seeming need for more positivity in the world and the result has been a re-emphasis, not a new discovery, in the use of a positive lens for organizational behavior theory, research, and practice. Positive psychological resources such as hope or resilience, once thought to be reserved for "gifted" individuals (Garmezy, 1974), now have empirical support that they can be developed (Masten & Reed, 2002; Snyder, 2000). The same is true of more commonly recognized capacities in the field of organizational behavior, such as efficacy (Bandura, 1997; Stajkovic & Luthans, 1998) and optimism (Seligman, 1998). This study has taken the next step by empirically demonstrating that these positive capacities in the form of a second-order, core construct of psychological capital can be developed through a short web-based training intervention. The investment and development in psychological capital may not only have the potential to provide competitive advantage for organizations now and, especially, in the future, but also, through web-based delivery, an inexpensive, practical, and potentially effective means to deliver such development.

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