THE NUTS AND BOLTS OF LEADERSHIP TRAINING: A META-ANALYSIS

by

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ABSTRACT

Organizations within the United States spent over $70 billion on corporate training in 2013; 35% of this budget was allocated to management and leadership, making this field the leading training area for organizations (O'Leonard, 2014). Despite this spending, only 13% of companies believe that they have done a quality job training their leaders (Schwartz, Bersin, & Pelster, 2014). This calls into question the utility and effectiveness of current initiatives. In response, this study meta-analytically organizes leadership training literature to identify the conditions under which these programs are most effective. Thus, the current meta-analysis provides the following contributions to the field: (1) meta-analytic data across years (1887 – 2014) and organization types, utilizing only employee personnel data; (2) investigation of training effectiveness across all Kirkpatrick (1959) evaluation levels (i.e., trainee reactions, learning, transfer, and results); (3) meta-analytic data computed using updated procedures identified by Morris and DeShon (2002); and (4) an examination of moderators not previously investigated. Based on data from 335 independent samples, results suggest that leadership training is effective across reactions (d = .63), learning (d = .73), transfer (d =. 82), and results (d = .72). The strength of these effect sizes is dependent upon several moderators, but the pattern of results is not consistent across all outcomes. For learning outcomes, programs incorporating information-, demonstration-, and practiced-based delivery methods were most effective while other design and delivery features did not affect results. In regards to transfer, programs that utilized information-, demonstration-, and practice-based methods, feedback, content based on a needs analysis, face-to-face settings, and a voluntary attendance policy produced the largest effect sizes. For results, longer programs that were mandatory, spanned weekly sessions, incorporated practice-based methods, and located on-site produced the largest effect sizes.

For my family.

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CHAPTER ONE: INTRODUCTION

"Leadership and learning are indispensable to each other." (John F. Kennedy)

By definition, leaders coordinate, direct, and influence an organized group of individuals and aid them in achieving their goals (Bennis, 1959; Fiedler, 1967; Rauch & Behling, 1984). The success of an organization or a group is highly dependent upon its leader's knowledge, skill, and ability level as managers have a critical impact on organizational outcomes and performance (Burns, 1978; Bass, 1985; Fuller et al., 1996; Bono and Judge, 2003). However, finding good leaders, training them well, and retaining them poses an issue for most organizations. According to the Global Human Capital Trends 2014 survey conducted by Deloitte University Press, leadership is the number one talent issue facing organizations worldwide. In addition to being rated the most important skill, leadership was also rated as having the largest gap between an organization's readiness to address the issue and criticality. In fact, only 13% of respondents admit to doing an excellent job developing their leaders (Schwartz, Bersin, & Pelster, 2014). Although companies may not be producing effective leadership training programs, they continue to invest a significant amount of money into these programs annually and at an increasing rate (Gibler, Carter, & Goldsmith, 2000). It is clear from these findings that current leadership programs are critical, yet falling short. Companies are, "…not developing enough leaders" and "…not equipping the leaders they are building with the critical capabilities and skills they need to succeed" (Schwartz et al., 2014; p. 26). This issue raises a critical question in regards to current leader development and training research, *What do leadership training programs need to possess in order to be effective?*

The current study addresses this question by meta-analytically summarizing current leadership training research. The goal is to identify the specific elements contributing to the

success - or failure - of a leadership training program in regards to producing individual and organizational outcomes. Specific outcomes include trainee reactions, learning, behavior, and results as organized by the Kirkpatrick (1959) training evaluation framework. Previous meta-analytic investigations on this topic exist (e.g., Burke & Day, 1986; Collins & Holton, 2001); however, the current study offers several novel contributions to the science. First, the current study provides a meta-analysis of leadership training across all years (1887-2014) and in all types of organizations. The design and delivery of leadership training programs has most likely changed since the last meta-analysis encompassing all years (Burke & Day, 1986) due to the dynamic nature of organizations today. In order to have a competitive edge in the current market, organizations have become more globalized, service-oriented, and technologically savvy (Ryan & Ford, 2010; Leenders, Van Engelen, & Kratzer, 2003; Gephart, 2002). As such, current leadership training programs may not resemble the programs initially investigated in earlier reviews, and the current study provides a comprehensive, updated investigation. Secondly, the current study meta-analytically organizes research investigating the effect of leadership training on trainee reactions – an evaluation level yet to be meta-analyzed – in addition to learning, behavior, and results. Third, the meta-analytic technique identified by Morris and DeShon (2002) is implemented in order to combine the effect sizes of various study designs. Due to differences in how population parameters are estimated within distinct study designs, recently developed meta-analytic techniques call for effect size modifications to ensure accurate aggregation results (Glass, McGaw, & Smith, 1981; Morris & DeShon, 1997; Morris & DeShon, 2002). The current meta-analysis implements this updated technique to combine across study designs, which was not done for previous analyses (i.e., Collins & Holton, 2001; Powell & Yalcin, 2010; Avolio, Reichard, Hannah, Walumbwa, & Chan, 2009). One exception to this is the meta-analytic

investigation by Taylor, Russ-Eft, & Taylor (2009); however, this study only evaluated training transfer and did not include trainee reactions, learning, or results. Lastly, the current meta-analysis incorporates multiple moderator analyses that have yet to be tested across training outcomes in order to identify the 'nuts and bolts' of leadership training (e.g., presence of needs analysis, training location, provision of feedback). In sum, the purpose of the current meta-analysis is to not only identify if leadership training works, but is also to outline the conditions under which it is most effective in producing positive trainee reactions and positive changes in learning, behavior, and results. Additionally, the current study responds to the call for rapprochement between the training and leadership development literature (Barling, Christie, & Hoption, 2010) by testing whether best practices within the training literature also apply to leadership training effectiveness.

Leadership Development Defined

Leadership development is focused on developing "…the collective capacity of organizational members to engage effectively in leadership roles and processes" (Day, 2000; p. 582). Roles refer to both formal and informal authority positions and processes represent those that facilitate successful group and organizational performance (Day, 2000). Historically speaking, researchers considered leadership as solely an individual-level skill (Zaccaro, 2007; Johns & Moser, 1989). Additionally, researchers have identified the role of followers and the situation in contributing to leadership effectiveness (Malakyan, 2014; Seokhwa, Cox, & Sims, 2006). With this integrative model, researchers have also developed the distinction between leadership development and leader development (Day, 2000). Leader development represents training initiatives aimed at individual-level concepts whereas leadership development takes a more integrated approach as the focus consists of the interplay between leaders and followers

and socially-based concepts (Riggio, 2008; Iles, & Preece, 2006). Although researchers recognize this distinction, it is often the case that the terms are used interchangeably. As such, even though the focus of the current study is on leadership development, we have analyzed studies that refer to leader development, yet the actual training program includes concepts related to socially integrated knowledge, skills, and abilities.

When discussing the difference between leadership and leader development, it is also important to address the distinction between managerial training and leadership development. Managerial training and development has been described as "the process by which people acquire various skills and knowledge that increases their effectiveness in a number of ways, which include leading and leadership, guiding, organizing, and influencing others to name a few" (Klein and Ziegert, 2004; p. 228). The objective of a managerial training or development program involves teaching or enhancing managerial skills with the purpose of improving job performance (Goldstein, 1980; Wexley & Latham, 1981). Although, theoretically, there may be a distinction between managerial training and leadership training, it seems as if most researchers utilize the terms interchangeably and that managerial training programs can be considered leadership training or development programs. Specifically, the content areas of managerial training and development programs tend to overlap with leadership training and development programs (e.g., human relations, general management functions, problem solving and decision making, self-awareness, motivation/values, and specialties; Burke & Day, 1986). Additionally, a large number of studies involving training programs designated as managerial utilize leadership questionnaires to measure the training results (e.g., Hand, Richards, & Slocum, 1973; House, & Tosi, 1963), and these primary studies have been included in both managerial training and leadership development meta-analytic investigations (Burke & Day, 1986; Collins & Holton,

2001; Powell & Yalcin, 2010). In fact, Collins and Holton (2001) refer to leadership and managerial training programs as "managerial leadership development programs*"* (p. 217). Furthermore, it is often the case that managers constitute the participants in a leadership training study while the training is referred to as a leadership training or development program (e.g., Barling, Weber, & Kelloway, 1996; Kelloway, Barling, & Helleur, 2000; Howell & Avolio, 1993; MacKie, 2014).

With regards to the issue of leadership versus managerial development and training programs, the current study takes a similar approach; managerial, leader, and leadership training programs are included in the final analyses. The term 'leadership training' is used to denote programs designed to increase the knowledge, skill, and ability levels of leaders and managers within an organizational setting through the implementation of a systematically designed program. Moreover, executive coaching programs were also included.

Leadership Training: Previous Meta-Analytic Investigations

In addition to the theoretical explanation of leadership training effectiveness, Burke and Day (1986) and several other researchers (e.g., Collins & Holton, 2001; Powell & Yalcin, 2010) have provided meta-analytic evidence suggesting that leadership training programs increase learning and behavioral transfer; these studies are summarized in Table 1 and briefly discussed below. The current study builds upon and updates this previous work by investigating boundary conditions of leadership training effectiveness. Although previous results have alluded to significant moderators, the authors note that most of the analyses were based on a small number of primary studies. Future research is warranted due to, "…the inability to conduct some potentially useful follow-up analyses because many studies did not report necessary information" (Burke & Day, 1986; p. 243). The current study includes 335 primary studies; 378.57% more

than Burke and Day (1986) and an average of 440.61% more than the other meta-analytic investigations. Therefore, moderator analyses that were previously uninterpretable can be more confidently interpreted.

Burke and Day (1986). Burke and Day (1986) assessed the impact of managerial training by analyzing 70 studies utilizing methodologies outlined by Hunter, Schmidt, and Jackson (1982). They also investigated the impact of training method on outcomes and found effect sizes to vary depending on the method utilized. Although the results alluded to significant moderators of the effect of managerial training programs, the authors noted that most of the moderator analyses were based on a small number of primary studies. Furthermore, future research is warranted due to, "…the inability to conduct some potentially useful follow-up analyses because many studies did not report necessary information" (Burke & Day, 1986; p. 243). Since this meta-analysis, there has been an influx in the amount of leadership training studies published. For example, a search involving the term leadership development within Business Source Premiere yielded 2,040 results when including years 1983 to 2015 in comparison to 79 results when restricting it to years 1914 to 1982 (July, 2015). Furthermore, the current meta-analysis aims to conduct the moderator analyses that could not be interpreted with full confidence within Burke and Day's (1986) paper. In addition, updated meta-analytic techniques have been discovered since this initial meta-analysis (e.g., Morris & DeShon, 2002), and the current study implements these procedures.

Collins and Holton (2001). In 2001, Collins and Holton updated the findings of Burke and Day (1986). The authors meta-analytically investigated the effectiveness of managerial leadership development programs during the time period of 1982 and 2001 and analyzed 83 primary studies. Collins and Holton (2001) took a different approach to their analyses and

separated each study by research design (i.e., posttest only with control group (POWC), pretest-posttest with control group (PPWC), and single group pretest-posttest (SGPP)).

Although Collins and Holton (2001) coded for potential moderators (i.e., content, publication type, organization type, measurement method, and job classification), the lack of primary studies was insufficient and did not allow for such analyses. Furthermore, they conclude, "…any one of the moderator effects presented in this research could possibly be an artifact, due to the small number of effect sizes in subgroups of the moderator variable" (p. 228). As previously noted, the amount of relevant primary studies in the current leadership literature base surpasses what was available in 2001 enabling the current study to assess more moderator variables. In addition, Collins and Holton (2001) did not provide a true update of Burke and Day's (1986) study because the results are not an exact replica (i.e., they only included studies spanning 1982 and 2001 and possessed methodological differences). In fact, the authors note that, "…comparisons to Burke and Day's (1986) meta- analysis results should be made with caution" (p. 234). The current meta-analysis provides a true update of Burke and Day's (1986) meta-analysis, and combines study methods according to updated meta-analytic procedures identified by Morris and DeShon (2002). Additionally, results of the moderator analyses will be more stable due to the inclusion of a larger number of primary studies.

Avolio, Reichard, Hannah, Walumbwa, and Chan (2009). Avolio and colleagues (2009) meta-analytically investigated the impact of all leadership interventions (i.e., leadership training evaluations, manipulation studies) utilizing Hunter and Schmidt's (2004) methodology. Although Avolio and colleagues (2009) conducted a rigorous meta-analysis, most of the moderator analyses combined across leadership intervention types (i.e., leadership by manipulation and leadership interventions). While lumping the interventions together does

provide unique information as to the impact of leadership interventions in general, we are still unaware if these moderators influence leadership training effectiveness in particular. The current meta-analysis provides this information, and also uses updated meta-analytic procedures.

Taylor, Russ-Eft, and Taylor (2009). In Taylor and colleague's (2009) meta-analytic investigation, results only included measures of transfer and were categorized by the source of measurement (i.e., self, superior, peer, and subordinate). One hundred seven primary studies were analyzed and results suggested that the source of ratings has an impact on the degree of transfer. Transfer evaluations based on subordinate ratings were consistently lower than those based on self-ratings and superior ratings. Additionally, the degree of transfer varied by evaluation design, sample type, and study design. Although Taylor et al.'s (2009) study provides a comprehensive report of the transfer of leadership training; the current study includes all training evaluation levels (e.g., reactions, learning, transfer, and results), thereby providing a more robust synthesis of the literature.

Powell and Yalcin (2010). Powell and Yalcin (2010) integrated the findings from Burke and Day (1986) and Collins and Holton (2001), and conducted their own search for relevant studies from 2001 to 2002. Three separate meta-analyses, one for each research design (i.e., POWC, PPWC, and SGPP) were conducted, results were transformed to correlations, and Hunter and Schmidt's (2004) techniques were implemented. The authors note that they may have "overlooked additional factors" (Powell & Yalcin, 2010; p. 236), and encourage future research on potential moderators of leadership training effectiveness. Additionally, Powell and Yalcin (2010) only included studies published within the private sector, limiting the generalizability of these results to other working populations. This directly highlights the need for an updated and

more comprehensive meta-analytic review of the literature base in order to determine if the training domain and other variables are significant moderators of effectiveness.

CHAPTER TWO: TRAINING DESIGN AND DELIVERY

As competitiveness within the marketplace increases, organizations have begun to realize their performance and market value is reliant upon the knowledge, skill, and ability levels of their employees (McLagen, 1997). Moreover, researchers believe structured leadership training programs are one of the best ways to keep up with ever changing market trends (Gibler et al., 2000), and empirical research supports their effectiveness (e.g., Solansky, 2010; McEnrue, Groves, & Shen, 2010). Although there is empirical merit to the trait perspective of leadership research (Judge, Bono, Illies, & Gerhardt, 2002) there is evidence to support that variance within a leader's behavior is only partially attributed to genetics. Some people have argued for the stability of leadership due to trait and/or genetic influences (Larsson, Andershed, & Lichtenstein, 2006; Plomin, Willerman, & Loehlin, 1976), but I am interested in environmental/contextual influences as researchers suggest this explains a significantly large portion of variance within leaderhsip criteria (Arvey, Rotundo, Johnson, Zhang, & McGue, 2006; Arvey, Zhang, Avolio, & Krueger, 2007). Furthermore, when participating and excelling within a leadership training program, leaders are able accelerate the rate to which they learn from their experiences and, in turn, are able to increase their leadership capabilities (Hughes, Ginnett, & Curphy, 2015). As such, leadership training programs build the foundation to become an effective leader, and support for their effectiveness is discussed below. Similar to training programs within other contexts, there are several design and delivery characteristics that may impact leadership training outcomes (e.g., Baldwin & Ford, 1988; Arthur, Bennett, Edens, & Bell, 2003). Hypotheses developed from the extant training, learning, and leadership sciences are discussed in the following section, and the full model tested is depicted in Figure 1.

Training Evaluation

Generally speaking, all leadership training programs are designed to improve leadership effectiveness; however, the specific criterion utilized to evaluate program effectiveness is dependent upon the target of each change initiative. For example, DeRue, Nahrgang, Hollenbeck, and Workman (2012) assessed leadership behavior change by investigating the leader's change in scores on an adapted version of Halpin's (1957) Leader Behavior Description Questionnaire (LBDQ) as determined by training facilitators. This questionnaire included items relating to task-related leadership behaviors (e.g., initiating structure) and relational leadership behaviors (e.g., consideration). In addition to assessing leader-specific behaviors, Barling, Weber, and Kelloway (1996) also evaluated leaders on branch-level financial performance, which was operationalized as the number of personal loan and credit card sales. The fundamental purpose when conducting a meta-analysis is to amalgamate effect sizes reported from primary studies analyzing the relationship between the same independent and dependent variables (e.g., Hunter and Schmidt, 1990). In the two studies described, DeRue et al (2012) identifies the relationship between leadership training and a behavioral dependent variable (i.e., leadership behaviors) while Barling et al (1996) investigates the effect of training on an organizational outcome (i.e., financial performance). As such, because the two represent distinct dependent variables, they cannot be combined into one meaningful meta-analytic effect size; however, because they both identify the effectiveness of training it is important to include studies investigating both relationships in the current meta-analysis. With this issue in mind, it is therefore critical to categorize outcome variables according to the dependent variable assessed.

According to Kirkpatrick (1959) when evaluating training effectiveness, each dependent variable should be categorized into one of four levels: reactions, learning, behaviors, and results.

Reaction data reflects the attitudinal component of effectiveness and consists of trainee attitudes towards the training (e.g., training utility, satisfaction with the training). Learning represents what trainees *can do* following training and focuses on declarative knowledge change. In comparison, behavior (transfer) outcomes represent what the trainee *will do*, and can be thought of as the extent to which trainees utilize the skills and abilities taught during training on the job. Results are utility-based variables and provide the link between training and organizational objectives. These variables include costs, company profits, turnover, and absenteeism. This framework has been adopted in previous leadership training meta-analyses (e.g., Burke & Day, 1986) and training meta-analyses (e.g., Arthur, Bennett, Edens, & Bell, 2003), and is widely utilized within organizational behavior literature (Cascio, 1987). As such, the current study will implement the Kirkpatrick (1959) framework when categorizing outcomes.

Reactions. According to Riggio (2008), reactions formulate a majority of the evaluations methods utilized in leadership training research. The wide use of reaction evaluations is also reflected among training evaluations in general, and according to Patel (2010), 91% of organizational training evaluations include reaction data. In addition to the popularity of reaction data, this evaluation technique is important to consider when evaluating training effectiveness. According to Social Learning Theory (Bandura, 1977; Wood & Bandura, 1989), an individual must be motivated to learn in order for actual learning to occur. As such, trainee motivation and perceived utility of a training program is a key contributor to its effectiveness (e.g., Salas & Cannon-Bowers, 2001). Because reaction data directly assesses trainees' general liking of the training program and perceived utility of the training program, it is important to consider when evaluating training effectiveness as these facets contribute to trainee motivation and success within a training program (Salas & Cannon-Bowers, 2001). Moreover, research suggests

reactions are positively related to learning outcomes (Sitzmann et al., 2008). In regards to the leadership training literature, empirical research suggests that these programs contribute to positive trainee reactions (Thach, 2002). As such, I hypothesize that:

Hypothesis 1a: Leadership training programs have a positive effect on trainee reactions.

Learning. According to the transfer of training theory proposed by Baldwin and Ford (1988), learning of trained concepts must occur first in order for transfer of training to occur (i.e., the implementation of trained behaviors on-the-job). Learning is "a relatively permanent change in knowledge or skill produced by experience" (Weiss, 1990; p. 172), and according to Bloom (1956), this criterion consists of three domains: cognitive, affective, and psychomotor. Similarly, Kriager, Ford, and Salas (1993), categorize learned competencies as either affective-, cognitive-, or skill-based (Kraiger, Ford, & Salas, 1993). Cognitive learning reflects a developmental change in intellectual or mental-based skills, such as declarative or procedural knowledge. Affective learning reflects the acquisition or change in internally based states, such as self-efficacy or motivation. Skill-based, or psychomotor learning, reflects the acquisition of technical or motor-skills, such as public speaking. Meta-analytic evidence suggests that leadership training programs contribute to the onset of learning (e.g., Burke & Day, 1986; Collins & Holton, 2001). In addition, recent empirical evidence also supports this notion (e.g., Kombarakaran, Yang, Baker, & Fernandes, 2008). As such, I hypothesize that:

Hypothesis 1b. Leadership training programs have a positive effect affective, cognitive, and skill-based learning outcomes.

Behaviors. Generally speaking, the goal of leadership training is to create a positive behavior change in leaders, on-the-job (Day, 2001). As such, the evaluation of behaviors is critical for assessing leadership training effectiveness. Behaviors are also referred to as the transfer of

training or job performance as this criterion reflects the degree to which trained concepts are utilized on-the-job (Kirkpatrick, 1959; Alliger et al., 1997; Baldwin & Ford, 1988). Moreover, empirical and meta-analytic evidence exists identifying the positive effect leadership training has on transfer of training (Burke & Day, 1986; Avolio et al., 2009). For example, Johnson, Garrison, Hernez-Broome, Fleenor, & Steed (2012) implemented a 5-day leadership training program across 294 active leaders and found behavior changes for two leadership competencies (i.e., developing others and building and maintaining relationships). Empirical work by Abrell, Rowold, Weibler, and Moenninghoff (2011) also suggests that transformational leadership training programs positively affect leadership behaviors, job performance, and organizational citizenship behavior. In line with this research, I hypothesize that:

Hypothesis 1c: Leadership training programs lead to the transfer of trained affective, cognitive, and skill-based concepts.

Results. According to Kirkpatrick (1959), results are evaluative methods that reflect the training program's impact on achieving organizational objectives. In other words, results include more distal outcomes, including company financial performance and return on investment. For the current meta-analytic investigation, I categorize results as being either organizational outcomes or subordinate outcomes. In regards to organizational outcomes, Avolio, Avey, and Quisenberry (2010) concluded that the return on investment for leader development is positive. Moreover, empirical evidence exists linking leadership training to financial performance (Fullagar, 1992; Barling, Weber, & Kelloway, 1996). Similarly, meta-analytic evidence concludes that leadership training has a positive effect on results (i.e., "reduced costs, improved quality or quantity, promotions, and reduced number of errors in making performance ratings"; Burke & Day, 1986, p. 237). Empirical research also suggests that leadership training positively

impacts subordinate outcomes such as job satisfaction and absenteeism (Wexley & Nemeroff, 1975). As such, I hypothesize that:

Hypothesis 1d: Leadership training programs positively influence organizational and subordinate outcomes.

Training Design and Delivery: Moderator Analyses

In 2010, Barling, Christie, and Hoption called for the rapprochement between the training and leadership development sciences. They noted that a lost opportunity for leadership development practitioners and scientists is that advancements within the training domain are not implemented within the leadership arena. The current study responds to this call by drawing on the sciences of learning and training to aid in the explanation of leadership training effectiveness. Particularly, research suggests that delivery (e.g., instructional method; Smith-Jentsch, Jentsch, Payne, & Salas, 1996) and design features (e.g., spaced practice sessions; Karpicke, & Roediger III, 2007) impact the presence of desired cognitive, affective, and skill-based outcomes (e.g., Arthur et al., 2003; Russ-Eft, 2002; Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012). The current study integrates this literature, along with the science of leadership training into a robust meta-analytic summary of leadership training.

Needs Analysis. Although meta-analytic evidence is not yet conclusive in regards to the effect of conducting a needs analysis prior to designing and implementing a training program (Arthur, Bennett, Edens, & Bell, 2003), the benefits of conducting a needs analysis have long been discussed within the training literature (e.g., Goldstein & Ford, 2002). A needs analysis "is the process of determining the organization's training needs and seeks to answer the question of whether the organization's needs, objectives, and problems can be met or addressed by training" (Arthur et al., 2003; p. 235). A needs analysis is a critical step in training design because it aids

developers in determining how to focus training efforts and whether training will exhibit utility within an organization. Specifically, a needs analysis provides a prescription for the "design, development, delivery, and evaluation" (Arthur et al., 2003; p. 235) of a leadership training program. Moreover, by conducting a thorough needs analysis, developers are better able to provide trainees with a program parallel to their training needs, thereby increasing the appeal of the training to the trainee and subsequently enhancing results. As such, I hypothesize that:

Hypothesis 2: Leadership training programs incorporating content based upon a needs analysis will exhibit a greater, positive effect on trainee reactions (H2a), learning (H2b), transfer behaviors (H2c), and results (H2d) in comparison to training programs that do not report the application of a needs analysis.

Delivery Method. Within the training literature, researchers suggest that training delivery methods can be categorized into three broad categories based on their underlying purpose: (1) to deliver information, (2) to demonstrate skills and abilities being trained, or (3) to offer practice opportunities and feedback (Salas & Cannon-Bowers, 2000; Weaver, Rosen, Salas, Baum, & King, 2010). More simply, they are referred to as information-based, demonstration-based, and practice-based training methods. Lectures, presentations, advanced organizers, and most text-based training materials are considered information-based methods. Demonstration-based methods provide trainees with either negative or positive examples of the trained competency via in-person, audio, video, or simulated mediums. Practice-based methods include role-play, simulations, in-basket exercises, guided practice, and others.

Practice-based training methods (e.g., on-the-job training, role play) are considered to be the most critical when influencing training outcomes as they enable trainees to fully conceptualize the material and implement it within a realistic, yet secured environment (Weaver

et al. 2010). This notion can be explained by constructivism, a theory of learning developed by Piaget (e.g., Piaget & Cook, 1952). According to constructivism, individuals develop conceptualizations regarding the world around them through their experiences and the reflection of these experiences. In other words, constructivism reflects learning by doing. As such, when leaders are provided with opportunities to practice certain leadership competencies, they are able to accelerate the rate at which they learn from their experience, thereby obtaining the overall goal of the leadership training process (Velsor et al., 2004). This notion has been empirically supported via meta-analytic investigations. Specifically, Burke and Day (1986) found that the effect size was greater for management training programs incorporating lecture/discussion and role play or practice when predicting subjective behavior, and subjective and objective learning criteria. In line with research and theory, I hypothesize that:

Hypothesis 3: Leadership training programs incorporating only a practice-based method will lead to great effects on trainee reactions (H3a), learning (H3b), transfer (H3c), and results (H3d) as compared to programs incorporating only information- or demonstration-based methods.

Experiential learning theory is defined as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984; p. 41). The cycle of experiential learning consists of two overarching processes: grasping and transforming the experience. Furthermore, each process consists of two distinct methods where grasping the experience is exhibited by concrete experience and abstract conceptualization, and transforming the experience consists of reflective observation and active experimentation. The learner must move through a learning spiral whereby all bases are touched - experiencing, reflecting, thinking, and acting - in order to effectively transform an experience into learning (Kolb & Kolb, 2005). Moreover, grasping an

experience (i.e., having the experience) is not sufficient; one must also transform the experience (i.e., implement it) to produce learning effects. Experiential learning theory has been adopted and referenced within the management development literature (e.g., Ng, Van Dyne, & Ang, 2009; Kayes, 2002; Kolb & Kolb, 2005), and in accord with this theory, it would be believed programs that are able to move the learner through Kolb's stages will be more effective than those that only incorporate one stage. The information component of training maps onto grasping the experience, as described by Kolb (1984), and demonstration and practice map onto transforming the experience. Specifically, information provides abstract conceptualization and demonstration and practice allow for reflective observation and active experimentation.

In line with experiential learning theory, researchers suggest that highly effective training programs incorporate all three categories (e.g., Salas & Cannon-Bowers, 2001). This is evidenced by the validity of behavioral modeling training (Taylor, Russ-Eft, & Chan, 2005), which incorporates information-, demonstration-, and practice-based training methods. In addition, meta-analytic research investigating training effectiveness in general, has shown that most training programs incorporate multiple delivery methods and the effectiveness of training varies as a function of the training delivery method specified (Arthur, Bennett, Edens, & Bell, 2003). In line with this research, I hypothesize that:

Hypothesis 4: Leadership training programs incorporating information, demonstration, and practice-based methods will demonstrate a greater effect on reactions (H4a), learning (H4b), transfer (H4c), and results (H4d) in comparison to programs implementing only one (e.g., information only) or two methods (e.g., demonstration and information).

Feedback. Feedback is a "fundamental aspect of behavior" (Powers, 1973, p. 351), and fosters learning and transfer following training because it increases actual-self perceptions

(Maurer, 2002). According to feedback theory, this strategy outlines successes and failures and how to correct unsuccessful behavior (Kluger & DeNisi, 1996; Powers, 1973). Feedback is valuable to trainees because it enhances their ability to gain insight on their current ability, thereby signaling whether there is a dissonance between actual and intended performance (Nadler, 1977). The provision of feedback allows for an increased understanding of KSA strengths and weaknesses, thereby enhancing an individual's conceptualization of their actual self (Maurer, 2002) and motivation to alter their behaviors (Brett & Atwater, 2001). Additionally, feedback aids in learning and transfer because it encourages trainees to participate in metacognitive activities (i.e., planning, monitoring, and revising behavior; Brown, Bransford, Ferrara, & Campione, 1983) during training. Trainees that engage in such activities learn at an accelerated rate because they adjust their learning and behavior after determining problem areas, thereby leading to increased transfer performance (Ford, Smith, Weissbein, Gully, & Salas, 1998).

Feedback is effective across a multitude of training domains, including leadership (Kelloway et al., 2000) software (Martocchio & Webster, 1992), medicine (Ende, 1983), and teamwork (Salas et al., 2012). For example, in a study conducted by Kelloway and colleagues (2000), leaders that participated in a transformational leadership training program and were provided with feedback on their performance were rated higher by their subordinates in terms of performance than those leaders that did not receive feedback. The utility of this strategy is also widespread within practice as most Fortune 500 companies implement employee feedback programs (London & Smither, 1995). Feedback also engenders affective responses (Kluger & DeNisi, 1996), and the provision of feedback may increase trainees' perceptions of utility, thereby increasing positive reactions towards the training program (Giangreco, Sebastiani, &

Peccei, 2009). Specifically, feedback may increase trainees' awareness of direct benefits of a leadership training program because they are explicitly provided with their human capital strengths and weaknesses in relation to the training program. Parallel to this theory and research, I hypothesize that:

Hypothesis 5: Leadership training programs reporting the use of feedback will display a greater positive effect on trainee reactions (H5a), learning (H5b), transferred behaviors (H5c), and results (H5d), in comparison to programs that do not report the use of feedback.

Training Location. According to Baldwin and Ford's (1988) theory on the transfer of training, there are several critical elements that necessitate training effectiveness, including identical elements, among others. Specifically, the theory of identical elements suggests that transfer is maximized when training stimuli parallels the actual work environment (Baldwin & Ford, 1988), and this theory has been empirically supported (e.g., Druckman & Bjork, 1991). One way training scientists achieve similarity is by increasing physical fidelity (i.e., degree to which training conditions match the job environment), and I argue that this can be achieved by hosting an on-site training program. Training programs offered on-site immerse trainees within a similar, if not identical, work environment, thereby facilitating training techniques at an increased rate. Additionally, on-site training programs tend to use internal trainers, which add to the psychical fidelity of the training program. Taken together, I hypothesize:

Hypothesis 6: Programs hosted on-site will display a greater effect size in regards to trainee reactions (H6a), learning (H6b), transfer behaviors (H6c), and results (H6d) as compared to off-site programs.

Training Setting. The implementation of virtual learning environments has flourished over the past decade with more than one-third of training hours being delivered in this manner

within organizations (Miller, Mandzuk, Frankel, McDonald, & Bello, 2013). Additionally, within the university setting, almost 20% of all students were said to be enrolled in at least one e-learning course (Allen & Seaman, 2007). Despite this increased use, I argue that virtual training environments may not be as effective as face-to-face leadership training programs due to a lack of psychological and physical fidelity. Similar to physical fidelity, psychological fidelity increases the transfer of training and reflects whether trainees perceive the training environment to mirror their actual work environment (Bowers & Jentsch, 2001; Baldwin & Ford, 1988). As such, virtual training programs may not be as effective as face-to-face programs because they lack both psychological and physical fidelity. In an experimental study investigating success factors in e-learning, results suggested that the effectiveness of training increased as the number of face-to-face instructor-trainee interactions increased (Lim, Lee, & Nam, 2007). By delivering training in-person, trainees may benefit more because it enables them to gain better, hands-on experience in leadership practices.

Hypothesis 7: Face-to-face leadership training programs will increase positive trainee reactions (H7a), learning (H7b), transfer behaviors (H7c), and results (H7d) to a greater degree than virtual programs.

Training Attendance Policy. Trainees' motivation to learn and motivation to transfer trained concepts to their actual job setting is a critical predictor of training effectiveness (Burke & Hutchins, 2007). Trainees exhibiting high motivation and perceived value in the training program are more likely to implement trained concepts on the job (Blume, Ford, Baldwin & Huang., 2010; Chiaburu & Marinova, 2005; Tziner, Fisher, Senior & Weisberg, 2007), thereby increasing training utility and effectiveness. In order to increase trainees' motivation to transfer, researchers suggest creating voluntary training programs (Curado, Henriques, & Ribeiro, 2015).

In a cross-sectional study conducted on employees within an insurance company, results suggested that voluntary training programs enhanced transfer motivation to a greater degree than mandatory programs (Curado et al., 2015). Additionally, Baldwin, Magjuka, & Loher (1991) manipulated choice of training and found that participants having a choice exhibited a greater degree of motivation to learn. These findings can partially be explained by self-determination theory (Ryan & Deci, 2000), which focuses on intrinsic motivation (i.e., internal sources of motivation). According to self-determination theory, individuals are motivated by a need to experience fulfillment and achieve psychological growth, and this is achieved by satisfying three innate needs - competence, autonomy, and relatedness. By providing trainees with the choice to participate in training, the need for autonomy is satisfied, thereby increasing their motivation to learn and transfer trained concepts. In line with this theory and research, I hypothesize that:

Hypothesis 8: Voluntary leadership training programs will enhance trainee reactions (H8a), learning (H8b), transfer behaviors (H8c), and results (H8d) to a greater degree than involuntary programs.

Spacing Effect. Cognitive Load Theory (CLT) represents a dominant learning efficiency theory (e.g. Sweller, van Merrienboer & Paas, 1998; van Merrienboer & Sweller, 2005; Paas, Renkl, & Sweller, 2004), and states that learners have a finite working memory capacity, and once this is met, processing and learning abilities are hindered or lost entirely. If an excessive amount of information is presented to a learner, the information may enter working memory, but will not be processed into long-term memory, thus inhibiting the learners' ability to access the information in the future (van Merrienboer & Sweller, 2005). CLT highlights the need for training programs designed to reduce extraneous load while increasing learners' ability to process salient information. One way to do so is to temporally space training sessions – a

technique known as spacing (Hintzman, 1974). Meta-analytic evidence suggests that task performance is greater when individuals practice in spaced intervals as compared to a single massed practice session (Donovan, & Radosevich, 1999). Moreover, information may be remembered at an increased rate if the stimulus presentation sessions are temporally spaced rather than presented at once (Janiszewski, Noel, & Sawyer, 2003). When utilizing a spaced learning approach, trainees learn the information at distinct time points generating multiple mental routes to access the trained information. Drawing on the work of Miller (1956), a common theme within the learning literature is to only present learners with 7+/-2 pieces of novel information at once. Although this span of immediate working memory may pose as a limitation, in Miller's (1956) earlier work, they recommend the use of chunking information to increase the amount of information that is presented while still adhering to the 7+/- 2 rule of thumb. In line with theory and research supporting the spacing effect in training, I hypothesize that:

Hypothesis 9: Leadership training programs spanning multiple training sessions will result in greater effects on reactions (H9a), learning (H9b), transfer (H9c), and results (H9d) in comparison to training programs with one massed training session.

Summary of Contributions

Meta-analytic investigations are conducted in order to quantitatively summarize relevant empirical studies to establish an inclusive assumption regarding a significant amount of data. According to Arthur, Bennett, and Huffcutt (2001), a meta-analysis can be defined as "a set of statistical procedures that are used to quantitatively aggregate the results of multiple primary studies to arrive at an overall conclusion or summary across these studies" (p. 8). Meta-analytic methods exhibit several advantages for researchers. This method enables researchers to establish

conclusions that may not otherwise be feasible through the implementation of a single primary study. This is in part due to the increased power associated with meta-analytic investigations because of the large amount of data points it contains. Universal trends among relevant situations can also be determined as well as consistencies and inconsistencies within the data. Meta-analytic investigations also allow for the test of hypotheses that were not tested within the primary studies, such as interactions (e.g., Courtright, McCormick, Postlethwaite, Reeves, & Mount, 2013; Rabl, Jayasinghe, Gerhart, & Kuhlmann, 2014) or mediators (e.g., Beus, Dhanani, & McCord, 2014) of the relationships.

The current meta-analytic review aims to utilize these advantages by applying the technique to leadership training literature. The overarching goal of the current study is to identify the underpinnings that contribute to leadership training efficacy. Specifically, the current study will: (a) provide meta-analytic data across years (1887 – 2014) and organization types, (b) meta-analyze the impact of leadership training on all evaluation levels identified by Kirkpatrick (1959) (i.e., reactions, learning, behavior, and results), (c) analyze primary studies utilizing updated procedures identified by Morris and DeShon (2002), and (d) examine moderators of leadership training effectiveness not previously considered. Taken together, the current study will clarify the conditions under which leadership training promotes positive trainee reactions, behavioral and learning changes, and impacts organizational and subordinate outcomes.

CHAPTER THREE: METHODOLOGY

Literature Search and Inclusion Criteria

Relevant empirical studies were extracted in several ways. First, a literature search in the databases PsycINFO (1887 – December 2014), Business Source Premiere (1886 - December 2014), and ProQuest Dissertations and Theses (1861 – December 2014) was conducted. The following keywords were included in this initial search: *leadership*, *leader*, *manag** (utilizing the asterisk within searches allows for extraction of all keywords beginning with the root, e.g., *managerial*, *management*, and *manager*), *executive, supervisory, training*, and *development*. Google Scholar was also searched using the same keywords, with the addition of *method*, to ensure all relevant studies are included in the final analysis. Lastly, reference lists from previous meta-analyses on pertinent topics (Burke & Day, 1986; Collins & Holton, 2001; Avolio et al., 2009; Powell & Yalcin, 2010; Arthur et al., 2003; Taylor et al., 2009; Keith & Frese, 2008) were also crosschecked. Identified articles were categorized in terms of relevancy by reviewing the abstracts for applicable content (i.e., empirical studies that evaluated either a leadership, leader, managerial, supervisory, or executive training program).

Following this step, each study returned in the initial search was extensively reviewed and considered for inclusion within the meta-analysis. Studies were included if the following conditions were met: (a) empirical training evaluation of a leadership, leader, managerial, supervisory, or executive training (development or coaching) program, (b) adult sample (i.e., all participants over 18 years of age), (c) written in English, (d) identified the sample size and enough information to calculate an effect size, and (e)participants were employee personnel (e.g., not MBAs, undergraduate students). The initial search returned over 20,742 articles, of which 335 met the inclusion criteria.

Coding Procedures

The author along with one of two other researchers coded all studies, and any coding discrepancies were resolved through discussion. Interrater agreement was 96.22%, and detailed coding information for each primary study is available from the author.

Studies were coded for sample size, evaluation measure utilized, reliability (i.e., coefficient alpha; Cronbach, 1951), experimental design (i.e., *repeated measures*, same subjects are assessed before and after training; *independent groups*, an experimental and control group are utilized; and *independent groups with repeated measures*, an experimental and control group are tested before and after training), and effect size. Furthermore, the following definitions and descriptions were implemented when coding for additional moderators.

Evaluation criteria. Training evaluation dependent variables were categorized in line with the evaluation framework developed by Kirkpatrick (1959). *Reactions* represent trainees' perception of the training program, and a measure of learning does not take place. *Learning* measures represent quantifiable evidence that trainees' learned the knowledge, skills, and/or abilities that we represented during training. *Transfer* represents measures evaluating on-the-job behavior, as assessed by trainees, supervisors, peers, or subordinates. Both learning and transfer were further categorized as *cognitive learning/transfer* (i.e., verbal knowledge, knowledge organization, and cognitive strategies), *affective learning/transfer* (i.e., attitudinal and motivational elements), or *skill-based learning/transfer* (i.e., compilation elements and automaticity) based upon the framework identified by Kraiger, Ford, and Salas (1993). In addition to these three sub-categories, transfer also included a *job performance* category reflecting studies evaluating training in regards to on-the-job performance. *Results* reflect changes in organizational objectives as a result of the training program. Results were further

categorized as *organizational results* (e.g., turnover, absenteeism, ROI, profit, the leader's job satisfaction) or *subordinate results* (e.g., subordinate job satisfaction, subordinate performance ratings).

Delivery method. Training delivery method was classified as *information-based* (e.g., lectures, presentations, advanced organizers, text-based training materials), *demonstration-based* (e.g., case studies, in-person modeling, computer-generated avatars), *practice-based* (e.g., role-play, simulations, in-basket exercises) (Salas & Cannon-Bowers, 2000; Weaver, Rosen, Salas, Baum, & King, 2010), or a combination of the above listed methods (i.e., *information and demonstration*, *information and practice*, *demonstration and practice*, or *information, demonstration, and practice*).

Leadership criteria. Primary studies were coded in regards to the leadership criteria providing the foundation for the training program. Studies were only coded if there was sufficient information in the article identifying the theory taught to trainees. For example, Barling, Weber, and Kelloway's (1996) program was classified as transformational leadership training because it is described as "transformational leadership training," and included learning objectives focused on enhancing trainees' transformational leadership behaviors (p. 827).

Additional codes. Each primary study was also coded in regards to the instructional features utilized (e.g., *feedback, goal setting, case study, role-play, simulation, in-basket exercise, coaching/mentoring*), provision of feedback (i.e., *yes* or *no*), publication status (i.e., *published* or *unpublished*), sample type (i.e., *healthcare employees, corporate employees, military employees, school administrators,* or *mixed*), training length (reported in hours), presence of spacing effect (i.e., training sessions were temporally spaced either *daily, weekly, yearly, monthly*, or *other/not reported*), implementation of a formal needs analysis (i.e., *reported*

or *not reported/no*), training setting (i.e., *face-to-face* or *virtual*), location (i.e., *on-site, off-site*, or *self-administered*), and attendance policy (*voluntary* or *involuntary*).

Meta-Analytic Procedures

The relevant primary studies within the current study were comprised of three experimental design types. Moreover, the population parameters estimated are dependent upon the design type utilized (Ray & Shadish, 1996); thereby requiring modifications to be made in order to accurately aggregate individual effect sizes (Glass, McGaw, & Smith, 1981; Morris & DeShon, 1997; Morris & DeShon, 2002). This aggregation issue is not due to one experimental design being preferred over another, but due to the different population mean differences and population standard deviations used when calculating the effect size. For example, the effect size of a repeated measures design is the quotient of the mean difference between pre- and posttest scores within the experimental group and the sample standard deviation of change scores. In comparison, the effect size of an independent-groups experiment consists of the difference between the sample posttest means of the experimental and control group divided by the pooled with-group standard deviation of posttest scores (Morris and DeShon, 2002). As such, proper meta-analytic techniques require effect sizes to be converted to a common metric and a derivative of the same treatment effect in order to be aggregated. The current study implements the procedures outlined in Morris and DeShon (2002) to account for these issues, and the methodological steps taken are identified below. This procedure (i.e., combining across study designs) is warranted because the overall meta-analytic effect sizes are not significantly different between study designs (see Table 2).

First, effect size estimates were calculated from primary study data for repeated measures and independent groups designs if a standardized mean difference (i.e., *d*) was not reported. For repeated measures designs, the following equation was utilized:

$$d_{RM} = \frac{M_{Post} - M_{Pre}}{SD_{Change}} \quad (1)$$

where M_{Post} and M_{Pre} reflect the mean pre- and post-training scores, and SD_{Change} is the standard deviation of the change scores. SD_{Change} was calculated as:

$$SD_{Change} = \sqrt{SD_{Pre}^2 + SD_{Post}^2 - 2r_{Pre.Post}SD_{Pre}SD_{Post}} \quad (2)$$

where SD_{Pre} and SD_{Post} are the standard deviation of the pre-training and post-training scores, and $r_{Pre.Post}$ is the correlation between training scores. The majority of studies did not report this correlation; therefore, the inverse sampling error variance-weighted average $r_{Pre.Post}$ across repeated measures evaluation studies was used, per recommendations by Morris and DeShon (2002). For the current meta-analytic investigation, $\bar{r}_{Pre.Post}$= .52.

For independent groups designs, the standardized mean difference was calculated as follows:

$$d_{IG} = \frac{M_E - M_C}{SD_{pooled}} \quad (3)$$

where M_E and M_C are the means of the experimental and control group, and SD_{pooled} is the pooled standard deviation across groups. SD_{pooled} was calculated as:

$$SD_{pooled} = \sqrt{\frac{(n_E - 1)SD_E^2 + (n_C - 1)SD_C^2}{n_E + n_C - 2}} \quad (4)$$

where n_E and n_C are the sample sizes of the experimental and control groups, and SD_E and SD_C are the corresponding standard deviations.

Then, after computing *d* values, independent groups effect sizes were converted to

repeated measures effect sizes using the following equation:

$$d_{RM} = \frac{d_{IG}}{\sqrt{2(1-r_{Pre.Post})}} \quad (5)$$

If the primary study was a combination of independent groups and repeated measures designs (i.e., IG/RM), then the following conversion formula was utilized to calculate a repeated measures metric:

$$d_{IG/RM} = d_{RM,E} - d_{RM,C} \quad (6)$$

where $d_{RM,E}$ is the experimental group's repeated measures *d* value (see Equation 1) and $d_{RM,C}$ is the control group's effect size.

After the repeated measures effect sizes were computed, the sampling error variance was calculated in order to compute the meta-analytic effect size. Sampling error variance reflects the degree to which an effect size is expected to vary by study as a result of sampling error; sample size is a main contributor to this error as well as the study design implemented. Sampling error variance is required to calculate the mean as it is recommended to account for this degree of variance when identifying the meta-analytic effect size (Hedges & Olkin, 1985), and is calculated differently depending on the study design used. Sampling error variance was calculated using formulas identified by Morris and DeShon (2002).

After computing sampling error variance, the variance-weighted mean effect size was calculated using the following equation:

$$\bar{d} = \frac{\sum_i w_i d_i}{\sum_i w_i} \quad (7)$$

where w_i is the reciprocal of the sample variance estimated in the previous step.

According to Hunter and Schmidt (1990; 2004), in addition to accounting for sampling error variance, the variance-weighted mean effect size should also be corrected to account for criterion related unreliability. This is because the effect size may be repressed due to the

unreliability in the outcome measure. In order to adjust the effect size, the current study utilizes the equation identified by Hunter and Schmidt (1990):

$$\bar{d}_T = \frac{\bar{d}}{\sqrt{r_{xx}}} \quad (8)$$

where $\bar{d}$ is the variance-weighted mean calculated in Equation 10, and r_{xx} represents the criterion's unreliability.

I also computed 95% confidence intervals (CIs) in order to identify the accuracy of the meta-analytic effect size (Whitener, 1990). Specifically, CIs identify whether the meta-analytic effect size is significantly different from zero, and are calculated using the following formula (Hunter & Schmidt, 1990):

$$Conf_{95\%} = \bar{d}_T \pm (1.96) * (SD_\sigma) \quad (9)$$

Moderator Analyses

In contrast to multiple regression, moderators within meta-analytic research suggest a high degree of variance remains after corrections have been implemented (Arthur, Bennett, & Huffcutt, 2001). Within multiple regression, an interaction variable is significant when the prediction of the criterion increases with the presence of an interaction term. In order to test for moderators, the subgroup analysis technique, where a separate meta-analysis is conducted at each level for the relationship of interest, was utilized. Moreover, a significant moderator is present when the confidence intervals of the subgroups do not overlap; thereby suggesting the strength of the meta-analytic effect size differs as a result of the specified subgroup category (Arthur et al., 2001).

CHAPTER FOUR: RESULTS

The primary goal of the current meta-analytic effort was to identify the effectiveness of leadership training program across evaluation levels (i.e., reactions, learning, behavior, and results), and to determine the conditions under which leadership training programs are most effective. The results are presented in Tables 2-7. Table 2 presents the overall meta-analytic *d* combined across evaluation levels, Tables 3-6 present specific outcome results (reactions, learning, transfer, and results, respectively), and Table 7 reports the meta-analytic results for training duration as a continuous moderator. Results are presented in the corrected *d* value (corrected for unreliability in the criterion; Hunter & Schmidt, 2004) and the observed *d* value. A separate artifact distribution was utilized for each moderator analysis, and the subgroup meta-analytic technique was used to test for moderators. The reliability value utilized for the overall analysis was .97, and the reliabilities for reaction, learning, transfer, and results were as follows: .92, .95, .96, and .93. In order to test for significance of the effect size and of moderators, the 95% confidence intervals were investigated. Specifically, the effect size is said to be significant if the 95% confidence interval does not include zero, and effect sizes are significantly different if the corresponding 95% confidence intervals do not overlap (Arthur, Bennett, & Huffcutt, 2001).

To test for publication bias, the trim and fill analysis (Duval & Tweedie, 2000) was conducted. Results from a fixed effects model on the overall effect identified that publication bias is not an issue. Additionally, a moderator analysis was conducted comparing published studies and non-published studies (see Table 2), and results suggest that the meta-analytic effect sizes are not significantly different.

In support of Hypothesis 1, results suggest leadership training programs are effective. The strongest effect was found for transfer (d = .81, 95% CI [.57, 1.05]), followed by learning (*d*

= .73, 95% CI [.62, .85]), results (*d* = .71, 95% CI [.60, .83]), and reactions (*d* = .63, 95% CI [.12, 1.15]). Positive effect sizes were also found across evaluation sub-levels (i.e., cognitive learning/transfer, affective learning/transfer, skill-based learning/transfer, job performance, organizational results, and subordinate results; see Tables 2-6).

Support for Hypothesis 2 was found for transfer. That is, training programs developed from a needs analysis predicted transfer (*d* = 3.51, 95% CI [2.34, 4.68]) to a greater degree than those not reporting a needs analysis (*d* = .41, 95% CI [.33, .48]).

Partial support for Hypothesis 3 was found, as practice-based methods were only significantly more effective than information and demonstration-based methods when predicting results outcomes (see Table 6). This pattern of results was not found in reactions, learning, or behavioral outcomes.

In regards to learning and transfer, support was found for Hypothesis 4. Training programs incorporating information, demonstration, and practice-based methods displayed a significantly larger effect size than programs only incorporating one or two methods (see Tables 3-4) for both learning (*d* = 1.24, 95% CI [.97, 1.51]) and transfer (*d* = 2.20, 95% CI [1.35, 3.05]) outcomes. For learning, although this effect size was not significantly different than programs incorporating information and demonstration, due to overlapping confidence intervals, this moderator category included a small amount of primary studies in comparison to the others; therefore, the effect size may not be as stable. Similarly, in regards to transfer, demonstration based methods was not significantly different from this meta-analytic effect; however, this is effect size is only based on a single study. Hypothesis 4a was unable to be tested due to a low number of primary studies in each moderator category.

Hypothesis 5 predicted that programs utilizing feedback would produce greater outcomes, and was supported such that programs incorporating feedback (*d* = 1.37, 95% CI [.77, 1.98]) were more effective in predicting transfer than those that did not incorporate this tool (*d* = .50, 95% CI [.37, .63]).

For hypothesis 6, results suggest that training programs conducted on-site significantly predicted results to a greater degree than programs conducted off-site (*d* = 1.25, 95% CI [.88, 1.61]; *d* = .40, 95% CI [.21, .59], respectively).

Support was found for Hypothesis 7 as training programs conducted face-to-face predicted greater transfer (*d* = 1.10, 95% CI [.76, 1.43) than virtual programs (*d* = .22, 95% CI [.06, .37]).

Hypothesis 8c was supported such that voluntary training programs predicted transfer to a greater degree than involuntary training programs (*d* = 2.17, 95% CI [1.27, 3.08]; *d* = .38, 95% CI [.18, .57], respectively). However, contrary to Hypothesis 8d, involuntary training programs produced a greater effect on results than voluntary programs (*d* = 1.39 95% CI [1.16, 1.62]; *d* = .52, 95% CI [.30, .74], respectively). Hypothesis 8a and 8b were not supported, as reactions and learning were not significantly different between voluntary and involuntary training programs.

Support was found for Hypothesis 9d. Training programs spanned across multiple sessions predicted enhanced results (*d* = .48, 95% CI [.37, .59]) in comparison to programs with one, massed training session (*d* = .18, 95% CI [.05, .32]). This hypothesis was not supported for learning or transfer outcomes, and was unable to be tested for reactions due to a low amount of primary studies.

I also ran analyses for duration of training as a continuous moderator (see Table 7). There was a positive relationship between training duration and organizational outcomes (B = .32, SE = .00, t = 2.43, p = .02).

CHAPTER FIVE: DISCUSSION

Much has changed in the leadership training arena since Burke and Day's (1986) seminal meta-analytic investigation. Specifically, more studies exist and design and delivery changes (i.e., the addition of technological simulations) have taken place. Additionally, based on the current meta-analytic evidence, the effectiveness of these training programs has increased. Burke and Day (1986) initially reported overall effect sizes around .3 for learning outcomes (i.e., d = .31 for subjective and d = .33 for objective), .44 for subjective behavior outcomes, and .57 for objective results criteria. Across evaluation levels, the current study reports a meta-analytic effect size that is at least double what was previously reported, and this statistic is generated from more than triple the amount of primary studies included in the initial meta-analysis. It is clear that leadership training works across evaluation levels, and the utility of these training programs has increased over the past 29 years. Consistent with previous meta-analytic research, the current study also suggests that the effectiveness of different design and delivery methods depends on the level of evaluation. Interestingly, the extent to which training design and delivery features made significant differences was dependent upon the outcome evaluated. Although training delivery methods led to significant effect size differences across outcomes, additional moderators were only significant for transfer or result outcomes. These results and implications are discussed below, organized by evaluation level.

Reactions

To the author's knowledge, there has yet to be a meta-analytic investigation of the effectiveness of leadership training programs in regards to trainee reactions. Trainee reactions are an important component to training evaluation because they represent how well trainees enjoy the training and/or find it valuable (Kirkpatrick, 1972; Alliger et al., 1997). According to

adult learning theory it is important for trainees to find value in training programs as this increases their motivation to transfer trained concepts and acquire knowledge during training - this motivation is a known predictor of training transfer (Knowles, 1973). The current results suggest that leadership training programs are well received by trainees and trainees' positive affect toward the training programs increases following training. In other words, they find the training to be more beneficial and enjoyable upon completion.

The current search effort only identified seven experimental studies reporting trainee reaction data. As such, any moderator analyses conducted within this training evaluation level should be interpreted with caution. Experimental evaluation studies measuring trainee reactions are needed in order to confidently identify how to develop a leadership training program that maximizes positive trainee reactions. Most organizations include reaction data in evaluation efforts (Patel, 2010), signifying their concern with this evaluation level. Training research should parallel this concern.

Learning

In the current meta-analysis, dependent variables were classified as learning if they were measured immediately after or within one day of training; this is in line with Kraiger, Ford, and Salas' (1993) definition of learning outcomes. Learning outcomes were further classified as being affective, cognitive, or skill-based, following Kraiger and colleague's (1993) classification scheme. Overall, and parallel to previous meta-analytic research (Burke & Day, 1986), results suggest that leadership training programs result in trainee knowledge acquisition. Interestingly, it was found that leadership training programs have a significantly greater effect on cognitive learning in comparison to affective and skill-based learning.

Results suggest that most leadership training programs implement information and practice-based delivery methods (k = 46). Based on the current results, these programs would benefit from the addition of demonstration-based methods (e.g., modeling behavior, case studies) as training programs integrating three delivery methods produced significantly larger effects on learning outcomes.

Interestingly, and in contrast to previous research and theory, certain design characteristics did not seem to have an impact on training effectiveness when measured by learning. According to identical elements theory (Thorndike & Woodworth, 1991), training programs that mirror the actual job environment are more effective. However, this was found to not be the case where learning is concerned. Specifically, learning was not significantly greater amongst trainees that participated in face-to-face training programs delivered on-site. Moreover, training programs spanning multiple sessions (as compared to a single session) did not contribute to significantly greater learning outcomes. Results also suggest that the training attendance policy did not impact learning outcomes.

The current results lend themselves to several interpretations. Training methods significantly impact learning outcomes, but design elements (e.g., location) may not. As such, when aiming to produce learning outcomes, developers should focus more on the method by which training concepts are presented to trainees. In culmination, the results suggest that the impact of training on trainee learning is very stable, as indicated by the lack of significant moderators (Hunter & Schmidt, 2004). Leadership training programs are likely to produce learning outcomes regardless of the program's specific features.

Transfer

In support of previous meta-analytic research (Burke & Day, 1986; Taylor, Russ-Eft, & Taylor, 2009), leadership training programs lead to training transfer. Specifically, results suggest that skill-based transfer is significantly greater than cognitive transfer, and we can be fully confident that leadership training programs also enhance trainee job performance. Parallel to Baldwin and Ford's (1988) theory on the effect of training design and delivery on effectiveness, results also suggest that the degree of training transfer is relative to certain delivery and design characteristics.

As an initial step, it is recommended that training developers conduct a needs analysis to ensure appropriate material is taught and strategic alignment between organizational and training goals exists (e.g., Tannenbaum, 2002; Salas, Tannenbaum, Kraiger, & Smith-Jetnsch, 2012). In support of this recommendation, current evidence suggests that training programs developed from a needs analysis result in greater transfer. Additionally, Salas, Tannenbaum, Kraiger, and Smith-Jetnsch (2012), recommend developers to incorporate information, demonstration, practice, and feedback in a training program to maximize effectiveness. The current results support this guideline, as programs incorporating information, demonstration, and practice were significantly more effective than programs utilizing either a single delivery method or two delivery methodologies. In fact, by adding in either one (if using two methods) or two (if currently using one method) methods, transfer may be increased by more than one standard deviation. In line with this, and in support of other research (e.g., Tannenbaum & Cerasoli, 2013), programs with feedback were more effective than those without feedback. In order to further enhance the transfer of leadership skills, trainees should be provided with information on

how they are performing, where their current skills are in comparison to where they should be, and how they can improve upon their current ability level (Kluger & DeNisi, 1996). Although the current results identify the importance of feedback, future research should investigate specific feedback components and what elements make feedback most effective in leadership training.

The current meta-analytic evidence also supports theoretical arguments on the effect of training environment on transfer (e.g., Baldwin & Ford, 1988). Specifically, it was found that transfer was greatest in leadership training programs conducted in person as compared to virtual programs. Despite the increase of e-learning programs within organizations (Miller et al., 2013) and their reduced costs, these programs may inhibit transfer as is suggested by current research. It may be the case that e-learning programs may not be as effective due to reduced supervision during training. In line with this hypothesis, Heaven, Clegg, and Maguire (2006) found that transfer was greatest for trainees that had supervision during training as compared to those with no supervision.

Interestingly, training duration, and the timing of sessions did not have an impact on leadership training effectiveness when transfer is concerned. This is good news to practitioners because there may not be a direct benefit of longer leadership training programs if the organization is concerned with transfer. Perhaps trainees perceive longer training programs to be repetitive as the same information may be reiterated throughout the course. Additionally, longer training programs may lead to cognitive overload (van Merrienboer & Sweller, 2005), thereby reducing trainees information processing. Future research should investigate the optimal time period for leadership training programs, as there may be a curvilinear relationship between training duration and transfer outcomes.

Results

Results are critical to assessing leadership training effectiveness because they provide a direct link between training and organizational outcomes (e.g., employee turnover, productivity; Kirkpatrick, 1996). In fact, results have been considered the "ultimate" outcome due to this direct connection (Brogden & Taylor, 1950). The current findings suggest that leadership training has a positive impact on organizational and subordinate outcomes. Not only are improvements found among trainees following training, but this effect will also rise up to the organization and trickle down to subordinates. This finding is critical as it bolsters the value of leadership training to organizations, which is of great concern for researchers and practitioners (Avolio, Avey, & Quisenberry, 2010). The impact of leadership training on subordinate outcomes can be explained by social learning theory (Bandura, 1977). According to this learning theory, individuals understand, process, and learn how to implement novel information through direct observation. This finding lends itself to the importance of leaders and managers within an organization. Similar to the domino effect (i.e., when leadership behaviors trickle down from higher-level leaders to lower-level leaders; Bass, Waldman, Avolio, and Bebb, 1987), behaviors enacted by a leader may trickle down to their subordinates. Leadership training, for managers, results in the enactment of effective behaviors by leaders, and this positive behavior change trickles down to their subordinates.

Although results suggest that programs incorporating practice-based methods are more effective than those incorporating information-based methods, results did not provide evidence that programs with information, demonstration, and practice-based methods were the most effective. In support of the identical elements theory (Thorndike & Woodworth, 1991), results suggested that programs conducted on-site, thereby providing a similar – if not exact – replica of

trainees' work environment, are more effective than programs held off-site. Interestingly, training setting (i.e., face-to-face or virtual) did not have an impact on effectiveness. In contrast to transfer, training programs that were mandatory increased results to a greater extent than voluntary programs. Although this finding is contrary to my hypothesis, it does support previous research regarding training attendance policies. According to Salas and colleagues (2012), training should be mandatory if it is critical to employee and organizational performance. Similarly, Tannenbaum and Yukl (1992) argue that trainees may view mandatory training more positively if the organization exhibits a supportive training and learning climate. Mandatory training programs may result in greater organizational outcomes because trainees are more aware of the training's value to the organization. In addition, increased transfer may occur, thereby increasing organizational outcomes, because trainees perceive there to be a climate supportive of newly trained skill-use (Rouiller & Goldstein, 1993).

Results also provide evidence that longer training programs produce greater effects on result outcomes. Additionally, programs with multiple sessions spaced temporally resulted in greater outcomes, and those with sessions spanning weeks as opposed to days were significantly more effective. This finding supports the notion that leadership training is a continuous process (Riggio, 2008), and signifies the importance of providing trainees with multiple experiences to learn and practice trained concepts. Interestingly, results did not suggest that a needs analysis is critical when designing a leadership training program aimed at increasing organizational and subordinate results. This finding is consistent with previous meta-analytic research (Arthur et al., 2003); however, it may be an artifact due to a number of studies not reporting the use of a needs analysis. Specifically, in the current meta-analysis, studies reporting the use of a formal needs analysis were tested against those either: a) not mentioning the use of a needs analysis or b) those

directly reporting the use of an off-the- shelf training program. It could be the case that some studies in the non-needs analysis category did conduct a needs analysis without mentioning the process.

Limitations

The current study provides several noteworthy contributions to the literature; however, there are several limitations. First, the current sample of primary studies represents only those training evaluation studies that were conducted with working professionals. Seventy-one leadership training evaluation studies were excluded because their sample involved undergraduate students (Sidor, 2008), graduate students (Kruml & Yockey, 2011), or community leaders (e.g., retirees; Cusack & Thompson, 1992). Future research should investigate the conditions under which leadership training is effective across this array of populations. Secondly, some analyses incorporated a small amount of primary studies and should be interpreted with caution. Although the overall effect size calculated for reaction outcomes may be fairly stable, most moderator analyses include less than five primary studies making these meta-analytic effects subject to change. Unfortunately, a significant amount of reaction evaluations were excluded because they were single group, post-test designs. More repeated measures and independent groups designs should be utilized in this research stream.

Conclusion

Although the current results suggest that certain leadership training design and delivery methods matter when increasing outcomes, the pattern of results between training evaluation levels is not consistent. Interestingly, training design and delivery features did not impact learning outcomes to the same degree as transfer and result outcomes. It seems to be that as training outcomes become more distal to the training program, the specific training features

matter more. The current results suggest that learning is almost guaranteed to occur; whereas, transfer and results are a different story. Effect sizes differ depending on a variety of training design and delivery characteristics.

Based on the current meta-analytic data, it is recommended that leadership training programs exhibit the following, if possible, in order to maximize transfer: information, demonstration, and practice-based methods; feedback; face-to-face instruction; content developed from a needs analysis; and voluntary attendance. In order to optimize result outcomes, training developers should aim to incorporate the following: practice-based methods; on-site training; mandatory attendance; longer training period; and temporally spaced training sessions.

It is critical that leadership training practitioners and researchers first identify what outcomes they wish to improve upon before designing and implementing a leadership training program. There are certain elements that seem to be critical for predicting transfer and results, but are insignificant for learning outcomes. Furthermore, training developers should be careful if only evaluating the impact of training on the basis of learning outcomes. The current results suggest that learning will almost always occur as a result of leadership training – regardless of training design and delivery; however, this may not be the case for transfer and result outcomes. If only evaluating learning, developers may inaccurately conclude that the leadership training will have an impact on more distal outcomes. The recommendations identified in the current meta-analysis should be implemented in order to increase the chance that leadership training has a positive impact across evaluation levels. Additionally, it may be the case that a design element is good for one outcome, but detrimental for another. For example, it was found that voluntary training programs produce greater transfer, but the opposite is true for result outcomes. In this event, training developers should consult relevant stakeholders to ensure the outcome targeted by

the leadership training program aligns with organizational goals. In summation, leadership training is effective; however, it does not allow for a one-size fits all approach.

APPENDIX: TABLES AND FIGURES

Table 1. Summary of Meta-Analytic Research on Leadership Training

Study	Sample	Years	*k*	Moderators	Methodology	Evaluation Criteria
Burke & Day (1986)	Managerial personnel	1914 – 1982	70	• Content • Method • Outcome criteria	• IG design only • Hunter et al. (1992) • Meta-analysis of Cohen's *d* effect sizes	• Learning • Transfer • Results
Collins & Holton (2004)	Managerial personnel	1982 – 2001	83	• Outcome criteria	• Separate analyses per study design • Meta-analysis of Cohen's *d* effect sizes • Carlson & Schmidt (1999) • Hunter & Schmidt (1990)	• Learning • Transfer • Results
Powell & Yalcin (2010)	Private sector employees	2001 – 2002*	62	• Publication date • Outcome criteria • Managerial level	• Separate analyses per study design • Meta-analysis of correlations • Carlson & Schmidt (1999) • Hunter & Schmidt (2004)	• Learning • Transfer
Avolio et al. (2009)	Employee personnel	Not specified	37**	• Intervention type	• Hunter & Schmidt (2004) • Meta-analysis of Cohen's *d* effect sizes	• Overall
Taylor et al (2009)	Employee personnel	Not specified	107	• Rating source • Military setting • Study design • Blindness to condition • Measure type • Content • Length • Practice	• Separate analyses per rating source • Carlson & Schmidt (1999) • Morris & DeShon (2002) for adjustments • Hunter & Schmidt (2004)	• Transfer
Current study	Employee personnel	1887 – 2014	335	• Training design • Training delivery • Training content	• Morris & DeShon (2002) for adjustments • Hunter & Schmidt (2004)	• Reactions • Learning • Transfer • Results

Note. *Also included studies published in Burke and Day (1986) and Collins and Holton (2004); ***k* for leadership training evaluations only.

Table 2. Meta-Analytic Results: Overall

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI	
							LL	UL
Overall	335	26,573	.73	.76	1.18	.20	.64	.89
Published	214	17,219	.78	.81	1.40	.10	.63	1.00
Unpublished	121	9,354	.66	.69	.67	.96	.57	.80
Study Design								
Repeated Measures	208	18,182	.75	.78	1.19	.17	.62	.94
Independent Groups	62	3,901	.74	.76	1.17	.26	.48	1.05
Independent Groups and Repeated Measures	58	4,490	.46	.48	.93	.99	.25	.71

Note. *k* = number of independent studies; *N* = sample size; *d* = repeated measures Cohen's *d*; SD = corrected standard deviation; %Var = percent of variance accounted for by sampling error variance; CI = confidence interval; LL = lower limit; UL = upper limit.

Table 3. Meta-Analytic Results: Reactions Criteria

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI	
							LL	UL
Reactions	7	620	.58	.63	.74	1.05	.12	1.15
Training Method								
Information	1	88	.60	.65	-	-	-	-
Practice	1	30	.58	.63	-	-	-	-
Information and Practice	2	115	1.31	1.47	1.60	.40	-.58	3.52
Demonstration and Practice	1	73	.46	.50	-	-	-	-
Information, Demonstration, and Practice	2	257	.11	.12	.28	10.03	-.27	.50
Feedback								
Feedback	3	145	1.02	1.13	1.31	.00	-.24	2.50
No Feedback	4	475	.52	.57	.58	1.56	.04	1.09
Spacing Effect								
Spacing Effect	5	581	.53	.57	.56	1.64	.11	1.04
No Spacing Effect	1	30	.58	.63	-	-	-	-
Voluntary								
Voluntary	3	363	.16	.17	.32	8.21	-.18	.53
Involuntary	1	88	.60	.65	-	-	-	-

Note. *k* = number of independent studies; *N* = sample size; *d* = repeated measures Cohen's *d*; SD = corrected standard deviation; %Var = percent of variance accounted for by sampling error variance; CI = confidence interval; LL = lower limit; UL = upper limit.

Table 4. Meta-Analytic Results: Learning Criteria

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI	
							LL	UL
Learning	153	9,716	.69	.73	.76	.82	.62	.85
Type of Learning								
Affective learning	55	4,630	.51	.54	.41	4.16	.44	.65
Cognitive learning	48	3,206	.99	1.05	.95	.00	.79	1.30
Skill-based learning	103	5,437	.49	.51	.73	2.24	.37	.65
Training Method								
Information	21	1,568	.57	.60	.67	1.37	.31	.89
Practice	10	302	.27	.28	.19	47.21	.13	.44
Information and Demonstration	5	177	1.07	1.14	.85	.10	.44	1.85
Demonstration and Practice	3	244	.43	.45	.14	29.84	.27	.64
Information and Practice	46	2,164	.57	.60	.70	2.18	.40	.79
Information, Demonstration, and Practice	29	1,913	1.16	1.24	.77	.35	.97	1.51
Feedback								
Feedback	44	2,437	.75	.79	.71	.78	.59	.99
No Feedback	108	7,279	.68	.71	.77	.82	.57	.85
Needs Analysis								
Needs Analysis	30	1,218	1.05	1.12	1.02	.03	.76	1.47
No Needs Analysis	123	8,498	.64	.68	.69	1.14	.56	.80
Spacing Effect								
Spacing Effect	116	7,526	.70	.74	.78	.72	.61	.88
No Spacing Effect	17	1344	.86	.92	.76	.16	.57	1.26
Training Setting								
Virtual	10	620	.52	.55	.34	7.45	.34	.76
Face-to-Face	116	6,916	.74	.78	.84	.55	.63	.93
Training Location								
On-Site	27	2,001	.95	1.01	1.10	.01	.62	1.41
Off-Site	31	2,493	.80	.84	.41	1.07	.70	.98
Voluntary								
Voluntary	47	3,038	.65	.69	.66	1.29	.50	.87

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI	
							LL	UL
Learning	153	9,716	.69	.73	.76	.82	.62	.85
Type of Learning								
Involuntary	25	2,323	.88	.94	.77	.10	.64	1.23

Note. *k* = number of independent studies; *N* = sample size; *d* = repeated measures Cohen's *d*; SD = corrected standard deviation; %Var = percent of variance accounted for by sampling error variance; CI = confidence interval; LL = lower limit; UL = upper limit.

Table 5. Meta-Analytic Results: Transfer Criteria

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI	
							LL	UL
Behavior	190	12,124	.78	.82	1.75	.09	.58	1.06
Type of Behavior								
Affective behavior	34	1,463	.23	.24	.36	14.88	.11	.37
Cognitive behavior	21	844	.65	.68	.77	1.54	.36	1.00
Skill-based behavior	155	10,233	.85	.89	1.88	.04	.61	1.18
Job Performance	35	1,686	.53	.56	.53	4.09	.39	.73
Training Method								
Information	23	1,648	.43	.45	1.07	.88	.03	.87
Demonstration	1	124	5.69	10.83	-	.	-	-
Practice	28	1,613	.37	.39	.43	7.11	.23	.55
Information and Demonstration								
Information and Practice	43	2,548	.41	.43	.42	6.61	.31	.56
Demonstration and Practice	4	270	.68	.71	.19	11.58	.52	.90
Information, Demonstration, and Practice	45	2,600	2.02	2.20	3.00	1.97	1.35	3.05
Feedback								
Feedback	68	4,250	1.32	1.40	2.64	.13	.79	2.00
No Feedback	122	7,648	.48	.50	.73	1.89	.37	.63
Needs Analysis								
Needs Analysis	34	1,628	3.02	3.51	3.40	11.63	2.34	4.68
No Needs Analysis	156	10,496	.40	.42	.46	5.09	.34	.49
Spacing Effect								
Spacing Effect	133	9,113	.87	.92	1.90	.03	.61	1.23
No Spacing Effect	24	1,149	.43	.45	.68	3.25	.18	.71
Training Setting								
Virtual	11	562	.21	.22	.23	27.79	.06	.37
Face-to-Face	139	8,378	1.04	1.10	2.12	.00	.76	1.43
Location								
On-Site	38	2,490	.35	.37	.32	10.98	.26	.47

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI	
							LL	UL
Off-Site	32	3,476	.51	.54	.58	1.61	.34	.73
Voluntary								
Voluntary	43	2,688	1.99	2.17	3.13	1.57	1.27	3.08
Involuntary	46	3,653	.36	.38	.67	2.18	.18	.57

Note. *k* = number of independent studies; *N* = sample size; *d* = repeated measures Cohen's *d*; SD = corrected standard deviation; %Var = percent of variance accounted for by sampling error variance; CI = confidence interval; LL = lower limit; UL = upper limit.

Table 6. Meta-Analytic Results: Results Criteria

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	95% CI LL	95% CI UL
Results	78	11,640	.66	.72	.56	.76	.60	.84
Type of Results								
Organizational Outcomes	53	10,466	.69	.75	.57	.51	.61	.89
Subordinate Outcomes	30	2,507	.21	.22	.32	11.19	.11	.34
Training Method								
Information	9	1,136	.10	.11	.06	67.39	.04	.18
Practice	11	688	.35	.38	.21	24.40	.25	.51
Information and Demonstration	3	104	.64	.69	0	102.55	.58	.81
Information and Practice	22	1,208	.55	.60	.67	2.20	.33	.86
Demonstration and Practice	4	508	1.36	1.53	.35	4.74	1.19	1.86
Information, Demonstration, and Practice	22	1,208	.47	.51	.74	2.26	.22	.81
Feedback								
Feedback	34	2,027	.76	.84	.75	.61	.60	1.07
No Feedback	44	9,653	.64	.70	.52	.64	.55	.84
Needs Analysis								
Needs Analysis	20	689	.40	.43	.77	3.81	.11	.76
No Needs Analysis	58	10,991	.67	.73	.55	.60	.60	.87
Spacing Effect								
Spacing Effect	50	8,173	.45	.48	.42	2.46	.37	.60
No Spacing Effect	10	335	.17	.18	.15	59.42	.05	.32
Training Setting								
Face-to-Face	62	8,308	.43	.47	.41	3.23	.37	.56
Virtual	4	363	.48	.52	.24	8.74	.25	.79
Training Location								
On-Site	15	1,075	1.12	1.25	.78	.18	.88	1.61
Off-Site	13	1,028	.37	.40	.35	7.87	.21	.59

Variable	*k*	*N*	*d*	Corrected *d*	SD	%Var	LL	UL
Voluntary Training								
Voluntary	24	1,523	.48	.52	.57	3.22	.30	.74
Involuntary	12	2,846	1.24	1.39	.43	.78	1.16	1.62

Note. *k* = number of independent studies; *N* = sample size; *d* = repeated measures Cohen's *d*; SD = corrected standard deviation; %Var = percent of variance accounted for by sampling error variance; CI = confidence interval; LL = lower limit; UL = upper limit.

Table 7. Meta-Analytic Results: Training Duration as a Continuous Moderator

Variable	***N***	***β***
Duration		
Reaction	6	.79
Learning	113	-0.07
Behavior	145	-0.04
Results	54	.32*

Note. * = $p < .05$.

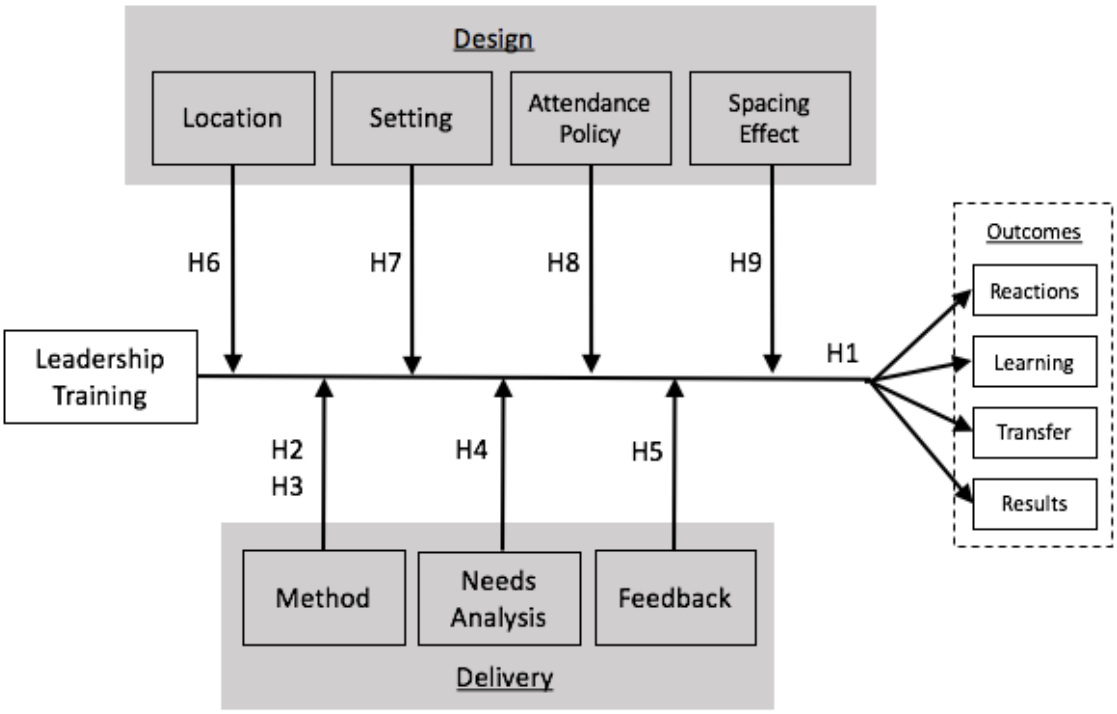

Figure 1. The Integrated Model of Leadership Training. This figure illustrates the model tested within the current meta-analytic investigation.

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