

The Role of Work Environment in Training Sustainment: A Meta-Analysis

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Objective: The purpose of this meta-analytic review is to examine the role of three work environment support variables (i.e., peer, supervisor, and organizational support) in training transfer and sustainment or long-term use of learned knowledge, skills, and attitudes (KSAs).

Background: Estimates demonstrate that little training is transferred to the job, wasting billions in organizational spending each year and resulting in significant loss to safety and individual and team performance. Prior research shows the importance of a supportive work environment to facilitating transfer; however, we know little of the relative importance of specific support variables. This study seeks to examine the unique roles of distinct support variables in training transfer.

Method: A meta-analysis was conducted with multiple regressions to answer three primary research questions.

Results: All work environment support variables demonstrate moderate and positive correlations with transfer of training. Furthermore, multiple regressions demonstrate that each factor of the work environment explains unique variance as a predictor, with the model accounting for 32% of transfer and peer support accounting for most of R^2 . Motivation to transfer mediates the relationship between all three work environment support variables and transfer. Furthermore, three support variables are positively related to sustainment, with peer and supervisor support showing the strongest relationships.

Conclusion: Findings illuminate the relative contribution of peer, supervisor, and organizational support to transfer and sustainment of training. As transfer continues to be an important yet understudied measure of the effectiveness of workplace training, these findings hold implications for both research and practice.

Keywords: meta-analysis, training, training transfer, work environment support

INTRODUCTION

Organizations spend billions of dollars on training and education initiatives every year (Association of Training and Development [ATD], 2015). Yet failure to optimally apply trained knowledge, skills, and attitudes (KSAs) within the work environment is common in organizational settings and results in the rapid decay of skills. In fact, estimates demonstrate that between 52% and 92% of acquired learning is lost within a year following training (Arthur, Bennett, Stanush, & McNelly, 1997; Saks, 2002); this in turn results in loss of organizational spending and failure to show return on investment (ROI). Furthermore, this “transfer problem” of suboptimal use of trained KSAs in the workplace may result in compromises to safety and performance, particularly when teams work in fast-paced and dynamic settings where the stakes are high (e.g., oil rigs, health care, nuclear power plants; Burke & Hutchins, 2008). Organizations should not anticipate that trainees will automatically and consistently demonstrate appropriate use of KSAs; training transfer is not a one-time event nor is it a checkbox (i.e., training transfer is “achieved”), rather, training transfer is the process by which KSAs are embedded and maintained according to the training’s content and purpose (Ford, Baldwin, & Prasad, 2018). Training transfer assessments vary based on the purpose of the training programs, which inform content of the evaluation and ways in which transfer could be operationalized and measured (e.g., frequency, quality, scenario-based demonstration, on-the-job observation, surveys). We define “optimal” training transfer more generally as the appropriate demonstration (in both quality and frequency) of KSAs by trainees on the job given the context and the purpose of the training program.

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Social influences, such as level of support, can impact the optimal use of trained KSAs on the job. Work environment social support factors may enhance trainee self-efficacy, promote a learning goal orientation, and increase trainee motivation (Seyler, Holton, Bates, Burnett, & Carvalho, 1998), which in turn can result in desired outcomes including improved productivity, job satisfaction, and a higher likelihood of using trained skills on the job (Kurtessis et al., 2017; Seyler et al., 1998). Indeed, empirical evidence on social support mechanisms within the work environment demonstrates the strong predictive ability of support to foster transfer, including typical use of trained skills (Blume, Ford, Baldwin, & Huang, 2010; Huang, Blume, Ford, & Baldwin, 2015). Furthermore, social support in the work environment explains improved transfer above and beyond the effects of training design and trainee characteristics alone (two other commonly examined transfer antecedent categories; Chiaburu & Lindsay, 2008), making work environment support a critical consideration in implementation of any given training program. Not surprisingly, then, workplace support factors for transfer are also gaining attention among practitioners who design and develop training (Lionetti, 2012).

Despite strong evidence of the collective benefits of work environment support, the relative benefits of distinct work environment support levels (e.g., support from an immediate supervisor vs. peer) remain largely unexamined (Grohmann, Beller, & Kauffeld, 2014; Huang et al., 2015). Therefore, the aim of this paper is to explore the relative contributions of different work environment support factors and mechanisms by which transfer is achieved and sustained over time.

Introduction to Research Questions

Work environment support variables. Research furthering our understanding of the role of a supportive work environment in training transfer has proliferated over the last two decades (Blume et al., 2010; Broad & Newstrom, 1992; Cromwell & Kolb, 2004). Three primary sources of work environment support are noted for their role in fostering training transfer efforts: organizational (e.g., top

management), supervisory (e.g., frontline supervisors), and peer support (e.g., fellow training attendees; Cromwell & Kolb, 2004). Employees at each level of support (i.e., peers, supervisors, and organizational leaders) can enact overall strategies that enhance a trainee's likelihood of transferring skills, such as providing opportunities for debriefing trainees on demonstration of KSAs. However, support is likely to differ functionally across levels based on specific job role, authority, and scope of practice (e.g., supervisors and peers may not have the authority to implement an organizational wide policy for use of trained skills). Despite these functional differences, levels of work environment support are often treated as a single variable (e.g., Clarke, 2002) in transfer research, leaving little to no guidance for the training practitioner. It is for these reasons that we focus on understanding the distinct contribution of organizational support, supervisory support, and peer support in transfer optimization; as such, we pose our first research question:

Research Question 1: What are the relative contributions of the three work environment support levels (i.e., peer, supervisor, and organization) to the transfer of training?

Motivation to transfer. Trainee motivation is important throughout the training lifecycle, including before (e.g., motivation to participate), during (e.g., motivation to learn), and after training (e.g., motivation to transfer; Beier & Kanfer, 2010; Chiaburu & Lindsay, 2008; Colquitt, LePine, & Noe, 2000; Holton, 1996; Scaduto, Lindsay, & Chiaburu, 2008). Importantly, trainee motivation to transfer is a critical facet of motivation, which influences the degree and quality to which training is transferred. Transfer motivation's importance is highlighted as it is among few trainee characteristics likely to be influenced by factors within the organization's control (Blume et al., 2010; Grossman & Salas, 2011; Huang et al., 2015). A wealth of empirical evidence, including prior reviews (e.g., Blume et al., 2010; Grossman & Salas, 2011; Huang et al., 2015), frameworks (e.g., Holton, 1996), and theories (e.g., Yamnill &

McLean, 2001), support transfer motivation's role as a mediator, explaining the positive association of work environment support and optimized training transfer. However, prior work treats work environment support as a single variable analytically, limiting our knowledge of the *unique* pathways by which support levels may foster transfer. Despite burgeoning evidence for transfer motivation's influence, no work-to-date has established a relationship between each level of support and transfer motivation.

We acknowledge that Blume and colleagues' (2010) meta-analysis examined work support more generally due to lack of published literature on supervisory and peer support; however, the question remains as to if support provided by peers and supervisors influence transfer *because* of transfer motivation. Reasons for the differential effects of peer, supervisory, or organizational support on transfer abound. Functionally, and foremost, organizations, peers, and supervisors express support differently and on different intervals. For instance, peers may work more closely with trainees on a day-to-day basis, meaning this level may provide more proximal reinforcement for training's use than organizational level support. On the contrary, supervisor level support (whether proximal or distal) may foster a sense of accountability by reinforcing policies related to training support (e.g., rewards, consequences; Grossman & Burke-Smalley, 2018; Skinner, 1953). Furthermore, we note that results of previous reviews that include a broad spectrum of relatively stable trainee characteristics (e.g., conscientiousness, cognitive ability) provide training practitioners with few evidence-driven options for enhancing motivation in the event of mandatory, organization-wide training initiatives (Lionetti, 2012). We believe that a deeper examination of transfer motivation as a mediator between transfer and all three support levels significantly contributes to our understanding as well as the facilitation of transfer in practice. Particularly, understanding the mediating factors influences the selection of transfer strategies, reinforcement schedules, and support at each level of the work environment. As such, we pose the following research question:

Research Question 2: Does motivation to transfer trained KSAs mediate the relationship between the three work environment support levels and training transfer?

Training sustainment. Trainees' use of trained KSAs on the job fluctuates (Baldwin & Ford, 1988; Blume et al., 2010) and typically degrades (Arthur et al., 1997) over time. However, the literature on training effectiveness is clear that to realize the positive effects of training on distal or organizational outcomes (e.g., safety climate, human performance capital), the prolonged use of trained behaviors on-the-job is required (Hughes et al., 2016; Tharenou, Saks, & Moore, 2007). Allocating time and resources to sustain training (defined as the prolonged use of training over time) is, therefore, in the organization's best interest (Chambers, Glasgow, & Stange, 2013). Supporting training sustainment is a nascent body of research. Implementation science offers foundational perspectives in the area of sustainability; specifically, creating and maintaining infrastructures of support may be necessary to sustain behavior change and associated outcomes. According to best practices of implementation science, training sustainment efforts should seek to gradually incorporate demonstration of trained behaviors as an organizational norm (Chambers et al., 2013; Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012). By doing so, organizational culture unquestionably supports training initiatives (Rouiller & Goldstein, 1993; Tracey, Tannenbaum, & Kavanagh, 1995), including transfer of trained skills to the job (King & Harden, 2013; Kozlowski & Salas, 1997; Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008; Salas et al., 2012).

Support at each level, including peer, supervisor, and organizational support, may play a key role in fostering training sustainment. Organizational science stipulates that for long-term change to be successful, there should be a champion spearheading change efforts (Kotter, 1995). We argue that adopting training and its long-term use may follow similar principles, and as such, peers, supervisors, and organizations may differ in terms of their impact on training sustainment practices. For instance, supervisors

may enact key leadership behaviors, such as facilitating team climate and expectations (Morgeson, DeRue, & Karam, 2010), which influence training's use; alternatively, peer networks may thrive in the presence of cohesive support by enacting the normalized trained behaviors (Yamhill & McLean, 2001). Given the nascent state of the science behind training sustainment, we pose the following research question to inform future evidence-based guidance:

Research Question 3: What is the relative contribution of three work environment characteristics to the sustainment of training?

METHOD

A model-based meta-analysis was conducted to quantify the relative impact of organizational, supervisory, and peer support along with motivation to transfer the acquired skills on training transfer.

Literature Search

We leveraged a multi-pronged search to identify relevant literature. First, we pulled papers from the reference sections of salient reviews (Baldwin & Ford, 1988; Blume et al., 2010; Burke & Hutchins, 2008; Burke, Hutchins, & Saks, 2013; Grossman & Salas, 2011; Huang et al., 2015). Next, we replicated search strategies used in previous meta-analyses of training transfer (Blume et al., 2010; Huang et al., 2015). Based on prior reviews, our search terms include training effectiveness, training transfer, transfer of training, and learning transfer (Baldwin & Ford, 1988; Blume et al., 2010; Huang et al., 2015). As transfer research is multidisciplinary, we followed recommendations from transfer researchers (e.g., Baldwin & Ford, 1988) and expanded our search to include the ProQuest database along with various journals not commonly included in prior transfer reviews. Specifically, we performed additional searches in the following journals: *Academy of Management*, *Human Factors and Ergonomics Journals* and *Proceedings* papers, *International Journal of Training and Development*, and *Human Resource Development*. When statistics presented in the primary article were unavail-

able to compute a between-person Pearson's r , we contacted the authors. In an effort to reduce the file drawer effect, we also contacted authors for unpublished manuscripts. To ensure our search did not exclude relevant manuscripts, we conducted additional manual searches in Google Scholar and Wiley Web of Science using the terms *training transfer*, *training effectiveness*, and *support and training transfer* and *support and motivation*, respectively (this added 1,231 articles to the pool of potentially relevant studies; see Figure 1 for complete listing of articles identified in the search).

Inclusion Criteria

The initial search yielded 55,496 unique articles; of these, 54,313 articles were removed from the pool of potentially relevant articles because they did not empirically examine training transfer. Articles were then reviewed based on abstract and then full text by two trained reviewers. To be included in the study, articles must have met the following criteria: (a) written in English, (b) report a relationship of interest to this study, (c) contain a healthy human adult sample (i.e., participants were over the age of 18), and (d) contain statistics required to calculate a correlation coefficient (i.e., Pearson's r ; see Table 1 for publication status of included studies; for more details on inclusion and exclusion, see Figure 1).

Coding Procedure

Two authors independently coded each of the 61 primary studies, 66 independent samples, included in the meta-analysis. Coders had previous experience in evaluating training research and were trained on use of the codebook prior to coding. Interrater agreement on the articles was high at 90%, and discrepancies were identified and resolved via discussion. Studies were coded for sample size, effect size, work environment support factor (i.e., organizational, supervisor, or peer), training transfer type (i.e., "transfer" or sustained), motivation to transfer, and reliability of the predictor and criterion variables. Previous meta-analytic results show rapid skill decay after 90 days (Arthur et al., 1997); therefore, we used 90 days as the operational definition for training sustainment such that only training

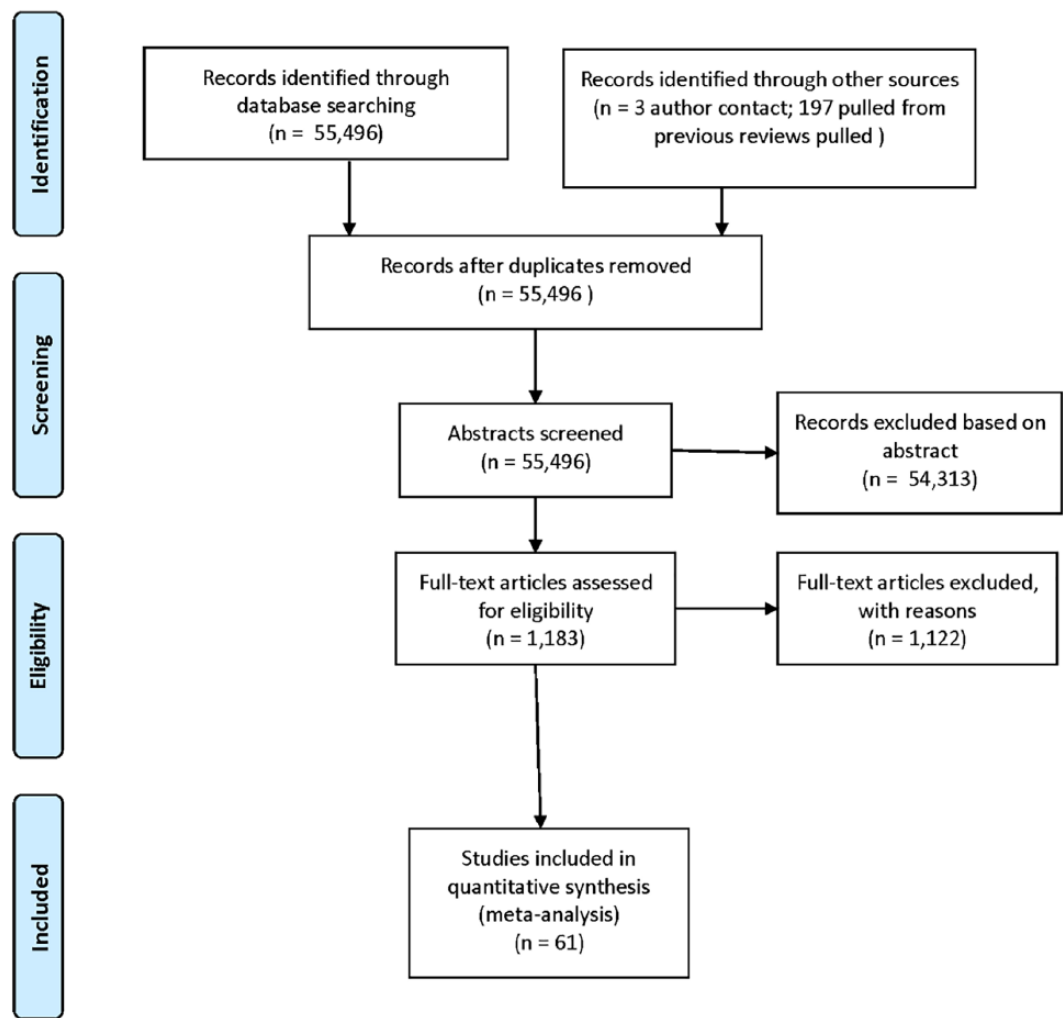


Figure 1. PRISMA flowchart.
Source. Adapted from Moher, Liberati, Tetzlaff, Altman, and The PRISMA Group (2009). For more information, visit www.prisma-statement.org.

transfer evaluated 90 days or more after completion of training is considered sustainment of training.

Meta-Analytic Procedures

Meta-analysis of primary studies. First, we conducted a meta-analysis of primary studies to produce a meta-matrix of corrected correlations. To do this, we used a random-effects Hunter and Schmidt (2004) approach to meta-analysis (Hedges & Olkin, 1985; Schulze, 2004). Effect size weights were calculated using the inverse of the sampling variance. When

multiple effect sizes appeared within a single independent sample, linear composites were created to reduce bias (Geyskens, Krishnan, Steenkamp, & Cunha, 2009). When intercorrelations among predictors or dependent variables were not reported for a given study, an average was taken to create a single effect size representative of that study (Nunnally, 1978). When a composite or average was calculated, the new reliability of the combined measures was estimated by inputting the number of items and reliabilities using the Spearman–Brown prophecy formula. When reliabilities of a given

TABLE 1: Publication Status and Predictors of Transfer

Predictor	k	N	\bar{r}	p	SDp	% Variance	95% CI		80% CV		Q
							Lower CI	Upper CI	Lower CI	Upper CI	
Trainee Characteristics											
Motivation											
Published	17	3,074	0.45	0.52	0.24	8.98	0.35	0.55	0.22	0.82	189.25**
Unpublished	16	3,464	0.30	0.35	0.27	7.58	0.18	0.41	0.01	0.37	232.62**
Work Environment											
Organizational support											
Published	11	2,699	0.27	0.32	0.18	13.34	0.17	0.37	0.08	0.56	88.90**
Unpublished	3	291	0.35	0.47	0.49	6.13	0.08	0.79	0.16	1.00	55.42**
Supervisory support											
Published	20	3,547	0.40	0.46	0.20	12.91	0.31	0.48	0.19	0.72	164.01**
Unpublished	9	1,419	0.44	0.55	0.21	18.82	0.31	0.56	0.28	0.81	73.59**
Peer support											
Published	11	2,567	0.44	0.51	0.17	13.24	0.35	0.53	0.30	0.73	95.65**
Unpublished	7	1,231	0.39	0.48	0.16	21.92	0.28	0.50	0.28	0.67	36.00**

Note. CI = confidence interval CV = credibility interval; k = number of samples; N = sample size.
* $p < .05$. ** $p < .01$.

measure were not provided, the mean reliability was imputed as the artifact distribution. Mean reliabilities were calculated for each outcome so as to provide more accurate estimates of corrected reliabilities and are as follows: supervisory support ($\alpha = 0.92$), peer support ($\alpha = 0.90$), motivation to transfer ($\alpha = 0.92$), and training transfer ($\alpha = 0.92$). Meta-analysis of primary studies was conducted using SAS Enterprise.

Meta-analyses are subject to publication bias in that published studies may artificially inflate effect size values used to inform meta-analytic results (i.e., there is a tendency for significant findings to be more “publishable,” creating significant differences between published and unpublished effects in primary articles; Hunter & Schmidt, 2004). As such, we tested for the influence of publication bias in a variety of ways. First, we leveraged trim and fill procedures for each relationship of interest (Duval & Tweedie, 2000), which resulted in funnel plots (see Figure 2). Trim and fill results demonstrate that no effects were imputed to the left of the mean. This finding suggests that the publica-

tion status of studies from which effects were calculated was not artificially inflated. Second, we ran publication status as a moderator, examining 95% confidence intervals for any significant differences in the effects of published and unpublished studies (see Table 1). Test results offer support that study effects were not likely to be inflated due to publication status of the primary study. We also conducted Egger’s test of the intercept (Egger, Davey Smith, Schneider, & Minder, 1997) as an additional test of publication bias. Egger’s intercept test revealed nonsignificant intercepts when the standardized effect size was regressed onto the inverse of the standard error (peer support: transfer, $\beta_0 = 1.76, p > .05$; supervisor support: transfer, $\beta_0 = -3.13, p > .05$; organizational support: transfer, $\beta_0 = -1.21, p > .05$; motivation: transfer, $\beta_0 = -3.48, p > .05$), again supporting a lack of publication bias.

Multiple regression(s). Second, we conducted multiple regressions in SAS Enterprise using the meta-matrix of corrected correlations and the harmonic mean of N (see Table 2;

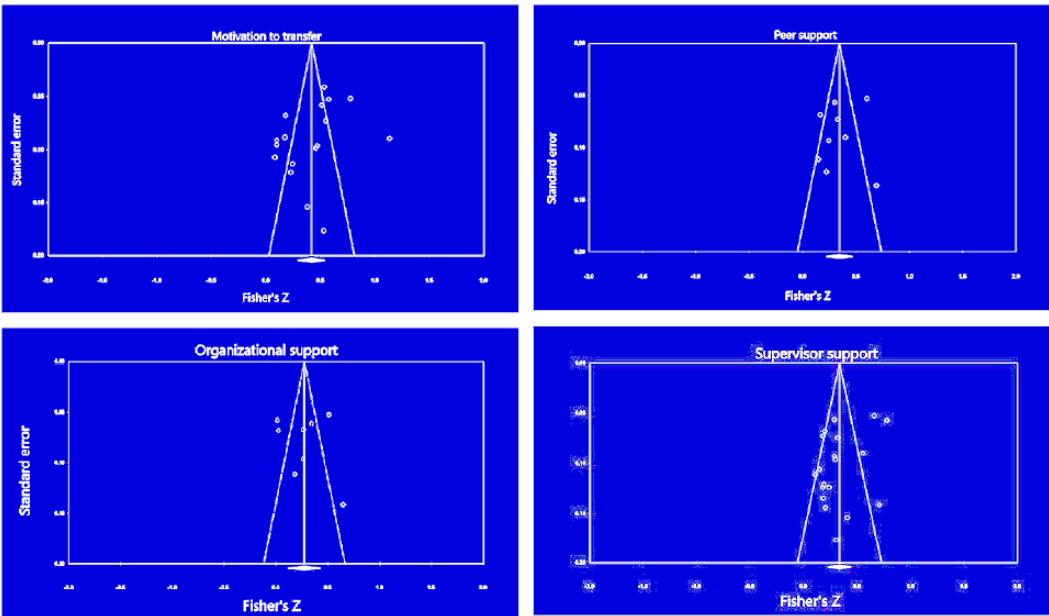


Figure 2. Funnel plots from publication bias assessment(s).

TABLE 2: Intercorrelations Among Predictors and Outcomes

	Motivation	Organizational Support	Supervisory Support	Peer Support	Transfer
Motivation	1.00				
k/N	—				
Organizational support	.49	1.00			
k/N	5/801	—			
Supervisory support	.41	.70	1.00		
k/N	16/2,771	8/2,093	—		
Peer support	.48	.63	.53	1.00	
k/N	12/2,081	5/1,679	17/3,769	—	
Transfer	.43	.34	.48	.50	1.00
k/N	33/6,538	14/2,990	29/4,966	18/3,798	—

Note: k = number of samples; N = sample size.

Viswesvaran & Ones, 1995). This approach is advantageous to testing our research questions for two reasons. First, this approach tests the model (i.e., interrelated set of postulated relationships; Becker & Schram, 1994) rather than testing the 1:1 relationship among criteria (e.g., motivation to transfer and training transfer). Testing 1:1 relationships is a typical approach performed in correlational meta-analysis alone

(Hunter & Schmidt, 2004; see Blume et al., 2010, for example); however, significance tests in this approach do not account for interrelatedness among predictors (e.g., correlation between supervisor support and organizational support), thereby correlational meta-analyses alone for this study would heighten the likelihood of Type I error. Thereby, results from model-based analyses produce more accurate effect size

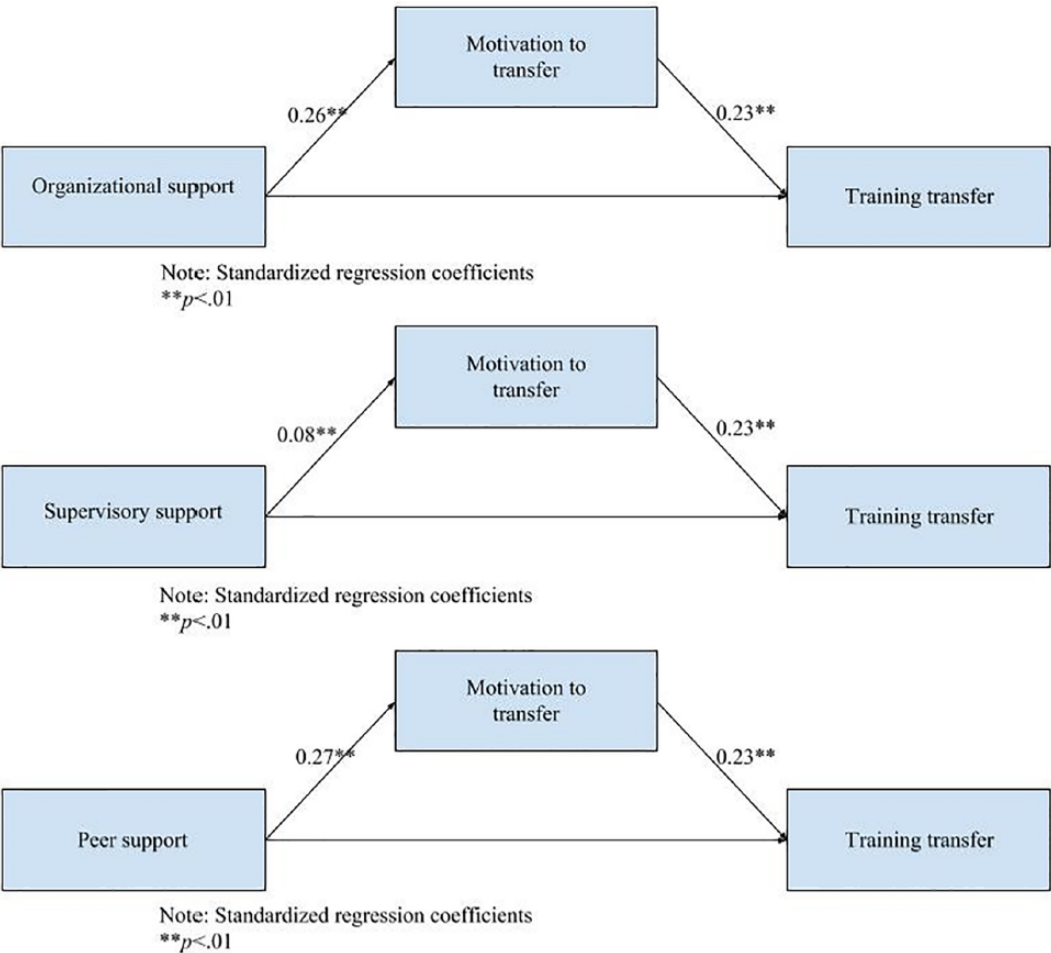


Figure 3. Mediation analyses.

estimates (Goldhaber & Brewer, 1999). Results produce beta weights and an R^2 for the variance accounted for within the model.

Mediation and relative importance tests. We used resulting beta weights and multiple regressions output(s) to conduct additional analyses for relative importance, incremental validity, and mediation tests. We conducted Monte Carlo simulations to construct 95% confidence intervals, which estimates the presence of an indirect effect of motivation to transfer. An estimated mediating effect is determined to be significant when a constructed 95% Monte Carlo confidence interval (Preacher & Selig, 2012) does not contain zero. While this approach does not produce a mediating effect size, it is appropriate for testing the presence of mediation relationships

in meta-analysis and other scenarios where raw data are unavailable (Preacher & Selig, 2012; see Figure 3). Results of our multiple regressions are also used to test the relative contributions of our three work environment support variables in explaining transfer. Significance for relative importance is determined in three ways. First, t -values for beta weights produced in our multiple regressions are used. This informs us of the contribution of a given predictor. Second, we tested for incremental change in R^2 upon the introduction of a predictor variable. For this project, we chose supervisory support as it shares the most theoretical relevance with the other two support factors. Third, relative importance indices determine the weight of the contribution of each predictor in the model to the

TABLE 3: Research Questions and Analysis

	Research Question	Analysis Technique
1	What is the relative contribution of three work environment characteristics on training transfer?	Multiple regressions; relative importance indices
2	Are these three mechanisms of work support effective at optimizing training transfer only when they motivate trainees to apply the trained skills?	Multiple regressions; mediation tests
	What is the role of the work environment in sustaining training outcomes?	Meta-analysis of correlations ^a

^aMeta-analysis of correlations conducted as meta matrix intercorrelations for outcomes reporting sustained transfer demonstrated less than sufficient *k* for interpretation of multiple regression models.

variable of interest (in this case, the relative weights of our three work environment support variables). Relative importance indices and incremental validity tests were conducted in R studio (see Table 3 for a list of questions paired with their analysis techniques).

RESULTS

Meta-Analysis of Correlations

Results of correlational tests are presented first to demonstrate relationships among the various predictors of transfer and the outcome of training transfer, organizational support ($k = 14$, $\rho = 0.34$, 95%CI [0.17, 0.38]), supervisory support ($k = 29$, $\rho = 0.48$, 95% CI [0.34, 0.48]), and peer support ($k = 18$, $\rho = 0.50$, 95% CI [0.35, 0.50]). All correlations with training transfer are significantly different from zero and are used to construct a meta-matrix of correlations used to run multiple regressions for Research Questions 1 to 2 (i.e., confidence intervals do not contain zero; see Table 2). While we would also have liked to test our sustainment of training research questions using multiple regressions as well as conduct moderator analyses, insufficient *k* precluded these analyses; therefore, results relating to our training sustainment research question are presented as corrected meta-analytic correlations. Future areas for determining moderating effects are mentioned within the discussion.

Multiple Regressions

Relative importance. Research Question 1 seeks to explore the relative importance of three work environment support variables in their

ability to predict transfer of training (i.e., organizational support, supervisor support, and peer support). All three work environment support variables contributed uniquely to transfer of training. In testing incremental validity, we compared the change in R^2 to a baseline model, which included organizational support and peer support. By adding supervisory support to the model (our tested model for incremental validity of an individual predictor), we found that supervisor support contributes a significant portion of unique variance to the model, accounting for an 8% change in R^2 . This change is significant to a $p < .05$, adding incremental value to the model and subsequently acting as an independent predictor of transfer (i.e., transferring 8% more of the skills to the job adds practical value; see Table 4). Relative importance indices further illustrate how each level of work environment support explains training transfer. Supervisor support demonstrates high relative contribution to R^2 (39.50%); however, findings reveal peer support accounts for a slightly higher percentage of training transfer than supervisor or organizational support (see Table 5).

Mediation tests. To explore Research Question 2, we tested the relationships presented in Figure 1 using a 95% Monte Carlo simulation interval of beta weights (Preacher & Selig, 2012). Simulated confidence intervals reveal an estimated and significant indirect effect of motivation to transfer between our three work environment support variables' relationships with training transfer. Specifically, the organizational support (95% CI [0.02, 0.11]), supervisor support (95% CI [0.01,0.03]), and peer support's

TABLE 4: Incremental Validity Test(s)

Predictor	Training Transfer		ΔR^2
	Model 0	Model 1	
	β	β	
Organizational support	0.04	-0.20*	
Supervisor support	—	0.40*	
Peer support	0.47*	0.41*	
Model summary			
R^2	.25*	.33*	.08*

Note. Standardized regression coefficients. Harmonic mean *N* for model without supervisory support = 3,105; Harmonic mean *N* for model with supervisory support = 3,562.
**p* < .05.

TABLE 5: Relative Importance Indices of Work Support

Predictor	Motivation to Transfer		Transfer of Training	
	Raw Relative Weights	% of R^2	Raw Relative Weights	% of R^2
Work Environment				
Organizational support	0.14	42.94%	0.04	14.85%
Supervisory support	0.04	12.16%	0.11	39.50%
Peer support	0.14	42.28%	0.14	46.76%

(95% CI [0.05, 0.08]) relationships with training transfer are explained by transfer motivation as 95% confidence intervals all excluded zero. However, the estimated 95% confidence intervals for mediating effects, especially for supervisory support, indicate that the strength of these effects may differ by predictive support variables; in addition, the estimated effects appear weak as lower confidence intervals approach zero, warranting investigation in future research.

Training Sustainment

Research Question 3 explores the role of three work environment variables in predicting training sustainment. Findings illustrate that organizational support relates positively to the long-term sustainment of training transfer (*k* = 7, ρ = 0.32, 95% CI [0.07, 0.44]). Interestingly, supervisor support and peer support

exhibit stronger relationships with sustained training transfer (*k* = 13, ρ = 0.51, 95% CI [0.30, 0.55] for supervisor support; *k* = 7, ρ = 0.48, 95% CI [0.30, 0.51] for peer support) than organizational support, suggesting that support at the supervisory and peer levels could play a more direct role in a trainee’s long-term use of trained skills. However, it is important to note that confidence intervals overlap, suggesting that more than one form of support is similarly important to the transfer process (see Table 6). Additional research that seeks to explore the driving factors to sustainment is warranted.

DISCUSSION

Our results corroborate the findings of existing research on the importance of the work environment, evidencing medium to strong positive relationships between all levels of work environment support and training transfer. Furthermore,

TABLE 6: Sustainment of Training Transfer

Predictor	K	N	\bar{r}	ρ	SD ρ	% Variance	95% CI		80% CV		Q
							Lower CI	Upper CI	Lower CI	Upper CI	
Trainee characteristics											
Motivation	9	1,256	0.64	0.75	0.28	5.26	0.48	0.80	0.39	1.00	171.14**
Work environment											
Organizational support	7	990	0.25	0.32	0.28	10.75	0.07	0.44	0.06	0.70	65.09**
Supervisory support	13	1,838	0.42	0.51	0.26	11.80	0.30	0.55	0.18	0.83	110.21**
Peer support	7	1,293	0.40	0.48	0.15	19.56	0.30	0.51	0.29	0.68	35.79

Note. CI = confidence interval CV = credibility interval; k = number of samples; N = sample size.
* $p < .05$. ** $p < .01$.

results have helped clarify the extent to which trainees benefit from specific levels of work environment support to facilitate transfer of training and training sustainment. Interestingly, all levels of work environment support added incremental validity to the regression model, exhibiting their unique importance in transfer of training. However, peer support plays the largest relative role in predicting training transfer. It is possible that employees are more likely to interact with their peers on a regular basis, or that peers are more likely to influence typical versus maximum transfer (Huang et al., 2015).

Motivation to transfer is shown to act as an important mediator, explaining the ability of work environment support variables (at all three levels) to predict training transfer. While constructed confidence intervals are only able to estimate the presence of a mediating effect, 95% confidence intervals evidence the existence of a statistically significant mediating effect. This approach cannot quantify the strength of the indirect effect; yet, confidence intervals approach zero, meaning that future investigation in this area is warranted as the effects may be weak. Additional factors that have gained attention within the past 5 years should be explored for their role in explaining the relationship between the work environment and training transfer. One such factor that may play a role in the work environment–transfer relationship is that of accountability (Grossman & Burke-Smalley, 2018; Schlenker, Britt, Pennington,

Murphy, & Doherty, 1994). Supportive peer networks, necessity of training, transfer type, and longitudinal assessments of continued support may also further this field of inquiry.

Finally, the results emphasize the importance of designing training as a systemic, multilevel process that occurs over time; that is, all levels of work environment support (i.e., organizational, supervisor, and peer) are important to the sustainment of training. Findings suggest peer and supervisor support play large roles in long-term sustainment of training. It is possible that the organization’s role in fostering and maintaining transfer is less prominent after the initial policies and procedure have been set, and that continual enforcement of policies through peers and/or supervisors directly influences continued use of trained skills. Training sustainment is a complex and multilevel phenomenon that should be considered throughout the entirety of the training lifecycle (i.e., before, during, and after training has occurred). Organizations that create a supportive infrastructure before training may realize sustained performance improvement as a result of training efforts. This study is the first, to our knowledge, to explore the relative roles of support factors and the ways in which they influence training’s prolonged use. We realize, however, that several meta-analytic integrations of the transfer literature exist to-date. As such, we further illustrate contributions made by the current meta-analysis as compared with previous meta-analyses of transfer research in Table 7.

TABLE 7: Contributions of the Current Approach

Reference	Prior Approach Description	The Current Review		
		Contribution(s)	Conceptual Contribution(s)	Methodologically
Blume, Ford, Baldwin, and Huang (2010)	Uses Hunter and Schmidt (2004) correlational approach to quantify 1:1 relationships between transfer antecedents and training transfer	First to demonstrate population-level effects substantiating Baldwin and Ford's (1988) transfer model	Focuses on variables that lie within the organization's sphere of control	Uses multiple regressions to reduce likelihood of Type I error
		Established importance of several moderators	First to report work environment support variables with sufficient k for interpretation	Produces model estimate(s)
Huang, Blume, Ford, and Baldwin (2015)	Uses Hunter and Schmidt's (2004) correlational approach and tests incremental increase effects	Supports existence of two new transfer types—maximal and typical transfer	Introduction of relative importance concepts for practitioner-oriented guidance (optimizing transfer under time and/or resource constraints)	100% of primary studies double coded (higher reliability)
		Establishes incremental validity for conscientiousness	Definition and preliminary guidance for training sustainment	All relationships calculated from primary studies rather than imputed effect sizes
				Individual-level corrections (more accurate population estimates)

Practical Implications

Motivation to transfer plays both a direct and indirect role in transferring learned skills to the job. Therefore, those who design and deliver training should consider factors before, during, and after training that affect trainee's motivation to engage and subsequently leverage training content. To this end, training motivation has been shown to be directly influenced by interventions implemented by the organization such as creating an organizational learning culture (Egan, Yang, & Bartlett, 2004), by supervisors such as communicating a clear link between training and job performance (i.e., utility of training; Chiaburu & Lindsay, 2008), and by peers such as participation in an established peer support network (Cromwell & Kolb, 2004). Peer support can be embedded within the training lifecycle through engaging trainees in the training design process. Specifically, creating opportunities for trainees to provide input into training content and support factors bolster motivation to transfer (Grohmann et al., 2014; Seyler et al., 1998). Seyler and colleagues (1998) identify transfer design as a critical factor in optimizing transfer as a means to ensure design for learning and explicit links between training and organizational goals. Transfer design can come in many forms; all transfer designs have the shared goal of facilitating the transfer of skills acquired during training to the job setting. From a practical standpoint, aligning the training content with job requirements (Seyler et al., 1998), arming trainees with strategies that guard against relapsing, and encouraging self-management techniques can also enable transfer (Wexley & Nemeroff, 1975). Given the relative importance of peer support, interventions aimed at this level (e.g., peer mentoring programs; Bryant, 2005) should be considered. Support from colleagues and coworkers can come in the form of encouragement, feedback, and aid in finding solutions to complex problems (Martin, 2010). Trainees may be more receptive, in certain contexts, to request and receive feedback from their peers as opposed to supervisors, and may perceive the feedback as nonpunitive, constructive, and applicable to the job.

Finally, findings attest to the criticality of organizational support and ongoing support

from top leaders. Our findings align with organizational support theory (OST) in that supportive cultures are perceived as such by frontline workers, such that trainee motivation can be influenced (Kurtessis et al., 2017). Organizational support was found to be mediated by motivation to transfer, meaning that selection of organizational-level strategies to promote training's use should emphasize incentives and rewards associated with positive demonstration of the trained skills (e.g., recognition, career advancement opportunities). It is unclear, however, which specific incentives and policy changes may incite and sustain trainee motivation to leverage KSAs on-the-job. Therefore, specific strategy selection among other considerations should be pursued in future work.

Limitations

While the effectiveness of training transfer practices may vary based on industry, a good portion of transfer studies report collecting data from diverse industry types. The practice of including a diverse set of industries in the sample enables a generalization of effective transfer practices; yet this limits the understanding of what is most effective within specific industries to enable strategic guidance. In addition, results are based on correlational designs; while findings indicate that relationships exist between the work environment, training transfer, and motivation to transfer, readers are cautioned against interpreting results as work environments causing motivation or causing transfer. Similarly, this meta-analysis relies on reporting of effect sizes amenable to conversion to a correlation; quality of study design was not a factor in including relevant studies. Fortunately, in exploratory moderator analyses, study design type did not significantly inflate effect size values. However, results of beta scores should be interpreted with caution as true prediction would leverage a model that includes only studies in which predictors and criterion were assessed at different time points. Thereby, future research should seek to incorporate more robust methods of evaluating transfer, including more objective assessment tools and a study design in which predictors and criterion are evaluated at

more than one time point, preferably in a longitudinal design.

Future Directions

Support includes elements of operational support (e.g., providing time to use the learned skills) and social support (e.g., enhancing self-efficacy to use new skills). Due to the specificity of these strategies and the level of reporting within primary studies, a more granular level of analysis into support features was not feasible. Namely, primary studies reported statistics for a set of strategies performed at a level of support rather than a statistical information necessary to assess the effectiveness of a specific technique, such as debriefing with trainees. While some specific strategies have been empirically tested in individual studies (e.g., opportunity to use), there was an insufficient number of primary studies to run reliable analyses for the purpose of this meta-analysis. Additionally, we specified potential moderators (e.g., timing of evaluation of transfer and/or predictor variables in our model) prior to data collection and attempted to run moderator analyses. Our pool of primary studies demonstrates significant heterogeneity, which allows moderator analysis; however, insufficient k for each categorical moderator created unfair group comparisons. Thereby, we omitted moderator analysis attempts; however, we strongly encourage incorporation of manipulations of support, objective measures of training transfer, as well as assessment of transfer based on task types (see Keith & Frese, 2008). In addition, the confidence intervals that estimate the presence of a mediating effect approach zero for assessing the ability of transfer motivation to mediate the relationship between supervisor support and transfer. This signifies the need for future research to investigate potential underlying mechanisms by which supervisors influence training implementation and sustainment (e.g., establishing the perceived utility of training). Finally, work environment support variables account for a substantial portion of the variance in our transfer model; however, variance in transfer remains unexplained by work environment support and transfer motivation. Future meta-analytic investigations should investigate the relative contributions of both

well-established predictors (e.g., self-efficacy, perceived utility, practice, error-based learning, opportunity to perform) as well as those that are currently understudied or equivocal (e.g., locus of control, extrinsic vs. intrinsic motivation, needs analysis, active learning strategies, accountability) to transfer and sustainment of training (Burke & Hutchins, 2007).

CONCLUSION

Several considerations are required to optimize transfer of training to the work environment. Our study found that supporting training at all levels of the work environment can account for 32% of the variance in training transfer, providing encouraging results to practitioners who wish to reap the benefits of training.

KEY POINTS

- Support factors play a role in fostering training transfer. The role of peer support may prove most beneficial in promoting training transfer, while supervisor and peer support may be most beneficial to sustainment of trained skills.
- Organizational support promotes transfer by enhancing trainee motivation; strategies to elicit organizational support should aim to motivate trainees before, during, and after implementation of training.
- Future work should examine sustainment of training using longitudinal design for stronger inferences on prediction of support as well as training sustainment evaluations.

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of teams and training to practice, and includes best practices for the design, development, and implementation of evidence-based training, supporting, and evaluating training effectiveness, promoting informal learning, and facilitating effective teamwork and team performance.

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