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Employee exposure to HRD and training transfer: the mediating role of formal training evaluation and the moderating role of informal learning behaviors

Cataldo Giuliano Gemmano and Amelia Manuti
Department of Education, Psychology, Communication, University of Bari Aldo Moro, Bari, Italy, and

Vicente González-Romá
IDOCAL, University of València, València, Spain

Abstract

Purpose – This study investigates the mechanisms underlying the association between employee exposure to Human Resource Development (HRD) and training transfer, focusing on the mediating role of formal training evaluation and the moderating role of informal learning behaviors. Building on the Congruence theory and applying its propositions to the framework of training transfer, we argue that informal learning behaviors strengthen the positive indirect effect of employee exposure to HRD on training transfer through formal training evaluation.

Design/methodology/approach – A sample of 217 white-collar employees participated in the study, responding to an online survey. Latent moderated structural equation modeling was used to test the proposed moderated and mediated relationships.

Findings – Results showed a significant positive indirect effect of employee exposure to HRD on training transfer through the mediation of formal training evaluation. Moreover, informal learning behaviors were revealed to boost this indirect relationship.

Originality/value – These findings contribute to sustaining the theoretical and practical integration of formal and informal learning in view of their combined effect on training transfer. The study outlines organizational strategies to enhance training transfer by fostering both quantity and quality of formal training and encouraging informal learning in the workplace.

Keywords Human resource development, Training transfer, Informal learning, Training evaluation, Congruence theory

Paper type Research paper

Introduction

Contemporary organizations operate in environments that continuously evolve. To address this challenge, organizations need to foster learning processes, which are considered crucial and strategic for financial success and competitiveness (Garavan et al., 2019). Accordingly, a

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growing body of scientific literature has highlighted the relevance of formal and informal dimensions of workplace learning to improve workers' competencies, facilitate professional development, and improve organizational performance (Garavan et al., 2021; Jeong, Han, Lee, Sunalai, & Yoon, 2018).

Traditionally, organizations have primarily focused on Human Resource Development (HRD) initiatives to provide training opportunities aimed at contributing to workforce development and effectiveness. This type of training is predominantly formal, encompassing structured learning processes (Garavan et al., 2021) characterized by predetermined goals, planned activities, and prescribed learning frameworks (Eraut, 2000). Investments in training have been proven beneficial in developing employees' knowledge, skills, and attitudes (KSAs), thereby enhancing both individual and organizational performance (Tseng & McLean, 2008). Accordingly, the path from training to performance finds its keystone in the transfer of training (Baldwin & Ford, 1988; Burke & Hutchins, 2008), described as "the extent to which trainees effectively apply the knowledge, skills, and attitudes gained in a training context back to the job" (Tannenbaum & Yukl, 1992, p. 420). Transfer is central to training effectiveness because training produces organizational value only when learned KSAs are applied across work activities and training experiences (Burke & Hutchins, 2007). This broader perspective on transfer accounts for the cumulative effect of various training programs rather than the impact of a single course. However, Blume, Ford, Baldwin, and Huang (2010) observed significant variability in the extent to which individuals transfer their enhanced KSAs after training to their work. Consequently, researchers have investigated what factors influence transfer outcomes to explain this variability (Gil, Mataveli, & Garcia-Alcaraz, 2022; Sparr, Knipfer, & Willems, 2017).

Some of the factors that may explain this variability are rooted in the quantity and quality of formal training received (Ford, Baldwin, & Prasad, 2018). Specifically, training quantity can be conceptualized through what Sung & Choi (2014) define as employee exposure to HRD, which refers to the number of training hours employees receive within a given period. The emphasis on HRD initiatives within an organization not only provides employees with more opportunities for competency development but also communicates strong organizational commitment to employee development, encouraging the process of individual learning (Sung & Choi, 2014). Thus, greater exposure to HRD increases the likelihood that employees will transfer trained knowledge and skills to their job activities (Brown & McCracken, 2009; Saks & Burke, 2012). However, this relationship is not always straightforward. Actually, scientific literature continues to debate the extent to which training initiatives effectively translate into effective competencies in the workplace (Ford, Yelon, & Billington, 2011, Ford et al., 2018; Torraco & Lundgren, 2020). Moreover, little is known about *why* employee exposure to HRD is related to transfer, as research investigating potential intervening variables in this relationship remains scarce. This omission is problematic and deserves attention from both theoretical and practical perspectives. From a theoretical point of view, a comprehensive understanding of the intervening factors explaining the association between these two variables is still lacking. Additionally, the scarcity of mediational studies makes it difficult to identify the underlying mechanisms through which training hours lead to workplace improvements. This situation is worrisome because it suggests that we do not fully understand the relation between HRD exposure and training transfer. From a practical standpoint, organizations risk investing in training hours without achieving a return on investment in terms of skill transfer and performance improvement. Thus, identifying the mediators explaining the link between employee exposure to HRD and training transfer is crucial for organizations to efficiently implement training and development initiatives that contribute to organizational competitiveness.

A key factor that may explain the link between training quantity and transfer lies in the quality of training. Training quality can be operationalized from the participants' perspective in terms of formal training evaluation, which is defined as the extent to which trainees perceive the training as satisfactory, useful, and rich in relevant knowledge (Grohmann & Kauffeld, 2013). A growing body of research suggests that the mere presence of training is insufficient to ensure successful transfer as the effectiveness of training also depends on the quality of the learning experience as perceived by employees (Ford et al., 2018). Therefore, formal training evaluation may be one of the mechanisms that explain the link between employee exposure to HRD and training transfer. In this respect, if the quality of formal training is not perceived as satisfactory and useful by participants for their actual work activities, it may not be transferred on the job and fail to enhance work performance.

While both the quantity and quality of formal training play a crucial role in training transfer, research indicates that they may not be sufficient on their own (Mehner, Rothenbusch, & Kauffeld, 2025). Some studies suggest that to maximize the effectiveness of formal training processes and their impact on transfer, it is also essential to consider informal dynamics that play a key role in facilitating the application of learned skills on the job (e.g., Park & Choi, 2016; Sparr et al., 2017). Therefore, training transfer should be examined not only in relation to formal training processes but also through the lens of informal learning dynamics that support the application of newly acquired competencies in the workplace. Informal learning consists of experiential and practical learning activities that happen in the actual work environment (Marsick & Watkins, 1990). It constitutes an inductive process characterized by individual reflection and relational exchanges (Marsick & Volpe, 1999). Some scholars have even argued that most of the learning in organizations occurs in informal and unstructured situations rather than in formal learning settings (Bedwell, Weaver, Salas, & Tindall, 2011; Tannenbaum, Beard, McNall, & Salas, 2010). In this vein, scholars have emphasized the role of informal learning in affecting the transfer process (e.g., Burns, 2008; Enos, Kehrhahn, & Bell, 2003; Sparr et al., 2017).

However, few studies have prioritized linking formal and informal learning processes (e.g., Park & Choi, 2016; Sparr et al., 2017). This dearth of knowledge is regrettable for theoretical and practical concerns. Theoretically, the lack of studies investigating the interaction between formal and informal learning prevents us from determining whether they synergistically contribute to fostering training transfer. Specifically, it remains unclear whether the adoption of informal learning behaviors in the work environment could enhance the effect of formal training evaluation on transfer of training. From a practical standpoint, this omission suggests that organizations may overlook the practical benefits of integrating formal and informal learning, often investing primarily in formal training programs while disregarding development opportunities arising from informal learning dynamics within the work setting (Tannenbaum et al., 2010). For example, formal training courses that are not supported by informal learning behaviors may fail to yield the expected results of transfer and work performance.

Therefore, the goals of the present study are to investigate: 1. the indirect effect of employee exposure to HRD on training transfer through formal learning, and 2. the moderating role of employees' informal learning behaviors in the aforementioned indirect effect. We chose formal training evaluation as a mediator because employees who receive more training opportunities are more likely to develop positive perceptions of training quality. This is due to their increased exposure to structured learning environments, interaction with knowledgeable instructors, and opportunities to acquire new knowledge. In turn, the perceived quality of formal training directly supports skill application in the workplace, acting as a catalyst for transfer processes (Gil et al., 2022; Velada & Caetano,

2007). We chose employee informal learning behaviors as a moderator for two reasons. First, Barnett's (1999) theoretical framework of workplace learning posits that informal learning enactment can maximize the training outcomes resulting from formal learning. Second, some review articles have called for research that examines the integration of formal and informal learning to enhance training transfer (Ford et al., 2018; Manuti, Pastore, Scardigno, Giancaspro, & Morciano, 2015).

Our research attempts to provide the following contributions to the literature. First, by uncovering the mediating role of formal training evaluation in the association between employee exposure to HRD and training transfer, we contribute to explaining *why* these variables are related. Developing a richer understanding of the underlying mechanisms through which two variables are related is what supports advancement of organizational knowledge (Mathieu, DeShon, & Bergh, 2008). Practically, we raise the need for organizations to align the investment in training hours with employees' expectations of high-quality training experience. Second, by uncovering the moderating role of informal learning behaviors in enhancing the link between formal training evaluation and transfer, we contribute to understanding *when* this relationship is stronger. Theoretically, analyzing the interaction between formal and informal learning processes contributes to expanding the knowledge about workplace learning, addressing the request for research on the combined effect of these types of learning (Ford et al., 2018). Practically, by revealing the integrated effect of formal and informal learning on transfer, we show to organizations the imperative to complement investments in formal training with thorough attention to informal learning in the work environment.

Theoretical background

The relationship between employee exposure to HRD, formal training evaluation, and training transfer

We posit that employee exposure to HRD is indirectly related to training transfer through training evaluation. HRD initiatives are essential for employee development, providing opportunities to enhance skills relevant to both present and future work positions (Garavan et al., 2021). Among different HRD dimensions, we start from the quantitative aspect of employee exposure to HRD, specifically the number of training hours employees receive annually (Sung & Choi, 2014). Employee exposure to HRD reflects the extent to which organizations invest in human capital development by providing structured learning opportunities. This measure not only captures the amount of training but also serves as an indicator of an organization's commitment to employee development. Employee exposure to HRD can be seen as a foundational element influencing both training quality and subsequent transfer, as greater exposure to training is expected to lead to higher global evaluations of formal training (Sung & Choi, 2014).

Training evaluation refers to employees' appraisal of the quality and value of the formal training received within their organization (Goldstein & Ford, 2002). Grohmann and Kauffeld (2013) model distinguished between short-term evaluation – which consists of trainee perceptions of satisfaction, knowledge, and utility of training – and long-term evaluation – which consists of the application to practice, individual results, and global results. The present study focuses on short-term evaluation of the global training received, because it is a consequence of the quantity of HRD initiatives and a trigger for the process of training transfer. We have excluded long-term evaluation from our focus because it could be redundant with training transfer, which we propose as a long-term outcome of training.

Training transfer is "the extent to which what is learned in training is applied on the job and enhances job-related performance" (Laker & Powell, 2011, p. 112). This definition

builds on the seminal work of Baldwin & Ford (1988), which conceptualized transfer as depending on training inputs, training outputs, and transfer conditions. A subsequent contribution by Holton, Bates, and Ruona (2000) further developed this perspective by emphasizing the systemic and organizational factors that shape transfer. Thus, the theoretical foundations of the construct highlight the role of organizational initiatives in fostering training transfer. (e.g., Blume et al., 2010; Burke & Hutchins, 2007; Ford et al., 2018).

We expect that employee exposure to HRD is related to training evaluation because having access to a sufficient amount of training increases the likelihood of a positive evaluation. Additional training opportunities provide significant value to employees in terms of satisfaction, utility, and knowledge. Thus, focusing on the relationship between the quantity and quality of training is essential to understanding *why* employee exposure to HRD contributes to training transfer.

The rationale underlying the association between employee exposure to HRD and training evaluation may be attributed to what Burke and Hutchins (2007) called the "strategic link", referring to the alignment between organizational strategies and employee training. When employees perceive that training is part of a broader organizational commitment to development, they are more likely to view it as meaningful, useful, and relevant. Accordingly, previous research has shown that HRD practices and training quantity are associated with subjective training evaluation, including trainee reactions and knowledge acquisition (Gil et al., 2013; Tseng & McLean, 2008; Urbancová, Vrabcová, Hudáková, & Petrů, 2021; Zaitouni, Harraf, & Kisswani, 2020).

Furthermore, a positive evaluation of training is expected to increase training transfer because perceived utility, satisfaction, and knowledge acquisition support employees' willingness and ability to apply learned competencies. Transfer models emphasize that favorable evaluations facilitate transfer by increasing the perceived value of training (Burke & Hutchins, 2007; Blume, Ford, Surface, & Olenick, 2019). In this vein, empirical research sustains the association between training evaluation and transfer. Alliger and colleagues' (1997) meta-analysis on training criteria sustained the role of training evaluation for transfer, finding that affective reactions, utility reactions, and knowledge are positively related to transfer behaviors. Further studies found that the dimensions of short-term evaluation of training are associated with training transfer in terms of the application of learnings and gains in work performance (e.g., Gil et al., 2022; Velada & Caetano, 2007).

Taken together, prior theoretical contributions and empirical findings provide consistent support for the relevance of HRD exposure and training evaluation for training transfer (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997; Björkman, Ehrnrooth, Mäkelä, Smale, & Sumelius, 2014; Blume et al., 2019; Burke & Hutchins, 2007). However, existing research has often examined these relationships separately, focusing on bivariate associations rather than on the underlying process linking HRD investments to transfer outcomes (e.g., Gil et al., 2013, 2022; Urbancová et al., 2021; Velada & Caetano, 2007). As a consequence, the mechanism through which employee exposure to HRD translates into training transfer remains only partially explicated, particularly with regard to the role of training evaluation as a proximal explanatory factor. The present study aims to offer a novel perspective by moving beyond bivariate associations and explicitly modeling formal training evaluation as a proximal mediating mechanism linking employee exposure to HRD and training transfer.

Taking into account the theoretical justifications and empirical evidence presented above, we expect that employee exposure to HRD will have a positive indirect effect on training transfer through training evaluation. HRD initiatives that provide more training opportunities to address employee learning needs will be associated with a more favorable evaluation of

the global training received, which, in turn, will promote the process of training transfer. Therefore, we hypothesize that:

H1. There is a positive indirect effect of employee exposure to HRD on training transfer through formal training evaluation.

The moderating role of informal learning behaviors in the relationship between formal training evaluation and training transfer

We posit that the relationship between formal training evaluation and training transfer is moderated by informal learning behaviors. Formal training refers to planned learning events based on needs analysis and characterized by structured objectives and prescribed learning frameworks (Eraut, 2000; Hashem, Sfeir, Hejase, & Hejase, 2022). Informal learning refers to the unplanned acquisition of KSAs through work activities in the actual work environment (Jacobs & Park, 2009), including reflection, feedback, experiential learning, and intent to learn (Tannenbaum et al., 2010). Although distinct, formal and informal learning are interrelated because formal learning can be reinforced by informal learning at work (Barnett, 1999; Sparr et al., 2017).

Thus, we expect that informal learning moderates the link between formal training and transfer because when the application of formally acquired KSAs is sustained by the learning that happens informally, training transfer is expected to be maximized. The adoption of informal learning behaviors (e.g., individual reflection and feedback seeking) can assist workers in processing knowledge, assessing contexts for optimal skills utilization, and further developing the competencies promoted in high-quality formal training (i.e. training that receives positive evaluation).

The rationale underlying this moderation is grounded in Congruence theory (Nadler & Tushman, 1980), which argues that organizational effectiveness depends on the alignment among key organizational components. Applied to workplace learning, the theory suggests that formal and informal learning can create synergies when they are aligned. Thus, informal learning behaviors may strengthen the effect of positively evaluated formal training on transfer.

In line with our arguments, some empirical studies examined the interrelationship between formal training and informal learning (e.g., Bednall & Sanders, 2017; Choi & Jacobs, 2011) and their combined effects on transfer and performance outcomes (e.g., Park & Choi, 2016; Sparr et al., 2017). Park & Choi (2016) found that both formal and informal learning have a positive impact on employees' work performance. Sparr et al. (2017) showed that participants in formal training report a more successful transfer when they adopt informal learning behaviors.

However, prior research has mostly examined formal and informal learning as parallel or complementary predictors, rather than explicitly modeling informal learning as a boundary condition within a broader HRD process. The present study extends this line of research by conceptualizing informal learning behaviors as a moderator of the relationship between formal training evaluation and training transfer. By embedding this moderating condition within a broader indirect pathway linking employee exposure to HRD and training transfer, the study aims to advance a more integrative understanding of how formal and informal learning jointly contribute to effective training transfer.

Building on the conceptual and empirical arguments presented above, we posit that the positive link between formal training evaluation and training transfer is moderated by informal learning behaviors, so that when informal learning behaviors are high, the relationship is stronger, and when informal learning behaviors are low, the relationship is

weaker. Integrating this moderated relationship with the indirect effect proposed in *H1* yields our second hypothesis (see Figure 1):

H2. The positive indirect effect of employee exposure to HRD on training transfer through formal training evaluation is moderated by informal learning behaviors.

Method

Procedure and sample

The data for this study were collected through an online survey administered to 249 Italian workers between July and December 2022. Participants were recruited through a convenience sampling procedure. The survey link was shared through the authors' personal and professional networks and disseminated through social media to reach potentially eligible workers. Only employees who had attended at least one formal training initiative in the past year were eligible to participate. The study followed established ethical guidelines and complied with relevant data protection regulations. Respondents received information about the research aims, voluntary and anonymous participation, informed consent, the right to refuse or withdraw, and the measures adopted to ensure confidentiality. No coercion or undue influence was used, and data were used solely for research purposes.

Considering the limitations of the sampling procedure and the low representation of blue-collar workers in the sample recruited, we opted to include only white-collar employees in this study to ensure a sample with homogeneous work conditions, tasks, and experiences. Additionally, we excluded respondents who reported an unreasonably high number of training hours in the past year (e.g., 3,000 h). After data cleaning procedures, the final sample comprised 217 employees.

Measures

We utilized measures that had been previously validated in the Italian context when they were available. Otherwise, we followed the procedure suggested by Brislin (1986) to translate foreign scales into Italian. The original version of the items was translated into Italian and then back-translated into the original language by a bilingual author. The two versions in the original language were compared to refine the Italian translation through minor adjustments. Subsequently, the final Italian version was administrated to a pilot

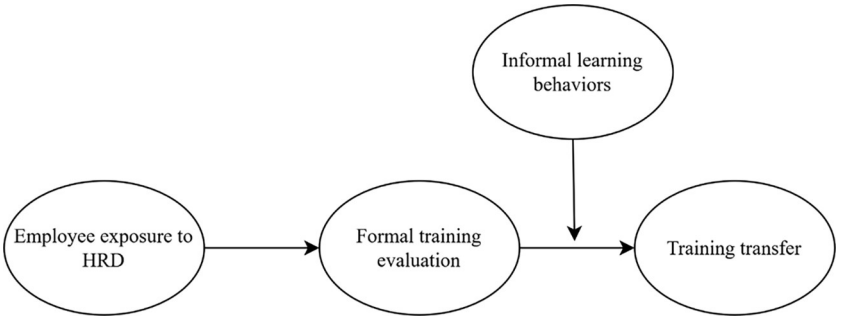

Figure 1. The research model
Source(s): Authors' own work

sample of 10 Italian native speakers who confirmed the clarity and appropriateness of the translated items for the Italian context.

Employee exposure to HRD. This variable was measured using a quantitative approach, following the framework of Sung & Choi (2014). This indicator refers to the number of hours of formal training activities provided by the organization that employees attended over the past year. Each respondent reported the total number of training hours they had received in the last 12 months.

Formal training evaluation. This variable was measured using three items taken from the Questionnaire for Professional Training Evaluation (Grohmann & Kauffeld, 2013), which has been validated in Italy by Fregonese, Caputo, and Langher (2018). The complete scale has 12 items distributed into six items for short-term evaluation and six items for long-term evaluation. For this study, we focused on the short-term evaluation, which captures individual perceptions of formal training quality. The short-term evaluation consists of three dimensions concerning satisfaction, utility, and knowledge. For each dimension, we chose the item with the highest factor loading to be included in the study to represent the respective dimension (see Table 1 for the complete list of items). We adapted the introductory instructions asking participants to globally evaluate the training experiences within their current organization. Participants were asked to express their agreement using an 11-point Likert scale ranging from 0 "completely disagree" to 10 "completely agree". Cronbach's alpha was 0.93.

Informal learning behaviors. This variable was measured using four items taken from the short form of the Informal Workplace Learning scale (Decius, Knappstein, Schaper, & Seifert, 2023). The scale consists of four dimensions: experience/action, feedback, reflection, and intent to learn. For each dimension, we chose the item with the highest factor loading to be included in the study for representing the respective dimensions (see Table 1 for the complete list of items). A 6-point Likert scale ranging from 1 "Not agree at all" to 6 "Fully agree" was used. Cronbach's alpha was 0.77.

Training transfer. This variable was measured by three items elaborated by Xiao (1996) concerning the extent to which the KSAs that are learned in training are applied on the job to enhance work performance (see Table 1 for the complete list of items). As we did with the formal training evaluation measure, we adapted the introductory instructions, asking participants to refer to the transfer of their overall training experience within their current organization. A 5-point Likert scale ranging from 1 "completely disagree" to 5 "completely agree" was used. Cronbach's alpha was 0.92.

A Confirmatory Factor Analysis (CFA) was performed with Mplus 8 (Muthén & Muthén, 2017) to evaluate measurement quality. The measurement model included three latent variables with their respective observed items and showed satisfactory fit ($\chi^2(32) = 43.13$, $p = 0.09$, CFI = 0.98, TLI = 0.98, RMSEA = 0.04, SRMR = 0.05). Table 1 reports standardized factor loadings, latent correlations, average variance extracted (AVE), and composite reliability. Discriminant validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and was supported because the square root of AVE for each construct exceeded its correlations with the other latent variables. To test for potential common method variance, we compared the hypothesized three-factor model against a one-factor model in which all the items loaded on a single common factor. This latter model showed a poor fit to the data (χ^2 (35) = 312.53, $p < 0.001$, CFI = 0.65, TLI = 0.55, RMSEA = 0.19, SRMR = 0.13), and its fit was worse than the fit of the three-factor model ($\Delta\chi^2$ (3) = 269.4, $p < 0.001$). Moreover, the use of response scales with distinct scale ranges helped mitigate the likelihood of systematic common method bias.

Table 1. Confirmatory factor analysis results, construct reliability, and discriminant validity

Factor and item	Standardized loading	Latent correlations			AVE	√AVE	CR
		1	2	3			
1. Formal training evaluation		–	0.27	0.72	0.83	0.91	0.94
I enjoyed the training very much	0.88						
Participation in this kind of training is very useful for my job	0.95						
After the training, I know substantially more about the training contents than before	0.91						
2. Informal learning behaviors		0.27	–	0.31	0.45	0.67	0.76
I use my own ideas to improve tasks at work	0.61						
I ask my colleagues about the methods and tricks they use at work	0.46						
Before starting a new task, I think about how I can do my work best	0.83						
I want to learn something new for myself because then I can solve problems at work faster	0.72						
3. Training transfer		0.72	0.31	–	0.81	0.90	0.93
Using the new KSA has helped me improve my work	0.90						
I have accomplished my job tasks faster than before training	0.88						
The quality of my work has improved after using new KSA	0.91						

Note(s): AVE = average variance extracted; √AVE = square root of average variance extracted; CR = composite reliability. Values under "Latent correlations" represent correlations among latent variables. All standardized factor loadings were statistically significant at $p < 0.001$. Discriminant validity was supported because the square root of AVE for each construct exceeded its correlations with the other latent variables
Source(s): Authors' own work

Data analysis

Mplus 8 (Muthén & Muthén, 2017) was used to test the hypothesized model, which involved modeling relationships among observed (employee exposure to HRD) and latent variables (formal training evaluation, informal learning behaviors, and training transfer). To assess the multivariate normality assumption of the manifest indicators, we computed Henze & Zirkler (1990) index. The obtained result (2.60, $p < 0.001$) did not support the assumption of multivariate normality. Therefore, we employed the Robust Maximum Likelihood (MLR) method of estimation implemented in Mplus for all Structural Equation Modeling (SEM) analyses reported in this study. This method is robust to violations of normality assumptions. SEM analyses were used to test the hypothesized model because the study involves simultaneous estimation of direct, indirect, and conditional effects among observed and latent variables within a single coherent framework.

To examine the indirect effect proposed in *H1*, we employed bootstrapping (with 5000 resamples) to calculate the 95% confidence interval (CI) for the hypothesized indirect effect. Bootstrapping was chosen because indirect effects typically have asymmetric sampling distributions, and this approach provides more accurate confidence intervals compared to normal-theory tests, especially under conditions of non-normality.

H2 involved an interaction between two latent variables and the test of the conditional indirect effect. Modeling the interaction between latent variables (vs observed ones) allowed us to account for measurement error and provided a more accurate test of the hypothesized moderating mechanism. Conventional fit indices for a model with an interaction between two latent variables are not reliable because the analysis includes non-linear effects leading to biased fit indices (Kelava et al., 2011). Consequently, Mplus does not report these indices for models with latent interactions. Therefore, to evaluate the fit of the model including the latent interaction, we compared it with the model without the latent interaction by computing a chi-square difference test based on the corresponding loglikelihood values and scaling correction factors (Cheung, Cooper-Thomas, Lau, & Wang, 2021; Satorra & Bentler, 2010). Additionally, we compared the two models in terms of the Akaike Information Criterion (AIC), with lower values indicating a better fit. Thus, we examined whether the latent interaction improved model fit, whether the interaction effect was statistically significant, and whether the indirect effect was stronger at higher levels of the moderator and weaker at lower levels of the moderator.

Results

The final sample of the present study comprised 217 employees with a mean age of 39.71 years (SD = 11.83), of whom 49% were women. In terms of education, 60% of participants held a bachelor's degree and 40% had graduated from secondary school. In terms of contract type, 86% of participants were employed on permanent contracts, while the remaining participants held fixed-term contracts. Regarding company size, 21% of participants worked in small enterprises (fewer than 50 employees), 24% in medium-sized companies (51–250 employees), and 54% in large organizations (more than 250 employees), operating in the private (65%) and public (35%) sectors.

Descriptive statistics, Cronbach's alpha coefficients, and correlations between the study variables are presented in Table 2.

To test *H1*, we fitted a model including the indirect effect of employee exposure to HRD on training transfer through formal training evaluation (see Figure 2). The model demonstrated a satisfactory goodness-of-fit (χ^2 (13) = 26.74, $p < 0.05$, CFI = 0.98, TLI = 0.97, RMSEA = 0.07, SRMR = 0.03). Figure 2 displays the unstandardized and standardized parameter estimates for the bivariate relationships involved. The results showed that

Table 2. Means, standard deviations, correlations, and cronbach's alphas

Variable	Range	*M*	SD	1	2	3	4
1. Employee exposure to HRD	1–100	3.49	1.23	–			
2. Formal training evaluation	0–10	7.44	2.28	0.14*	(0.93)		
3. Training transfer	1–5	3.79	1.08	0.06	0.67***	(0.92)	
4. Informal learning behaviors	1–6	5.07	0.87	0.00	0.27***	0.33***	(0.77)

Note(s): $N = 217$. *$p < 0.05$, ***$p < 0.001$. *M* = Mean. SD = standard deviation. Cronbach's alphas are reported on the diagonal within parentheses
Source(s): Authors' own work

Figure 2. Parameter estimates for the latent mediation model

Note(s): **$p < 0.001$, *$p < 0.05$. Unstandardized coefficients are reported with standard errors in parentheses. Standardized coefficients (β) are also reported. Indicators are not shown for the sake of clarity
Source(s): Authors' own work

employee exposure to HRD was positively related to formal training evaluation (0.10, $SE = 0.05$, $p < 0.05$, $\beta = 0.15$), and the latter was positively related to training transfer (0.38, $SE = 0.04$, $p < 0.001$, $\beta = 0.71$). The indirect effect was positive (0.04, $SE = 0.02$) and statistically significant (95% CI [0.01, 0.07]), thus supporting *H1*. Furthermore, we compared the model shown in Figure 2 with a model including the direct relationship between employee exposure to HRD and training transfer. The fit of this alternative model did not significantly differ from the previous model ($\Delta\chi^2$ (1) = 0.64, $p > 0.05$) and the aforementioned direct relationship was not statistically significant (−0.01, $SE = 0.01$, $p > 0.05$, $\beta = 0.04$). Hence, we retained the more parsimonious model. Finally, to obtain an effect size measure of the observed indirect effect, we computed the Completely Standardized Indirect Effects (ab_{cs}) (Preacher & Kelley, 2011), showing that training transfer increased by 0.11 standard deviations (SD) for every one-SD increase in employee exposure to HRD through formal training evaluation.

Taken together, these findings support the hypothesized indirect effect, suggesting that the relationship between employee exposure to HRD and training transfer is mediated by formal training evaluation. This highlights the role of training evaluation as an explanatory mechanism linking HRD investments to transfer outcomes.

Figure 3 shows the latent moderated structural equation model that was fitted to test *H2*. Since conventional fit indices are not reliable for models including a latent interaction due to the presence of non-linear effects (Kelava et al., 2011), to obtain fit indices we first ran a model that included all the relationships excluding the interaction term. The results were acceptable (χ^2 (42) = 73.48, $p < 0.01$, CFI = 0.97, TLI = 0.95, RMSEA = 0.06, SRMR = 0.10). We then compared this model without the interaction term to a model that included the interaction effect using a chi-square difference test based on the corresponding log-likelihood values and scaling correction factors (Cheung et al., 2021; Satorra & Bentler,

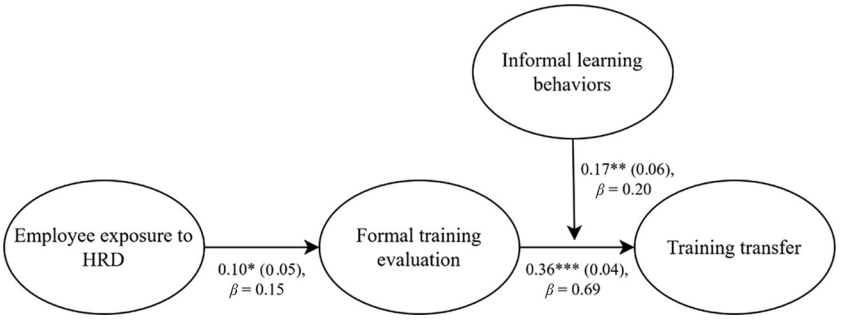

Figure 3. Parameter estimates for the latent moderated mediation model

Note(s): $^{**}p < 0.001$, $^{*}p < 0.05$. Unstandardized coefficients are reported with standard errors in parentheses. Standardized coefficients (β) are also reported. Indicators are not shown for the sake of clarity

Source(s): Authors' own work

2010). The test yielded a statistically significant value of 8.99 ($\Delta df = 1$, $p < 0.01$), indicating that the moderation improved the model's goodness of fit. Consistently, the AIC value of the model with the interaction (AIC = 6081.22) was lower than the AIC value of the model without the interaction (AIC = 6090.93), further supporting the improved fit of the interaction model. The inclusion of the latent interaction resulted in a 4% increase (from 51% to 55%) in the explained variance of training transfer. Moreover, the statistically significant interaction effect (0.17, $SE = 0.06$, $p < 0.01$, $\beta = 0.20$) supported the moderating role of informal learning behaviors in the relationship between formal training evaluation and training transfer. Specifically, as informal learning behaviors increased, the link between formal training evaluation and training transfer also strengthened.

To examine the hypothesized conditional indirect effect (*H2*), we employed Preacher *et al.*'s (2007) method for testing moderated mediation models. The conditional indirect effect is contingent upon whether the interaction coefficient is significantly different from zero. We represented the conditional indirect effect in Figure 4 using the Johnson-Neyman technique (Johnson & Neyman, 1936), plotting the unstandardized indirect effect (*y*-axis) across the range of values of the moderator (*x*-axis). The plot of the positive interaction effect pointed out that the indirect effect of employee exposure to HRD on training transfer through formal training evaluation strengthened as informal learning behaviors increased, thus supporting *H2*.

To clarify the interpretation of the conditional indirect effect, we also estimated and tested the indirect effects at specific values (-1SD, mean, +1SD) of the moderator variable (see Table 3). The results showed that the indirect effect was significant at all three levels of the moderator, and notably, the positive indirect effect was stronger as the moderator increased.

Taken together, these findings support the moderating role of informal learning behaviors. When informal learning complements formal training experiences, employees are more likely to process and apply acquired knowledge, thereby strengthening the relationship between formal training evaluation and transfer. A summary of the hypothesis testing results is reported in Table 4.

Discussion

The study aimed to investigate the indirect relationship between employee exposure to HRD and training transfer through formal training evaluation, alongside examining the moderator

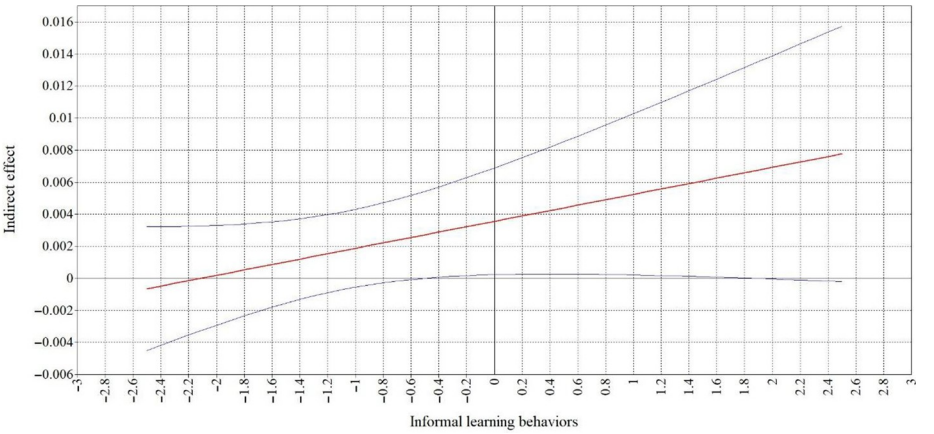

Figure 4. Plot of the conditional indirect effect of employee exposure to HRD on training transfer through formal training evaluation across values of informal learning behaviors

Note(s): Indirect effect refers to the estimate of the indirect relationship between employee exposure to HRD and training transfer through formal training evaluation. The distribution of informal learning behaviors is mean centered. The red line represents the point estimate of the indirect effect across the range of informal learning behaviors. The blue lines define the corresponding 95% confidence interval

Source(s): Authors' own work

Table 3. Bootstrap confidence intervals for the conditional indirect effect of employee exposure to HRD on training transfer through formal training evaluation at different levels of informal learning behaviors

	Conditional Indirect Effect *a1* (*b1* + *b3* W)		
Moderator values	95% Lower Limit	Estimate	95% Upper Limit
W mean - 1 SD	0.01	0.03	0.05
W mean value	0.01	0.04	0.07
W mean + 1 SD	0.01	0.05	0.09

Note(s): W = moderator variable (informal learning behaviors); SD = standard deviation. The conditional indirect effects are unstandardized

Source(s): Authors' own work

role of informal learning behaviors in the association between formal training evaluation and training transfer in a sample of white-collar employees.

With regard to the first hypothesis, our findings are consistent with previous studies showing that greater exposure to HRD is associated with more favorable perceptions of the overall training received (Gil et al., 2013; Tseng & McLean, 2008; Urbancová et al., 2021; Zaitouni et al., 2020). They also align with evidence that trainees' satisfaction, perceived utility, and learning are positively related to training transfer (Alliger et al., 1997; Gil et al., 2022; Velada & Caetano, 2007). However, these relationships have generally been examined separately. By linking them within a single indirect pathway, the present study helps explain why training investments do not automatically translate into the application of acquired

Table 4. Summary of hypothesis testing results

Hypothesis	Tested relationship	Main evidence	Result
H1	Indirect effect of employee exposure to HRD on training transfer through formal training evaluation	Indirect effect: $b = 0.04$, SE = 0.02, 95% CI [0.01, 0.07]; completely standardized indirect effect = 0.11	Supported
H2	Conditional indirect effect of employee exposure to HRD on training transfer through formal training evaluation, moderated by informal learning behaviors	Latent interaction: $b = 0.17$, SE = 0.06, $p < 0.01$, $\beta = 0.20$; adding the interaction improved model fit, $\Delta\chi^2(1) = 8.99$, $p < 0.01$. The indirect effect increased as informal learning behaviors increased (see Table 3 and Figure 4)	Supported

Note(s): b = unstandardized coefficient; SE = standard error; CI = confidence interval; β = standardized coefficient; $\Delta\chi^2$ = chi-square difference test
Source(s): Authors' own work

competencies at work (Ford et al., 2011, 2018; Torraco & Lundgren, 2020). Our findings indicate that greater exposure to HRD contributes to training transfer because employees provided with ample opportunities to address their training needs are more likely to positively evaluate their training experiences, subsequently enhancing transfer. This pattern is consistent with Burke and Hutchins (2007) notion of the strategic link, according to which training is more likely to produce transfer when employees perceive it as a meaningful expression of the organization's commitment to their development.

With regard to the second hypothesis, our findings are consistent with research showing that formal and informal learning jointly support training transfer and performance (Park & Choi, 2016; Sparr et al., 2017). In particular, Sparr et al. (2017) found that feedback-seeking and reflection facilitate the transfer of formal training. Our study extends this evidence by showing that informal learning behaviors do not merely operate alongside formal training, but rather they strengthen the relationship between employees' perceptions of formal training quality and its application at work. This pattern is consistent with the Congruence theory (Nadler & Tushman, 1980), according to which aligned formal and informal components create synergies. Moreover, it responds to calls for more integrative accounts of formal and informal workplace learning (Ford et al., 2018; Manuti et al., 2015).

Theoretical implications

Our findings have some theoretical implications worth discussing. First, by uncovering the mediator role of formal training evaluation, we contribute to explain *why* employee exposure to HRD is positively and indirectly related to training transfer. Employees who are provided with more hours of training – in quantitative terms – tend to develop more positive evaluations of their training experiences – in qualitative terms – because additional learning opportunities enable the continuous assimilation of new concepts, refinement of skills over time, and increased confidence in applying acquired knowledge. A positive formal training evaluation, in turn, increases the likelihood of training transfer because a high-quality training experience encourages the application of the learned KSAs on the job. Thus, formal training evaluation acts as a mediator because it is promoted by employee exposure to HRD and it is an important trigger for transfer.

These findings extend existing models of training transfer (Baldwin & Ford, 1988; Burke & Hutchins, 2007) by empirically validating the pivotal role of the relationship between employee exposure to HRD and training evaluation to reach training transfer. Our focus on employee exposure to HRD might prove useful to explain the delicate link between training initiatives and transfer. Thus, our study contributes to the theoretical advancement of training transfer models by highlighting the significance of both quantity and quality of training in the transfer process. Existing research suggests that investments in training do not automatically result in effective skill application at work, as the mechanisms through which training initiatives are converted into usable competencies remain only partially understood (Ford et al., 2011, 2018; Torraco & Lundgren, 2020). By positioning formal training evaluation as an explanatory mechanism, the present study moves beyond common associations and clarifies the process through which quantitative HRD investments become meaningful for employees.

Second, by uncovering the moderating role of informal learning behaviors, our results show the conditions that foster the relationship between formal training evaluation and training transfer. Our findings indicate that informal learning behaviors boost the connection between high-quality formal training experiences and the transfer of formal training. Thus, training transfer is maximized when positive formal training experiences are sustained by the learning that happens informally in the workplace. This contributes to moving organizational knowledge forward by addressing a gap in empirical evidence regarding the integration of formal and informal learning (Ford et al., 2018; Manuti et al., 2015). The present study contributes to the workplace learning and transfer literature because it extends our understanding of how employees leverage informal learning environments to reinforce the transfer of KSAs acquired in formal learning environments. We empirically showed that formal and informal dynamics are not separate dimensions of learning. They should be considered concurrent processes that interact to foster training transfer. By modeling informal learning behaviors as a boundary condition that strengthens the effect of formal training evaluation, the present study advances a more integrative perspective on how learning processes jointly contribute to training transfer.

Finally, our results should be interpreted within a broader organizational context that supports learning and knowledge application. The mechanisms identified in this study are likely to operate most effectively in organizations characterized by a culture that values learning, experimentation, and the application of new knowledge at work. A supportive organizational culture may legitimize the use of newly acquired competencies, reduce perceived risks associated with change, and encourage employees to translate positive training experiences into concrete behavioral changes (Gemmano, Manuti, & Giancaspro, 2022; Zaitouni et al., 2020).

Practical implications

Our findings offer valuable insights for organizational practice. First, the mediation mechanism shows that the more employees perceive the amount of training they received as aligned with a wider HRD perspective that emphasizes continuous professional development, the more their evaluation of this experience will be positive and relevant for transfer. Therefore, organizations stand to benefit significantly from measuring and aligning the quantity of HRD initiatives with a quality of training that meets employees' needs and expectations in terms of satisfaction, utility, and knowledge. The link between employee exposure to HRD, training evaluation, and transfer should be of particular interest to organizations, because it underscores their fundamental role in fostering employees' development through both the quantity and quality of HRD initiatives.

Organizations should prioritize the strategic planning of HRD initiatives by ensuring a structured and substantial provision of high-quality training in the direction of continuous learning. Providing employees with sufficient training hours is essential, but ensuring that training is positively perceived by employees further enhances its impact. This involves the effective distribution of training opportunities across the workforce and a thorough evaluation of all HRD initiatives provided, along with complementary incentives (e.g., supervisory support, recognition systems, and opportunities for skill utilization) that reinforce learning and transfer. Moreover, the volume of training hours should be complemented by efforts to improve training quality through relevant training content, effective delivery methods, and constructive engagement strategies, ideally grounded in systematic training needs analysis and aligned with performance management processes. By doing so, they can maximize training transfer, ensuring that employees not only receive ample training opportunities but also find them useful, satisfactory, and conducive to skill application in the workplace.

Second, the moderation of informal learning behaviors highlights the importance of combining formal and informal modes of learning to reach higher levels of training transfer. Typically, organizations primarily invest in formal training to address learning needs, sometimes overlooking the valuable experiences offered by informal learning opportunities. Our findings highlight the practical advantages of the integration between formal and informal learning dimensions. Managers can promote informal learning by stimulating employees to share with their teams the new KSAs learned in the formal training experience (Gemmano, Giancaspro, & Manuti, 2026). Thus, they can start a collective reflection and trigger discussions about how the new competencies can be integrated into the work practice. Moreover, they can give time and opportunities to employees to individually process new knowledge and test new skills during work activities. In this way, individuals have the chance to develop confidence in the use of new competencies and enhance their performance over time. Organizations should support managers and employees in informal learning activities spreading the assumption that continuous learning has great value in the organization.

More broadly, these practices are more likely to be effective when embedded in an organizational culture that legitimizes learning and knowledge application in everyday work. In practical terms, this implies fostering an organizational value for lifelong learning competences, whereby continuous development and the use of newly acquired KSAs are perceived as legitimate aspects of employees' work. By reinforcing learning and transfer as valued components of organizational functioning, organizations can strengthen the effectiveness of both formal training and informal learning.

Study limitations and future research

The study has limitations that warrant consideration when interpreting its findings. First, the sampling procedure was non-probabilistic: the sample did not represent the entirety of the Italian working population and it was composed of white-collar employees. These characteristics limit the generalizability of our results. Future research should replicate our findings using a representative sample of the target population. Second, all the measures were based on self-reports, which might have fostered common-method variance and inflated some correlations between the study variables. Future research should consider collecting data from other sources (e.g., the direct supervisor could report on their employees' training transfer). Third, our study was conducted by implementing a cross-sectional design. Therefore, we cannot infer causal influence among the study variables based on the observed relationships. Future longitudinal studies should investigate whether

the proposed mediation sequence is supported by their findings. Taken together, these limitations suggest that the conclusions of the present study should be interpreted as theory-driven and context-dependent. Nevertheless, the study provides a robust foundation for future research aimed at testing the model across different organizational and cultural settings.

Conclusions

Our study enhances the comprehension of *why* employee exposure to HRD is related to training transfer and the factors that boost this relationship. We uncovered a linking mechanism between employee exposure to HRD and training transfer highlighting the mediating role of formal training evaluation. Additionally, we identified a factor that strengthens the association between formal training evaluation and training transfer, highlighting the moderating role played by informal learning behaviors. Our study may assist organizations in strengthening the connection between the resources invested in HRD initiatives and the expected transfer of training by integrating formal and informal learning processes.

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Corresponding author
Cataldo Giuliano Gemmano can be contacted at: giuliano.gemmano@uniba.it