Dimensions of Motivation to Transfer: A Longitudinal Analysis of Their Influence on Retention, Transfer, and Attitude Change

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Abstract This longitudinal study examined the multidimensionality of motivation to transfer training. Based on self-determination theory, expectancy theory, and the theory of planned behaviour, motivation to transfer was conceptualized in three dimensions: autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer. Relationships of these dimensions with attitudes toward training content, knowledge test performance, and self- and supervisory-assessed transfer were investigated to understand further the mediating role of intentions in the transfer process. Participants were 128 trainees in occupational health and safety programs. Confirmatory factor analysis indicated good fit of the proposed three-factor structure. Partial least squares (PLS) based path modelling indicated partial support of the hypothesized relationships. Knowledge gain following training was large (Cohen's $d=1.00$), while attitude change was small (Cohen's $d=0.27$). The findings are discussed in terms of their significance for the development of theories of training effectiveness and their implications for evaluating professional development.

Transfer and Motivation

Transfer of training can be defined as the productive use of training at the workplace and is influenced by multiple factors. For example, transfer correlates with organizational factors such as a supportive work environment (Harteis & Gruber 2004) and job control (Gijbels et al. 2010); with individual factors such as experience in prior careers (Tigchelaar et al. 2010) and interest (Lewalter & Scholta 2009); and with

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instructional factors such as learner-centered environments (Gegenfurtner 2011) and guided example elaboration (Stark et al. 1999). However, for some, motivation is most important for transfer because "the time, money, and resources an organization devotes to ways of increasing a person's abilities are wasted to the extent that an employee chooses not to learn what is being taught, or chooses not to apply newly acquired knowledge and skills in the workplace" (Latham 2007, pp. 3–4).

Motivation to transfer can be defined as a desire to productively use the knowledge and skills learned in training programs on the job. This motivation includes the transfer of knowledge and skills (Gegenfurtner 2011), as well as more emotion-related categories such as attitudes, beliefs, and utility values (Eagly & Chaiken 1993). Research on the motivational influences on transfer has gained growing attention in recent years (Gegenfurtner et al. 2009; Grohmann et al. 2012; Pineda-Herrero et al. 2011; Segers & Gegenfurtner 2012), partly because of the important consequences of motivation for regulating agency in corporate and higher education settings (Gorges & Kandler 2012; Pham et al. 2010; Volet & Vauras 2012). However, recent meta-analyses of motivation and transfer (Gegenfurtner 2011; Gegenfurtner & Vauras 2012; Gegenfurtner, Veermans, & Vauras 2012) have suggested that correlates between motivation and transfer varied extensively. One reason for the heterogeneity and disagreement in the literature may be the theoretical conceptualization: the majority of past studies operationalized motivation to transfer as a one-dimensional construct, without a clear reference to motivation theories. For example, a recent review of 31 studies published between 1986 and 2008 (Gegenfurtner et al. 2009a, b) identified that although well validated theories are available in the (work) motivation literature to conceptualize motivation in multiple qualities, past research has investigated motivation to transfer as a one-dimensional construct. A more detailed analysis demonstrated that these studies hardly reference motivation theories, which may explain the predominantly one-dimensional framing of transfer motivation in the literature (Gegenfurtner et al. 2009a, b). Given the importance of motivation for positive transfer, the paucity of theoretically guided research on dimensions of transfer motivation represents an unfortunate gap.

In the study reported here, the multidimensional nature of motivation to transfer was explored in the context of corporate off-the-job training. The rationale was to apply motivation theory to provide grounding for operationalizing transfer motivation. In particular, the grounding was based on self-determination theory (Deci & Ryan 2000), expectancy theory (Vroom 1964), and the theory of planned behavior (Ajzen 1991). Motivation to transfer was conceptualized with three dimensions, namely autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer. Another aim of the study was to test the (mediating) function of those three dimensions in the transfer process, with a particular emphasis on their correlates and consequences for retention, transfer, and attitude change. In the following sections, a brief review of the literature deepens the account of (a) the multidimensional nature of transfer motivation and (b) the measurement of transfer.

The Multidimensional Nature of Transfer Motivation

In this study, the aim was to articulate three dimensions of motivation to transfer: autonomous motivation to transfer, controlled motivation to transfer, and intention to

transfer. While intention to transfer is based on the theory of planned behavior (Ajzen 1991), autonomous and controlled motivation to transfer are based on expectancy theory (Vroom 1964) and self-determination theory (Deci & Ryan 2000). These theories are significant for the context of transfer of training because of their predictive validity in explaining human attitudes, intentions, and actions in training and workplace contexts (Baard 2002; Minnaert et al. 2011; Quesada-Pallarès 2012). Moreover, the theories are well validated and frequently used in the educational, social psychological, and management literature (Ajzen 1991; Deci & Ryan 2000; Vroom 1964). Surprisingly, however, these theories were rarely used in past research on transfer motivation (see the review of Gegenfurtner et al. 2009a, b). The multidimensional account of autonomous motivation to transfer, controlled motivation to transfer, and intentions to transfer is described in turn.

Autonomous motivation to transfer can be defined as an internalized desire to transfer learning that is initiated and governed by the self (i.e., regulated by identification or by integration with one's values). Controlled motivation can be defined as a desire to transfer learning that is not initiated and governed by the self (i.e. regulated by external rewards or sanctions). For example, autonomously motivated trainees would engage in using what was learned in training because of an interest in the learning material (Minnaert et al. 2011) and because training application would offer another way of identifying with work activities and challenges (Pham et al. 2010). In contrast, controlled-motivated trainees would engage in transfer because of external factors—to follow the wish of a supervisor, to avoid sanctions, or to receive financial awards (Kyndt et al. 2011). When evaluating the quality of motivational orientations, distinguishing between autonomous and controlled motivation indicates the trainees' degree of internalization, i.e., the process by which individuals acquire beliefs, attitudes, or behavioral regulations from an external source and progressively transform those controlled motivations into personal attributes, values, or regulatory styles. Some researchers (Baard 2002; Hagger et al. 2006; Ratelle et al. 2007; Shahar et al. 2003) argue that distinguishing between autonomous and controlled motivation can be more beneficial than distinguishing between intrinsic and extrinsic motivation when the research is focused on personal motivational orientations (Shahar et al. 2003), motivational regulation (Volet & Vauras 2012), and adaptations of motives for actions that originated outside the self (Ratelle et al. 2007), particularly in a work context, where purely intrinsic motivation is rare (Baard 2002; Deci & Ryan 2000). For example, Gegenfurtner et al. (2009a, p. 126) noted the following:

> The difference between autonomous motivation and intrinsic motivation is that, although both have an internal locus of causality, the former originated outside the self. When evaluating the quality of motivational orientations, distinguishing between autonomous versus controlled motivation is more important than distinguishing between intrinsic and extrinsic motivation, because extrinsic motivation encompasses both autonomously and controlled motivated behaviours.

A conceptualization of autonomous and controlled motivation to transfer may benefit from including the motives for actions—i.e., whether and why the motives for actions are instrumental for trainee goal achievement. Expectancy theory (e.g., Vroom 1964) provides a possible framework. Vroom (1964) has suggested that an

individual's choice for tasks and effort levels depends on perceived effort-performance expectancy, perceived instrumentality, and evaluation of outcomes based on valences. For example, consider a trainee who is wondering whether it is worthwhile to transfer the training content to the workplace. According to Vroom, the trainee considers first whether the job performance will improve when using the training content (i.e., transfer effort-performance expectations). Second, the trainee considers whether improved job performance will lead to second-level outcomes, such as pay, promotion, or more job satisfaction (instrumentality beliefs). Third, the trainee considers if these second-level outcomes are attractive and worthwhile to reach (valence). A modification of Vroom's conceptualization, the quality of transfer effort-performance expectations, is framed in two qualities: autonomous and controlled. These qualities represent distinctive perceptions of instrumentality/valence, with either an internal or external locus of causality (Baard 2002; Gorges & Kandler 2012; Ratelle et al. 2007; Shahar et al. 2003). Overall, the aim was to advance autonomous and controlled motivation as two qualitative distinctions of motivation to transfer. A third distinction was intention to transfer.

Intention to transfer can be defined as a willingness to engage in transfer actions that leads to a concrete plan for executing the newly trained behavior or skills. Ajzen (1991) has proposed that human action can be understood not only as a function of motivational orientations but also as the degree to which externally regulated behavior is internalized. His theory of planned behavior (Ajzen 1991) offers a way to conceptualize human action as a function of its intentions over a behavior. According to this theory, attitudes toward a behavior determine the degree to which intentions are translated into corresponding behavior. In the context of transfer research, trainees would engage in transfer if the newly trained behavior were associated with corresponding positive attitudes toward the behavior, which in turn would yield to transfer intentions. For example, consider a trainee who returns from a training environment back to the work environment. The trainee may experience that the work environment is positive toward the use of behavior trained elsewhere; such a context would influence both the attitudes the trainee has toward the trained behavior as well as the intention to show the trained behavior at work. In contrast, the trainee may experience that the work environment is not positive toward the use of behavior trained elsewhere; such a context would negatively affect attitudes and intentions. A drawback of the theory of planned behavior is its emphasis on attitudes toward *behavior*. It can be argued that attitudes toward the *training content* are similarly important. Attitudes toward training content are cognitive and affective judgments about the training content or object (Ajzen 1991; Eagly & Chaiken 1993). Though few empirical investigations exist on the role of attitudes toward training content in the context of motivation research, the theory of planned behavior tends to provide a well-established grounding for including intention to transfer and attitudes toward training content in examinations of motivational influences on transfer.

The theory of planned behavior attributes intentions as a mediating function between attitudes and a specific behavioral outcome. Figure 1 illustrates this central position. If Ajzen's (1991) conceptualization is true that attitudes predict intentions (Eagly & Chaiken 1993), then we would also expect a positive attitude–

Before training (T1) **Immediately after training (T2)** **Three months after training (T3)**
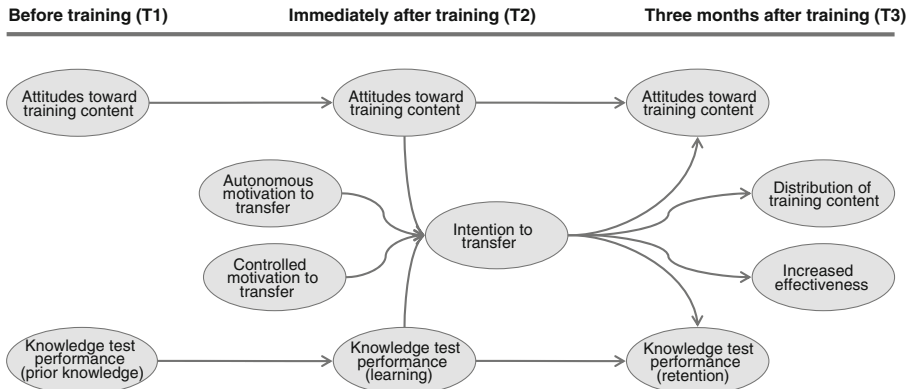

Fig. 1 Hypothesized path model

intention relationship in a transfer context. If intentions predict actions (Ajzen 1991), then we would expect intentions to predict transfer of training. Attitudes can be understood not only as predictors of intentions, but also as outcomes. Although research has examined outcomes of attitudes as attitude changes (Ajzen 1991; Eagly & Chaiken 1993), evidence is lacking regarding the relationship between intentions and attitudes after training. Accordingly, in this study, we address this relationship. Moreover, based on Vroom (1964) and Ajzen (1991), autonomous and controlled motivations predict the intention to perform a certain action because (differential) motivational orientations endorsed by trainees are actualized into intentional plans of actions (Ajzen 1991; see also Gegenfurtner et al. 2009a, b; Hagger et al. 2006). We would, therefore, expect a positive relationship between autonomous and controlled motivation with intention to transfer. Little research exists, however, on the relationship between learning and intentions to transfer. Such linkages can, in principle, influence motivational outcomes in any learning environment, including corporate training classrooms. If we assume that learning novel content is associated with the intention to use this novel content (Barnett & Ceci 2002; Gegenfurtner et al. 2009a, b; Weisweiler et al. 2012), then we can expect a positive knowledge–intention relationship. After training, we assumed that the intention to use novel content would be positively related with retention, because trainees with high intentions for transfer will seek opportunities to apply the new knowledge and, consequently, remember and reactivate the training content. Finally, and consistent with the training literature (De Grip & Sauermann 2012; Gegenfurtner 2011; Pham et al. 2010; Pilar-Pineda-Herrero et al. 2011; Weisweiler et al. 2012), it can be expected that training leads to changes in knowledge and attitudes.

In summary, intention to transfer was believed to have a central role in the transfer process (Ajzen 1991; Eagly & Chaiken 1993). Moreover, self-determination theory (Deci & Ryan 2000), expectancy theory (Vroom 1964), and the theory of planned behavior (Ajzen 1991) are believed to offer approaches to conceptualize three dimensions of transfer motivation: autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer. This conceptualization helps consider transfer motivation to vary not only in amount but also in kind, which affords a more differentiated measurement of transfer motivation.

Measurement of Transfer

Research on the transfer of training frequently uses self-reports. Self-assessed transfer can include biases typical for survey research, such as leniency, social desirability, or self-serving bias (Segers et al. 2003). However, the measurement of transfer can be improved in several ways. One way is to use multiple assessment sources (Gegenfurtner 2011; Segers et al. 2003). For example, researchers can ask the trainee supervisor whether the training content has been used at work or to what extent the trained behavior has been shown. Researchers can also use external sources of assessments, such as performance tests. Testing knowledge or performance of a trainee some time after the training can uncover the degree to which the training content is retained. The use of multiple sources of assessment, therefore, can offer a way to triangulate trainee self-reports.

Measurement of transfer can be improved in a second way: by using multiple assessment criteria (Gegenfurtner 2011). For example, researchers can measure transfer as increased effectiveness—i.e., whether job performance has improved after training (De Grip & Sauermann 2012). Transfer can also be assessed as distribution of training content—i.e., whether the trainee has passed on the training material to colleagues or the supervisor. In addition, transfer can be assessed as the performance on a retention test some time after training. Finally, transfer assessment can be viewed as the degree of attitude change. If attitudes toward training content after training are significantly different than they were before training, transfer may have occurred. In summary, the use of multiple criteria can help to improve the robustness of assessing transfer.

Consequently, one aim of the present study was to avoid problems typically associated with survey research (e.g., leniency, self-serving bias), so transfer was measured with multiple assessment sources and criteria. Specifically, transfer was indicated by the trainee, by the trainee supervisor, and by evaluation of knowledge test results. In addition, transfer and retention were operationalized with measures of increased effectiveness, distribution of the training content, and knowledge test performance. To measure attitude change and knowledge gains, it is important to control for levels of prior knowledge and attitudes before training.

The Present Study

Three goals motivated the present study. One goal was to examine the dimensionality of the construct motivation to transfer. Specifically, it was hypothesized that estimates of model fit and construct validity would indicate statistical support for the theoretical assumptions of a three-factor structure specifying autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer (Hypothesis 1). A second goal of the present study was to examine the extent to which trainees' intentions would mediate the transfer process. Specifically, it was hypothesized that autonomous motivation to transfer, controlled motivation to transfer, attitudes toward training content, and knowledge test performance immediately after training would positively predict intention to transfer (Hypothesis 2). In turn, intention to transfer would positively predict increased effectiveness, distribution of training content, attitudes toward training content, and knowledge test performance 3 months after training (Hypothesis 3). A third goal of the present study was to examine training-

related changes in attitudes toward training content and knowledge test scores over a three-month period. It was hypothesized that training would improve trainees' knowledge and attitudes immediately after training and 3 months after training, controlling for prior knowledge and attitudes before training (Hypothesis 4).

Method

Participants

Participants in the study were 496 safety inspectors of industrial organizations, who attended 5-day training programs in occupational health and safety following German statutory accident insurance regulations. One hundred thirty-one trainees (26.41 %) completed and returned paper-and-pencil questionnaires before, immediately after, and 3 months after training. Deletion of three multivariate outlying cases ultimately yielded a final sample size of 128 trainees. Among the reasons for dropout may have been the three-month time lag. As sample attrition was high, alignments between the initial and the final sample were made to check if only a special group kept up until the third time of measurement. There was no statistically significant difference in age, organizational tenure, and organization size between respondents and non-respondents, signaling data missing at random. The majority of participants was between 41 and 50 years old (42.64 %) and had worked with their current employer for up to 5 years (24.81 %); the average organization size was between 50 and 99 employees (16.47 %). Participation in the study was voluntary, with informed consent forms signed by the trainees. Anonymity and confidentiality were guaranteed for all responses.

Procedure

The training goal was to increase safety and health in the workplace. Trainees worked in different branches, including the chemical industry, insurance, the construction industry, the metal industry, and precision engineering. Specific training programs were designed to meet the requirements of each branch. Participants completed the training off the job. Examples of the trained contents were tool operation, fire safety, protective clothing, and workplace ergonomics, so the training was targeted toward advancing knowledge, skills, and attitudes associated with workplace health and safety. Instruction included lectures, discussion, group work, and hands-on activities.

The present study used three sources of data and three measurement times. First, trainees completed a paper-and-pencil questionnaire immediately before (T1), immediately after (T2), and 3 months after training (T3). Second, the trainees' supervisors received a questionnaire sent to their workplace 3 months after training (T3). Third, knowledge tests were administered to trainees immediately before (T1), immediately after (T2), and 3 months after training (T3).

Measures

Unless otherwise indicated, a five-point response scale was used for all items: 1=*strongly does not agree* 2=*does not agree*, 3=*partly agrees*, 4=*agrees*, and

5=*strongly agrees*. All scales were pilot-tested; minor revisions in expressions and the ordering of items were reflected in the final version of the instrument. Before training, prior knowledge and attitudes were measured (time 1). Immediately after training, motivation to transfer, attitudes, and learning were measured (time 2). Three months after training, attitudes, retention, distribution of training content, and increased effectiveness were measured (time 3). Retention was assessed with a knowledge test; distribution of training content was assessed with supervisory reports; and attitudes and increased effectiveness were assessed with trainee self-reports. Each measure is specified below.

Knowledge Test Performance

Declarative knowledge of health and safety regulations was assessed with a 12-item knowledge test. Some of the questions had multiple correct answers; the maximum score was 20. The questions reflected the breadth of topics covered during training. To guarantee the content validity of the knowledge test, questions were developed in close collaboration with the training providers, who were subject-matter experts in occupational health and safety. Items were the same across the three measurement times. Performance at T1 indicated prior knowledge; performance at T2 indicated learning; and performance at T3 indicated retention.

Attitudes Toward Training Content

To assess attitudes toward training content, five items described in Gegenfurtner et al. (2009a, b) were used to measure cognitive and emotional/affective aspects of attitudes toward occupational health and safety. At time 1, Cronbach's $\alpha=0.81$, average variance extracted (AVE)=0.59, and composite scale reliability (CSR)=0.86; at time 2, Cronbach's $\alpha=0.83$, $AVE=0.63$, and $CSR=0.88$; and at time 3, Cronbach's $\alpha=0.80$, $AVE=0.57$, and $CSR=0.86$. Items were the same across the three measurement times. Sample items were as follows: for cognition, "I easily come up with at least five reasons for complying with safety and health regulations," and for emotion, "I feel responsible for health and safety in my working area."

Motivation to Transfer

Motivation to transfer was measured with three scales specifying autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer (see the Appendix for wording). For autonomous motivation, two pairs of items from Gegenfurtner et al. (2009a, b) were included to measure instrumentality and valence of autonomous motives for training transfer. Sample items were as follows: for instrumentality, "While applying training at work, I can learn a lot," and for valence, "This learning is important to me." Cronbach's $\alpha=0.84$, $AVE=0.67$, and $CSR=0.89$. For controlled motivation, two pairs of items from Gegenfurtner et al. (2009a, b) were included to measure instrumentality and valence of controlled motives for training transfer. Sample items were as follows: for instrumentality, "Successful application of the training content will probably result in a materialistic reward, such as a financial bonus," and for valence, "This reward is important to me." Cronbach's $\alpha=0.74$, $AVE=0.55$, and $CSR=0.82$. A three-item scale was used to

measured intention to transfer, with Cronbach's $\alpha=0.79$, $AVE=0.61$, and $CSR=0.85$. A sample item is "I will try to use the training content in my workplace".

Transfer of Training

Transfer of training was measured as distribution of training content and increased effectiveness. For distribution of training content, one item was included for the trainee supervisor to assess whether the training content was indeed distributed at the workplace ("Has your employee tried to pass on the training content to you?" with 0=no 1=yes). For increased effectiveness, five items described in Festner and Gruber (2008) were used to self-assess the extent to which work as a safety inspector improved after training. Cronbach's $\alpha=0.88$, $AVE=0.68$, and $CSR=0.92$. A sample item is "Today, I engage more in health and safety than I did before the training".

Analysis

A two-stage procedure was adopted for data analysis. First, the factorial validity of motivation to transfer was assessed using confirmatory factor analysis (CFA). Based on the EQS 6.1 (Bentler 2005) software, three first-order CFA models were examined. The first model was a three-factor model composed of autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer. The second model was a two-factor model in which autonomous and controlled motivation were merged, representing one factor. Finally, the third model was a one-factor model that forced autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer into one factor (which is the current research practice). Data were screened to test for normality, multicollinearity, and multivariate outliers on the basis of a substantially different contribution to normalized multivariate kurtosis (Bentler 2005). The direct maximum likelihood approach and robust methods were used as normality estimator corrections: robust methods use Yuan-Bentler residual-based F statistic (Bentler 2005) and transfer the robust properties of the covariance estimators to the parameter estimators, which makes this procedure (and the resulting model fit) less biased than other procedures currently available (Bentler 2005). Parameters were set free and allowed to correlate (not fixed at zero). Assessment of the model fit was based on four criteria reflecting statistical and theoretical considerations. The criteria were as follows: (a) the Yuan–Bentler scaled χ^2 test statistic, (b) the comparative fit index (CFI), (c) the standardized root-mean square residual (SRMR), and (d) the root-mean square error of approximation (RMSEA), with its 90 % confidence interval (CI). Cut-off criteria to indicate appropriate goodness-of-fit were $CFI>0.95$, $SRMR<0.09$, and the $RMSEA<0.06$ (Bentler 2005). Validation of the three-dimensional construct seemed important to test the extent to which the measured variables actually represented the theoretical dimensions.

Once the factorial validity of motivation to transfer was established, its mediating position was assessed in our hypothesized path model. This was done using path analysis following a partial least squares (PLS) approach. Contrary to other estimation techniques like multiple regression or structural equation modeling, PLS can be applied to a nonnormally distributed data set collected with a small sample to

explore relations between latent factors. Based on the SmartPLS 2.0 (Ringle et al. 2005) software, the relationships among the variables were assessed using the path weighting scheme algorithm. Importantly, PLS is an approach for predicting relationships in a model, not for assessing overall model fit. However, we used three reliability indices to indicate appropriate psychometric properties of the measurement models. For cut-off criteria, guidelines were followed for Cronbach's $\alpha > 0.70$, the average variance extracted (AVE)>0.50, and the composite scale reliability (CSR)>0.60 (Hair et al. 2006). Mediation was analyzed following recommendations by MacKinnon et al. (2007). They recommend assessing the statistical significance of the X to M relation, $\hat{a}$ path, and then the M to Y relation, $\hat{b}$ path. "If both are statistically significant, there is evidence of mediation" (MacKinnon et al. 2007, p. 608).

Results

Data Screening

Data was screened for multicollinearity and multivariate nonnormality. Collinearity analysis revealed tolerance values (0.38–0.71) larger than 0.10 and variance inflation factors (1.41–2.65) less than 10. These estimates indicate no evidence for multicollinearity among the data. Kurtosis values and Kolmogorov-Smirnov-Z values indicated univariate nonnormality of the measures. However, univariate nonnormal distributions do not necessarily imply multivariate nonnormality (Hair et al. 2006). In testing for multivariate nonnormality, two multivariate outlying cases with a substantially different contribution to normalized multivariate kurtosis were subsequently deleted from all analyses. Normality analysis revealed a Yuan, Lambert, and Fouladi's normalized estimate larger than 5 (45.88). These estimates indicate evidence of multivariate nonnormality among the data (Bentler 2005). To compensate for the nonnormal distribution, confirmatory factor analyses were conducted using robust methods (Bentler 2005) and path analyses were conducted using a partial least squares approach. Table 1 shows means, standard deviations, and correlation estimates of all measures. The next four sections describe the results of testing the multidimensionality of motivation to transfer, the hypothesized path model, knowledge gains following training, and attitude change following training.

Multidimensionality of Motivation to Transfer

The model to be tested postulates a priori that motivation to transfer is a three-factorial structure composed of autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer. First, the three-factor model was tested; then it was compared to the two-factor model and the one-factor model. Attenuation was corrected using the latent variable modeling approach (Bentler 2005). Table 2 presents fit statistics relative to these models. The fit indices substantially improved from the one-factor model (CFI=0.78; SRMR=0.10; RMSEA=0.12) and the two-factor model (CFI=0.79; SRMR=0.10; RMSEA=0.12)

Table 1 Means, standard deviations, and correlation estimates of all measures

	1	2	3	4	5	6	7	8	9	10	11
1 Attitudes toward training content T1	-	0.08	0.13	0.14	0.16	0.46	0.03	0.12	0.04	0.01	0.44
2 Knowledge test (prior knowledge)	0.28**	-	0.01	0.01	0.07	0.06	0.14	0.07	0.00	0.00	0.03
3 Autonomous motivation to transfer	0.36**	0.10	-	0.22	0.41	0.27	0.05	0.05	0.08	0.00	0.14
4 Controlled motivation to transfer	0.38**	0.10	0.47**	-	0.18	0.19	0.02	0.04	0.15	0.00	0.15
5 Intention to transfer	0.40**	0.26**	0.64**	0.42**	-	0.28	0.04	0.07	0.08	0.01	0.18
6 Attitudes toward training content T2	0.68**	0.25**	0.52**	0.43**	0.53**	-	0.04	0.09	0.01	0.00	0.48
7 Knowledge test (learning)	0.17*	0.37**	0.23**	0.15*	0.21*	0.20*	-	0.30	0.01	0.00	0.01
8 Knowledge test (retention)	0.34**	0.27**	0.23**	0.19*	0.26**	0.30**	0.55**	-	0.03	0.01	0.08
9 Increased effectiveness	0.20*	−0.03	0.28**	0.39**	0.28**	0.12	0.11	0.18*	-	0.00	0.12
10 Distribution of training content	0.11	0.02	−0.03	0.00	−0.11	0.02	−0.05	0.08	−0.05	-	0.00
11 Attitudes toward training content T3	0.66**	0.16*	0.38**	0.39**	0.42**	0.69**	0.12	0.29**	0.35**	−0.02	-
Mean	4.39	8.73	4.36	2.79	4.14	4.48	13.37	12.40	3.84	0.82	4.53
Standard deviation	0.76	3.78	0.75	1.16	0.74	0.66	3.02	3.52	1.03	0.19	0.69

The values below the diagonal are correlation estimates, and the values above the diagonal are squared correlation estimates.

* $p<.05$; ** $p<.01$.

to the three-factor model (CFI=0.94; SRMR=0.06; RMSEA=0.07). Also the χ^2 estimates improved for the more fine-grained models ($\chi^2_{one\text{-}factor}=140.38$, $\chi^2_{two\text{-}factor}=136.45$, $\chi^2_{three\text{-}factor}=87.70$). These psychometric properties indicate that the hypothesized three-factor model represented the best fit to the data (Hypothesis 1).

After the confirmatory factor analysis, the construct validity of the three-factor solution was tested by assessing convergent, discriminant, nomological, and face validity. First, according to Hair et al. (2006), a construct is convergently valid if variance-extracted measures exceed the 50 % level and Cronbach's α is larger than 0.70. Reliability estimates show that the variance-extracted measures of autonomous (67 %), controlled (55 %), and intention to transfer (61 %) all exceeded the 50 % level, and the Cronbach's α was larger than 0.74; hence, convergent validity was established. Second, a construct is divergently valid if the variance-extracted estimates for each factor are larger than the squared interconstruct correlations associated with this factor (Hair et al. 2006). Average variance extracted (AVE)

Table 2 Confirmatory factor analytic model fit statistics

Model	χ^2	df	CFI	SRMR	RMSEA (90 % CI)
Three-factor model	87.70	55	0.939	0.064	0.067 (0.039, 0.093)
Two-factor model	136.45	57	0.788	0.098	0.119 (0.095, 0.143)
One-factor model	140.38	58	0.781	0.101	0.121 (0.096, 0.144)

for each scale is reported in the Measures section, and squared interconstruct correlations are reported above the diagonal in Table 1. A comparison of these two estimates shows that all variance-extracted estimates (0.55–0.67) were larger than the corresponding squared correlation estimates (0.18–0.41); hence, divergent validity was established. Third, concerning nomological validity, Hair et al. (2006) have recommended comparing the constructs to other variables not included in the model, which, in this study, were demographic and organizational membership characteristics. The three factors were not significantly affected by trainee age, organizational tenure, or organization size; hence, nomological validity was established. Finally, the face validity of the three dimensions was established based on discussions among colleagues about the content of the corresponding items. These analyses demonstrate the construct validity of the three-factor solution, meaning that motivation to transfer can be measured with three scales specifying autonomous motivation to transfer, controlled motivation to transfer, and intention to transfer. In summary, both the established construct validity and the acceptable model fit indicated good conditions to test further the hypothesized relationships of the three-factor solution in the PLS path model.

Hypothesized Path Model

Figure 2 shows the parameter estimates of the hypothesized path model. Consistent with Hypothesis 2, attitudes toward training content ($\beta=0.29$; 99 % CI= 0.27, 0.32) and autonomous motivation to transfer ($\beta=0.45$; 99 % CI=0.43, 0.48) positively predicted intention to transfer. Consistent with Hypothesis 3, intention to transfer positively predicted increased effectiveness ($\beta=0.28$; 99 % CI=0.25, 0.31) and knowledge test performance 3 months after training ($\beta=0.23$; 99 % CI= 0.20, 0.25). Mediation analysis (MacKinnon et al. 2007) indicated that intention to transfer fully mediated the effects of autonomous motivation on increased effectiveness and retention. Autonomous motivation had a stronger effect on intentions than did controlled motivation. Despite the hypotheses, the paths from controlled motivation and knowledge test performance (T2) to intention to transfer were nonsignificant, as were the paths from intention to distribution of the training content and attitudes toward training content (T3).

Knowledge Gains Following Training

Figure 2 shows that prior knowledge positively influenced knowledge test performance immediately after training ($\beta=0.37$; 99 % CI=0.35, 0.39), which in
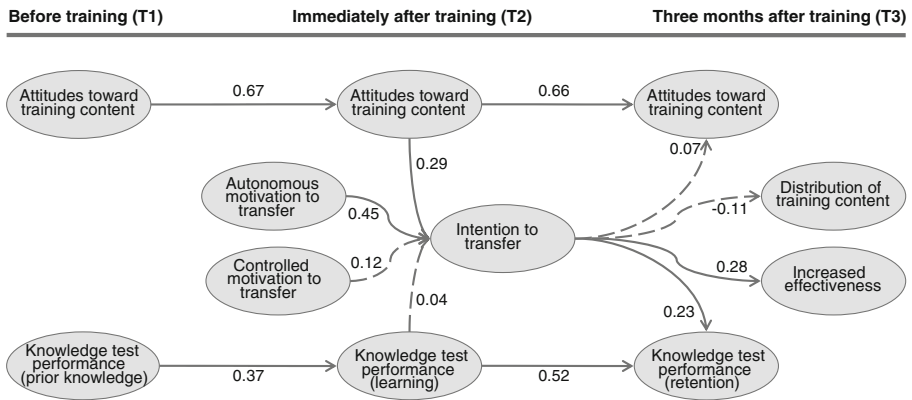
Before training (T1)   Immediately after training (T2)   Three months after training (T3)

Fig. 2 Parameter estimates of hypothesized path model. Solid lines indicate significant estimates (*p*<.05), dashed lines indicate nonsignificant estimates (*p*>.05)

turn positively influenced knowledge test performance 3 months after training (*β*=0.52; 99 % CI=0.50, 0.55). These findings support Hypothesis 4. Table 3 presents the mean differences in knowledge test performance by measurement time. Generally, test performance increased from T1 to T2 [*t* (130)=13.71, *p*<.001, Cohen's *d*=1.36] and slightly decreased from T2 to T3 [*t* (130)=−3.54, *p*<.001, Cohen's *d*=−0.30]. However, declarative knowledge of occupational health and safety 3 months after training was still significantly higher than before the training [*t* (130)=9.52, *p*<.001, Cohen's *d*=1.00]. These estimates signal that the training had positive effects on trainee knowledge and that knowledge gain following training was stronger immediately after than it was 3 months after training.

Attitude Change Following Training

Figure 2 indicates that attitudes toward training content at Time 1 affected attitudes at Time 2 (*β*=0.67; 99 % CI=0.66, 0.69), which in turn affected attitudes at Time 3 (*β*=0.66; 99 % CI=0.63, 0.68). These findings support Hypothesis 4. Table 4 shows that attitude change following training was generally marginal, being largest for the comparison between T1 and T3 [*t* (130)=3.71, *p*<.001, Cohen's *d*=0.27]). The small differences can be explained as a ceiling effect, indicated by

Table 3 Differences in knowledge test performance by measurement time

	M	*SD*	*t*	*df*	*p*	Cohen's *d*
Knowledge T2 – T1	4.64	3.88	13.71	128	0.001	1.36
Knowledge T3 – T2	−0.97	3.13	−3.54	128	0.001	−0.30
Knowledge T3 – T1	3.68	4.42	9.52	128	0.001	1.00

Table 4 Differences in attitudes toward training content by measurement time

	M	SD	t	df	p	Cohen's d
Attitudes T2 – T1	0.09	0.43	2.45	128	0.015	0.17
Attitudes T3 – T2	0.05	0.38	1.41	128	0.161	0.10
Attitudes T3 – T1	0.14	0.43	3.71	128	0.001	0.27

Attitude means M_{T1}=4.39, M_{T2}=4.48, M_{T3}=4.53. Means and standard deviations are reported in Table 1

the high estimates of attitudes toward training content already evident at T1 (see Table 1 for mean values).

Discussion

The present study extended previous examinations of motivation to transfer in several ways. First, the use of contemporary motivation theories allowed a multidimensional conceptualization of motivation to transfer (Hypothesis 1). A distinction among autonomous motivation, controlled motivation, and intention to transfer found adequate statistical support. Because of its theoretical grounding, the identified three-factor structure advances current research on motivation to transfer. Specifically, it indicates that motivation to transfer can vary not only in amount, but also in kind.

The second main finding of the study concerns the mediating position of intention in the transfer process. Consistent with theoretical predictions, intentions mediated the influence of autonomous motivation and attitudes toward training content (T2) on increased effectiveness and retention (Hypotheses 2 and 3). Contrary to expectations, however, there was no mediation with supervisory-assessed transfer and attitudes toward training content 3 months after training, or statistical significance in mediating paths with controlled motivation to transfer. An explanation for the latter finding may be the strong relationship between autonomous motivation to transfer and intention to transfer, indicating that autonomous motivation explained a larger proportion of shared variance than controlled motivation did, resulting in a nonsignificant role of controlled motivation.

The third main finding was that autonomous motivation exhibited stronger influences on intention to transfer than controlled motivation to transfer did. This finding signals that trainees with an internal locus of control are more willing to engage in transfer actions (for a similar finding on learning intentions, see Kyndt et al. 2011). Based on the estimated path coefficients, it would seem that fostering interest (Lewalter & Scholta 2009; Minnaert et al. 2011) in the training material promotes transfer more successfully than providing external rewards (Deci & Ryan 2000; Vroom 1964). This also has a more practical implication, in that creating autonomy-supporting work environments that afford trainees high levels of job control seem more likely to facilitate transfer (Festner & Gruber 2008; Gijbels et al. 2010; Harteis & Gruber 2004; Helle et al. 2011; Kyndt et al. 2011; Minnaert et al. 2011).

The longitudinal development of attitudes and knowledge provided the final main finding. Knowledge gains were highest immediately after training. Knowledge test performance 3 months after training decreased slightly but remained at a significantly higher level than knowledge assessed before training; hence, training seemed to have a positive effect on knowledge gains, controlling for prior knowledge (Hypothesis 4). Contrary to expectations, however, there was marginal, nonsignificant attitude change, albeit in the positive direction. One possible explanation of this unexpected finding may be a ceiling effect—that is, a large increase was unlikely because of the high ratings of attitudes toward training content at the beginning of training. Therefore, the favorable view toward occupational health and safety at the outset of the training program (4.39 on a five-point scale) needs to be taken into consideration in evaluating the results of attitude change.

Results of the confirmatory factor analysis bear on the development of theories of transfer motivation. The identified three-factor structure of motivation to transfer was based on contemporary motivation theories (Ajzen 1991; Deci & Ryan 2000; Vroom 1964). This theory-driven approach represents an advancement of research on motivation to transfer, because prior research tended to lack a clear conceptual grounding in motivation theory. The implication of the identified three-factor structure for the development of future models of training effectiveness is twofold. First, motivation to transfer can be conceptualized in two causal orientations: autonomous motivation and controlled motivation. While this distinction is well established in self-determination theory (Deci & Ryan 2000), the present study sought to establish it in a transfer of training context. Reflecting the differential evidence with autonomous and controlled motivation, any model of training effectiveness considering only the amount of motivation variation is likely to be ineffective. Therefore, future steps are needed in conceptualizing the transfer process around a multidimensional representation of transfer motivation. The second implication of the identified three-factor structure pertains to intention to transfer. Incorporation of intentions seems a promising approach to capture how autonomous and controlled motivation influence intentions, and, in turn, how intentions influence the initiation and regulation of behavior (Ajzen 1991; Eagly & Chaiken 1993; Volet & Vauras 2012). In summary, the use of self-determination theory, expectancy theory, and the theory of planned behavior has proven a novel approach for conceptualizing the multidimensional nature of motivation in the transfer of training; future efforts may be directed toward generating models of training effectiveness that reflect different qualities of transfer motivation. Future research may also be devoted to develop an integrative framework for conceptualizing transfer assessment. Such a framework could advance the field, first, because it can scaffold theorizing on assessment source and criterion and, second, because it can inform best practices in measuring training outcomes. In this context, the experimental transfer literature (Barnett & Ceci 2002) can inform training researchers.

The results of this study have practical value for the evaluation of transfer and training effectiveness. Specifically, different correlates of intention to transfer with self-assessed and supervisory-assessed transfer tend to highlight the danger of basing conclusions about the effectiveness of a program on single assessment conditions (Gegenfurtner 2011; Segers et al. 2003). In response, the path coefficients in Fig. 1 seem to indicate the value of using multiple assessment conditions in training

evaluation, including different assessment sources and criteria. A related implication involves the use of multiple scales to measure motivation to transfer. Motivation to transfer varies not only in amount, but also in kind; recommendations for training policy and design that are based on a single motivational dimension tend to ignore the multidimensional nature of motivation. Therefore, evaluations of training effectiveness may consider using several scales for assessing motivation, including those validated in the present study. In addition to evaluating motivation to transfer, transfer of training can be evaluated with systematic observations of professional behavior at the workplace at a certain period of time after the training has been completed. In a meta-analysis of transfer assessment, Gegenfurtner (2011) indicated that objective measures of transfer were least biased by the presence of leniency and halo effects. Objective measures of transfer can include indicators of economic performance (De Grip & Sauermann 2012) and ratings by trained observers, in addition to supervisory-rated performance improvement and traditional laboratory measures that may, depending on the professional setting, include eye-tracking (Gegenfurtner et al. 2011; Seppänen & Gegenfurtner 2012) and neuroimaging (Gegenfurtner et al. 2012) methodologies to assess micro-level changes after completing the training program (Barnett & Ceci 2002; Stark et al. 1999).

This study has some limitations that should be noted. One limitation is that the study used three sources of data: the trainee, the trainee supervisor, and external knowledge tests. This decision was based on an interest in self-perceived attitudinal and motivational states, supervisory-perceived transfer, and knowledge gains. However, more assessment sources exist that could provide important evidence, such as peer assessment or organization-level indicators of economic performance (De Grip & Sauermann 2012; Segers et al. 2003). Although the inclusion of three different data sources sought to improve the robustness of conclusions beyond the known problems with survey research (e.g., leniency, self-serving bias), the authors acknowledge the tentative nature of the triangulated body of evidence. A second limitation was the measurement of distribution of training content with a dichotomous variable. Although the decision to use two response categories was grounded in an attempt to receive a clear feedback of trainees sharing trained content with colleagues, variance on this measure may have been reduced. Future research can evaluate the extent to which continuous measures of distributing training content enhances variance in supervisory-rated transfer. Along these lines, distribution of training content may differ as a function of the work context the trainee is embedded in. Future research can assess contextual influences on intentions and content distributions to provide a better understanding of the boundary conditions within which transfer occurs. An additional limitation of the study is transfer assessment 3 months after training. This decision was informed by literature recommendations. Specifically, trainees require a sufficient period after training to encounter opportunities to apply what was learned, which affords the initiation of transfer actions, such as distributing the training content to colleagues and supervisors. Because motivation changes over time, generalizations to different times warrant caution. Therefore, findings from the present study are limited to the three-month period after training. Future research can also assess levels of perceived behavioral control (Ajzen 1991) for predicting intention to transfer, and estimate temporal variations of this influence at different time lags (Gegenfurtner et al. 2012) between the end of training and the transfer assessment.

As noted at the outset, examining motivational influences on transfer have gained growing attention in learning research (Gegenfurtner & Vauras 2012; Grohmann et al. 2012; Pham et al. 2010; Quesada-Pallarès 2012). The scarcity of theoretically grounded examinations in transfer motivation research, associated with heterogeneity and disagreement in the training literature, ultimately led this study to seek a better understanding of how motivation regulates transfer. Future research is encouraged to extend the first steps reported here to the examination of different predictors affecting dimensions of motivation to transfer in professional development activities.

Appendix

Wording of the Three Scales Measuring Motivation to Transfer

1. Autonomous motivation to transfer

   - While applying training at work, I can learn a lot.
   - This learning is important to me.
   - Successfully applying the training content is an exciting challenge for me.
   - This challenge is important to me.

2. Controlled motivation to transfer

   - My supervisor will probably appreciate successful training application (e.g. through praise).
   - This appreciation is important to me.
   - Successfully applying the training content will probably result in a material reward, such as a financial bonus.
   - These material rewards are important to me.

3. Intention to transfer

   - I will try to use the training content in my workplace.
   - I feel able to use the training content at work.
   - The training has prepared me well for applying the training content.

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