

Safety Attitudes and Their Relationship to Safety Training and Generalised Self-Efficacy

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This paper studies safety attitudes, their relationship with safety training behaviour, and generalised self-efficacy. From a sociotechnical perspective, training programs might be used as a mechanism for enhancing attitudes, especially to improve safety and occupational health. Also, self-efficacy allows to enhance training effectiveness. The aim of this paper is to validate a safety attitude scale and to examine its relationship to safety training behaviour and self-efficacy in organisational settings. With data from 140 employees, results show a conceptually meaningful 3-factor solution. Hierarchical multiple regression analysis shows a main effect of safety training behaviour and levels of self-efficacy on safety attitude. Study limitations and its implications on safety training design are also discussed.

attitudes toward safety training efficacy beliefs

1. INTRODUCTION

According to law and various directives work must be both safe and free from health risks. In this vein, employers have a responsibility to introduce practical steps in the workplace to protect their employees from aspects of the working environment that are detrimental to safety and health. Safety is

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a complex and multifaceted concept. The literature available reflects a variety of different approaches on the overall issue of safety (Caruso, Chiantaretto, Paisio, & Perucca, 1976; Glendon, 1991; Leather, 1987, 1988). Attention has been paid to personal characteristics and safety, such as age and gender, but results are mixed. Regarding age, Hansen (1989) showed indirect effects in safety and Leigh (1986) found gender is statistically a predictor of accidents.

Nevertheless, the emphasis is on the importance of psychological, social, and organisational factors, and safety culture, which reflects the attitudes, beliefs, perceptions, and values that employees share with regard to safety (Cox, 1990; Cox & Cox, 1991; Health & Safety Executive, 1989; Zohar, 1980). For example, Cox and Cox (1991) displayed the existence of five dimensions or factors underpinning employees' safety attitudes. These are effectiveness of arrangements for safety (related to safety software), individual responsibility, personal scepticism (both referred to people), safety of the work environment, and personal immunity (both related to risk). In addition, Donald (1994) identified three principal constituents or facets of safety attitudes: organisational role, safety referent or object, and behavioural modality. Furthermore, Leather (1988) pointed out safety attitudes refer to internal versus external control. In conclusion, research shows different dimensions of safety attitudes. In this study, we will analyse the factorial structure of a questionnaire on safety attitudes in order to test the main factors/dimensions of this psychosocial construct.

In the field of social psychology, the study of behaviour-attitude relationships has engendered numerous debates that have brought about distinct theories. The idea that attitudes are formed through cognitive, affective, and behavioural processes has been proposed on the basis of this relationship (Eagly & Chaiken, 1993; Olson & Zanna, 1993; Petty & Wegener, 1998) and for quite a few years, Festinger's (1957) dissonance theory and Bem's (1967) self-perception theory have been the dominant models. Ajzen (1991) points out the relationship between attitudes and behaviour could be more predictable, when it includes additional variables, such as previous behaviour. In this vein, Albarracín and Wyer (2000) found that when people are made aware of their past behaviour, it can have a direct impact on their attitudes and intentions.

The relationship between work-related attitudes and training is complex. Tannenbaum, Mathieu, Salas, and Cannon-Bowers (1991) suggested that changes in work-related attitudes are important outcomes of training and that they should be viewed as an added criterion for evaluating the effectiveness of training. Moreover, training is used as a behavioural

mechanism for enhancing attitudes in the workplace. Research shows that employee attitude toward training is positively associated with participation in training courses. For instance, employees expect that participation in training will facilitate their career development. (Maurer & Tarulli, 1994; Noe & Wilk, 1993; Nordhaug, 1989). Ford and Noe (1987) showed that managers with favourable attitudes toward training usefulness perceived a greater need for training than managers with a more negative attitude. In a meta-analysis, Alliger, Tannenbaum, Bennett, Traver, and Shotland (1997) also found that usefulness-type reaction measures were more highly related to learning and on-the-job performance than were affective reactions.

Regarding more specific training, Cabrera (1998) found that participation in safety training produces a positive attitude toward safety and a significant relationship between employees' safe behaviour and both the climate of safety and attitudes toward safety. Donald (1994) indicates safety training is an important issue that could be included in safety object.

On the other hand, since the late 1980s, self-efficacy has received increasing attention from organisational researchers (Gist, 1987). Research on self-efficacy, the belief in one's ability to perform a given task (Bandura, 1986, 1997), has generally supported positive relationships between self-efficacy and a range of performance measures and outcomes (see Gist & Mitchell, 1992, and Bandura, 2001, for a summary). Subsequently, self-efficacy has been expected to affect task effort, persistence, expressed interest, and the level of goal difficulty selected for performance (Bandura, 1997). According to Bandura (1986, 1997, 2001), one's self-efficacy beliefs significantly determine performance outcomes, and are not necessarily determined by the underlying skills that one possesses with regard to the task.

Also, self-efficacy has been found to be relevant to the understanding of training effectiveness. Enhancing self-efficacy in training could increase job performance and help newcomers be adapted to their work (Saks, 1995). Rousseau, Jamieson, Rogers, Mead, and Sit (1998) conclude that through training, users may become both more proficient and efficient in computer use. Regarding this, Torkzadeh, Pflughoeft, and Hall (1999) showed that computer training significantly improved the computer self-efficacy of respondents. Respondents entered computer training with a moderate level of computer self-efficacy and after computer training, students' self-efficacy level significantly improved. Salanova, Grau, Cifre, and Llorens (2000) found that computer training courses increased levels of burnout (i.e., exhaustion and cynicism) only among workers with previous low computer self-efficacy. Self-efficacy has also been considered as correlate with

attitudes, such as the Theory of Planned Behaviour (Ajzen, 1989; Ajzen & Madden, 1986), which includes perceived behavioural control, and can be understood as self-efficacy. However and despite the relevance of self-efficacy as a crucial variable in work situations, little research has been done into the relationships between self-efficacy and safety at work. Thus, in this study, we look at the relationship between self-efficacy and safety attitudes.

Within this framework, the aim of this paper is to validate a safety attitude scale (designed by Cabrera, 1998) and to examine its relationship with safety training behaviour in organisational settings. We expect (hypothesis 1) safety training to be related to safety attitude, and (hypothesis 2) generalised self-efficacy to be positively associated with safety attitude.

2. METHOD

2.1. Procedure and Participants

The sample was made up of 140 workers (64 female—46% and 76 male—54%) from three Spanish companies from the tile sector and two offices in the public sector. This sample was selected by two reasons: (a) the ceramic sector is one important productive sector and together with the autonomous public administration can be representative of regional economy, (b) real needs of the three companies to be inside in a evaluation labour risks process, in execution of new Spanish law. Ninety-five participants in the study came from the tile sector and 45 from public administration. They worked in departments such as sales, administration, production line, information technology, and consumer orientation. The main occupational groups were production (11%), laboratory (13%), administration and clerical jobs (including Information Technology, Human Resources, Accounting & Finance Departments—47%), sales (15%), and consumer orientation (14%). Ages ranged from 20 to 56; the mean age of the sample was 32.8 ($SD = 8.05$).

Participants were asked to answer a self-report questionnaires set. Risk prevention experts were responsible for the distribution of the questionnaires, which were delivered in an envelope. A covering letter explained the purpose of the study, and that participation in the study was voluntary and confidentiality was guaranteed. Respondents were asked to return completed questionnaires inside the sealed envelope either to the person who had distributed them or directly to the research team.

2.2. Measures

Safety attitudes were measured by the 9 items of a shortened version of Cabrera's (1998) survey. Originally Cabrera's questionnaire was designed to measure airport safety, consequently it was necessary to shorten it by eliminating items referring to airport specific context. A sample item is "Safety norms and procedures have helped to improve our work conditions." All items were scored on a 5-point rating scale, ranging from 1—*agree* to 5—*disagree*. It is important to indicate the inverted sense of scale. The internal consistency of this questionnaire (Cronbach's alpha = .70) is satisfactory, as Cronbach's alpha meets the criterion of .70 (Nunnally, 1978).

Safety training was measured by a variable referred to if the participants had previously had training on the nature of the risks to which the employee is exposed and how to recognise them. The answers were categorized as 1 if the respondents had received one or more courses, and as 2 if the respondents had not received any.

Generalised self-efficacy was measured with a Spanish version (Grau, Salanova, & Peiró, 2000) of Schwarzer's (1999) questionnaire made up of 10 items such as "I can solve difficult problems if I make a big enough effort." The workers show the extent to which they agree on a scale of 5 points that ranges from *never* to *always*. Cronbach's alpha = .81.

2.3. Data Analysis

Factorial validity. Principal component analysis with varimax rotation was carried out, in order to identify the empirical structure of safety attitude, using the SPSS program (Norusis, 1993). The reliability analysis was obtained by calculating Cronbach's alpha.

Regression analysis. Hierarchical multiple regression analysis was done to detect the main effects of safety training and generalised self-efficacy on each component of safety attitude. Cross-product terms of standardised independent variables were computed to test interaction effects (cf. Cohen & Cohen, 1983; Kleinbaum, Kupper, & Muller, 1988). The independent variables were entered into the regression equation in two successive steps (cf. Aiken & West, 1991; Jaccard, Turrisi, & Wan, 1990). In the first step, age and gender were entered to control possible confusing effects. In the second step, safety training and self-efficacy were introduced respectively. A third step included the interaction between safety training and self-

efficacy. In order to interpret the a priori standardised variables as correctly as possible, nonstandardised regression coefficients are shown in Tables 3 and 4 (cf. Aiken & West, 1991; Jaccard et al., 1990).

3. RESULTS

3.1. Factorial Validity

Table 1 shows descriptive data, factorial structure, correlation, and reliability of each item as well as the corrected homogeneity indices. The values are reasonable in all the cases. Principal component analysis was used to examine the data. The program identified three factors that explain 55.25% of the data variance. Factor 1 (F-1) explains 31.22% of the total variance of the data. This factor is made up of five items. The more heavily weighted items in this factor refer to the effectiveness of safety norms (norm effectiveness).

TABLE 1. Descriptive Data, Factorial Structure, Correlation, and Reliability

Descriptive Data				Factors			Correlation		
Item	<i>N</i>	<i>M</i>	<i>SD</i>	F-1	F-2	F-3	Factor	Item-Factor	Item-Total
1	140	1.95	1.07	—	—	.603	F-3	.713	.460
2	136	1.94	0.85	.673	—	—	F-1	.699	.613
3	140	1.90	1.10	—	.637	—	F-2	.840	.435
4	140	1.67	0.83	.686	—	—	F-1	.505	.602
5	140	1.82	0.91	.753	—	—	F-1	.758	.636
6	138	3.31	1.02	-.565	—	—	F-1	.689	.401
7	140	1.79	0.85	.768	—	—	F-1	.704	.694
8	140	4.32	0.79	—	.537	—	F-2	.660	.418
9	140	2.75	1.12	—	—	-.543	F-3	.740	.501
% Explained Variance				31.22	12.81	11.21			
Reliability α , <i>r</i>				.72	.23**	.23**			

Notes. ** $p \leq .01$.

Factor 2 (F-2) explains 12.8% in the total variance and it concerns two items referring to personal responsibility. Finally, Factor 3 (F-3) explains 11% of total variance. It is made up of two items that refer to the need to be aware of the personal perceptions of safety of other people in the working environment.

The reliability of F-1 is satisfactory (Cronbach's alpha = .72), and has the same correlation as the other two factors (0.23**).

3.2. Descriptive Statistics

Table 2 shows the empirical ranges, means, standard deviations, coefficient alpha, and zero-order Pearson correlation of the studied variables. The measures of reliability showed a reasonable internal consistency. It is important to highlight the positive discharges and significant correlation between safety attitude and safety training and self-efficacy and the three-attitudinal components.

TABLE 2. Descriptive Statistics for the Key Study Variables

Variable	Range	<i>M</i>	<i>SD</i>	Relia- bility							
					2	3	4	5	6	7	
1. Age	20–56	32.8	8.05	—	-.24*	.01	-.06	.12	.11	-.02	
2. Gender	1–2	1.4	0.50	—	—	.02	-.06	-.05	.03	-.04	
3. Safety training	1–2	1.8	0.35	—	—	—	.07	-.05	.21*	.14	
4. Generalised self-efficacy	1–5	3.9	0.48	.86	—	—	—	-.23**	-.08	-.04	
5. Safety attitude (F-1)	1–5	1.9	0.65	.72	—	—	—	—	.24**	.28**	
6. Safety attitude (F-2)	1–5	1.8	0.65	.22**	—	—	—	—	—	.27**	
7. Safety attitude (F-3)	1–5	2.3	0.80	.22**	—	—	—	—	—	—	

Notes. * $p \leq .05$; ** $p \leq .01$.

3.3. Regression Analysis

In total, three hierarchical multiple regression analysis were performed separately (one with each dependent variable). We have tested the application conditions of the multiple regression analysis through residual analysis. In short it has been opted by the Kolmogorov-Smirnov's normality test (KS; Kleinbaum et al., 1988).

In order to interpret the a priori standardised variables as correctly as possible, nonstandardised regression coefficients are shown in Tables 3 and 4. (cf. Aiken & West, 1991; Jaccard et al., 1990).

3.3.1. F-1 (norm effectiveness)

The results of the carried out Kolmogorov-Smirnov's normality test have been $KS = .051$; $df = 140$; $p = .20$ (*ns*), which guarantees residual symmetric distribution. Table 3 shows the results of the hierarchical multiple regression analysis for F-1. The main effects of the independent variables are significant regard to changes in R^2 . We have not found main effects

regarding age and gender in safety attitudes. Moreover, the main effect of safety training is significant but in the opposite way to what was expected. That is to say, safety training is negatively associated with better safety attitudes (bearing in mind the inverse direction of the scale). With regard to self-efficacy, we see that it was positively linked to the safety attitude components. High levels of self-efficacy were associated with better attitude toward the effectiveness of safety norms.

TABLE 3. Hierarchical Multiple Regression Analysis of Safety Training and Self-Efficacy on Safety Attitude (F-1: Norm Effectiveness, $N = 140$)

Independent Variables	B	R^2 Change
1. Age	.08	.01
Gender	.07	
2. Safety training	.16**	.10**
Self-efficacy	-.24***	
Multiple R	.36	
R^2	.12	
F	2.7**	

Notes. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. The B values are the coefficients from the final stage of the regression analysis; due to rounding off, R^2 differs by .01 from the sum of R^2 change.

3.3.2. F-2 (personal responsibility)

In this case, the results of the carried out Kolmogorov-Smirnov's normality test have been $KS = .068$; $df = 103$; $p = .20$ (*ns*), which also guarantees residual symmetric distribution. Table 4 shows the results of hierarchical multiple regression analysis for F-2. The main effects of the independent

TABLE 4. Hierarchical Multiple Regression Analysis of Safety Training and Self-Efficacy on Safety Attitude (F-2: Personal responsibility, $N = 140$)

Independent Variables	B	R^2 Change
1. Age	.07	.03
Gender	.09	
2. Safety training	.22**	.06**
Self-efficacy	-.11	
Multiple R	.26	
R^2	.09	
F	2.4*	

Notes. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. The B values are the coefficients from the final stage of the regression analysis; due to rounding off, R^2 differs by .01 from the sum of R^2 change.

variables are significant according to changes in R^2 . Also in F-2 (personal responsibility) we have not found main effects regarding age and gender. However, if we look closely at the beta coefficients, the main effect of safety training is significant but in the opposite way to what was expected (the same as F-1). Training was negatively associated with a better attitude toward safety (bearing in mind the inverse direction of the safety attitude scale). However, self-efficacy was not significantly linked to this component of attitude toward safety (personal responsibility).

3.3.3. *F-3 (perception of others)*

Finally, the results of hierarchical multiple regression analysis are not significant with regard to any of the coefficients, so we have not included those results.

4. DISCUSSION

The main aim of this paper was to validate a scale of employee attitudes toward safety, using a shortened version of Cabrera's (1998) survey. Our data, which were collected from 140 respondents from Spanish workplaces, described three dimensions or factors of attitudes toward safety. All of these factors explain 55.2% of the data variance. The first factor (F-1) is related to attitude toward safety rules. The second factor (F-2) refers to personal responsibility in safety behaviour. The third factor (F-3) concerns to how people view other groups at the organisation.

F-1 could be related to safety software, as defined by Cox and Cox (1991), which includes beliefs, perceptions and values that employees share about safety regulations, safety policy and management. F-2 refers to another aspect of the same model, which considers safety to be an individual responsibility. On the other hand, F-3 is more related to the organisation role (Donald, 1994). For later authors, an important component of safety attitude is the organisational role, which is shaped by the perception of safety behaviour of other people around the individual. To sum up, the three-attitudinal components refer to (a) norm effectiveness, (b) safety as a personal responsibility of the worker, and (c) the influence of co-workers' beliefs and behaviour toward safety. These results could be useful as they broaden our knowledge of the architecture of safety attitude,

by describing possible objects of safety attitudes. This scale could be taken as an important starting point in this research field, as there is an evident lack of study into individuals' specific attitudes toward safety in organisational settings.

This paper also set out to test whether safety training is linked to safety attitudes (hypothesis 1). The data has confirmed this hypothesis: Safety training is associated with safety attitudes in two factors, F-1 (norm effectiveness) and F-2 (personal responsibility), but not in F-3 (perception of others). Nevertheless, the direction of the influence must be indicated: Training is negatively related to safety. This unexpected result could be understood if we bear in mind the attitudes of people who have undergone more training, but do not have a more favourable safety attitude. This could indicate that training did not improve attitude or that training must have certain quality conditions to be effective. This second possible explanation coincides with results from Orpen's (1993) study, who found that training is positively associated with a favourable attitude when the workers receiving training perceived the usefulness of the training program. Also in Salanova et al. (2000) computer training increased levels of burnout "only" when workers had low previous computer self-efficacy.

In general, considerations of usefulness appear to play a significant role in controlling trainee desire to participate in and use training. Moreover, this coincides with the results of a meta-analysis: usefulness-type reaction measures were related to learning and on-the-job performance (Alliger et al., 1997). However, more research on usefulness-type reactions to training, self-efficacy, and safety attitudes are needed in order to clarify the complex relationships among these psycho-social variables.

Finally, regarding our second hypothesis (to test whether self-efficacy is associated with safety attitude), a major effect of general self-efficacy on safety attitudes was found, but only in the factor of norm effectiveness. That is to say, high levels of self-efficacy go with a better safety attitude. In this sense, efficacy perceptions have direct cognitive links to beliefs or behaviours and it is conceptualised as a personality construct, a general belief in one's ability to succeed and a stable trait (Bandura, 1997). Another interesting result is the lack of effects of age and gender on safety attitudes, which are against previous studies (Hansen, 1989; Leigh, 1986). So, future research should clarify the specific influence of those and other sociodemographic factors on attitudes toward safety.

To sum up, the identification of the number and character of safety attitudes show the complexity and multifaceted nature of safety attitude. On

the other hand, safety training does not always have impact and posterior transfer (Haccoun, 1997). Besides, it is important to consider the role of self-efficacy as a type of self-belief that has a relevant direct influence on attitudes. These results have practical implications in the workplace, especially on labour risk prevention. A relevant shift in European organisational settings has arisen from various laws and directives. Legislation points out training is a meaningful activity for risk prevention and safety. Furthermore, this legislation emphasises that the key issue is the change in attitudes of the workers themselves toward safety.

Also some limitations must be mentioned. Firstly, data for this study has been collected through self-reporting, and results could have been affected by common method variance. It would be useful to supplement these measures with other methods. Additionally, the sample was made up of employees who use new technology and this condition has possibly influenced the results. Work with new technology implies the use of mental competencies and complex abilities.

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