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Supervisor's safety response: A multisample confirmatory factor analysis

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Supervisors' Safety Response (SSR) has been closely linked to workplace safety, and, as perceived by workers, it is considered to be one of the most influential issues with regard to employees' compliance with safety behaviours. This study defines and tests a bifactorial and a monofactorial model of the SSR. Two facets of the SSR were measured: (a) supervisors' response toward workers' safe or unsafe behaviour and (b) supervisors' safety attitudes and behaviours applied to their own work. In three samples of injured blue-collar workers (N_1= 110, N_2= 123, N_3= 104), multisample confirmatory factor analyses, using maximum likelihood estimation, were conducted to test both the bifactorial and the monofactorial model. Both models provide an overall good fit, but parsimony and the high correlation between factors in the bifactorial model support the monofactorial model. Attention is drawn to the measurement of the SSR as a diagnostic tool useful in selecting intervention goals, specifically integrating supervisors' safety behaviour.

La Respuesta de Seguridad de los Supervisores (RSS) se considera estrechamente ligada a la seguridad en el trabajo y, tal como es percibida por los trabajadores, es uno de los aspectos más importantes para el cumplimiento de las normas de seguridad. Este estudio define y contrasta un modelo bifactorial y otro monofactorial de la RSS. Se miden dos facetas de la RSS: (a) La respuesta de los supervisores hacia la conducta segura o insegura de los trabajadores; y (b) Los comportamientos y actitudes de seguridad de los supervisores aplicados a su propio trabajo. Para contrastar ambos modelos, se realiza un análisis factorial confirmatorio multimuestra utilizando estimación de máxima verosimilitud en tres muestras de trabajadores accidentados de cuello azul (N_1= 110, N_2= 123, N_3= 104). Ambos modelos presentan un buen ajuste global, pero se prefiere la solución unifactorial debido a razones de parsimonia y a la alta correlación entre ambos factores en la solución bifactorial. La medición de la RSS se presenta como una herramienta diagnóstica útil para seleccionar objetivos de intervención que consideren específicamente la respuesta de seguridad de los supervisores.

In Occupational Safety Psychology several models about safety have included the study of workers' safety perceptions as an indicator of the degree of safety compliance and development of the organization (Cox & Cheyne, 2000; Cox & Cox, 1991; Boada, de Diego, & Agulló, 2004; DeJoy, 1996; Leiter & Harvie, 1997). Safety climate is defined as a set of perceptions about safety concerns held by individuals or groups in an organization (Mearns, Flin, Gordon, & Fleming, 1998; Meliá & Sesé, 1999). Safety climate is an antecedent of workers' safety that orientates appropriate, as well as inappropriate, adaptive employee behaviour (Coyle, Sleeman, & Adams, 1995).

Supervisors' safety response as perceived by workers has been considered a relevant part of safety climate models and therefore it has been included regularly in measures of safety climate, sometimes considering managers and supervisors together (Cooper & Phillips, 1994; Cox & Cheyne, 2000; Meliá, & Becerril, 2006). Supervisors are key source of social influence because of their proximity to, permanent contact with, and authority over the workers (Leiter & Harvie, 1997). In the Dedobbeleer and Béland (1991) safety climate two-factor model the first factor was related to the management safety behaviour, including the worker's perceptions of supervisor's behaviour. Hayes, Perander, Smecko and Trask (1998) measured five constructs: job safety, peers' safety, supervisors' safety, management's safety practices, and satisfaction with the safety program. The supervisors and management dimensions were the best predictors of job satisfaction and both were related to accidents. Mearns et al. (1998) also included some items related to supervisors' safety attitudes and behaviours in a broad questionnaire of safety attitudes. Their third factor was named «Supervisors Commitment to Safety». Supervisors had more positive scores than workers in this factor but their own levels of self-reported safety behaviour were not significantly different from those of the personnel they supervised.

Zohar (2000) presented a group-level model of safety climate that emphasized supervisors' safety practices orientated toward

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workers' behaviour. Zohar identified two factors, named supervisory action and supervisory expectation. Supervisory action referred to overt supervisory reaction to workers' behaviour and the initiation of action. The supervisory expectation gave priority to noncommensurate task facets, mostly safety versus productivity. Both factors correlated 0.45 ($p<0.001$; N= 53) for the aggregated data used in this study. A count of minor injuries requiring medical attention correlated –0.23 with the first factor and -0.25 with the second factor.

The importance of supervisors in safety has been emphasized both from a theoretical and an applied point of view (Beers, 1990; Linton, 1991). The frequency and intensity with which supervisors monitor and respond to safety issues determines the expectancy valence associated with safe or unsafe behaviour and this affects motivation and finally the workers' safe or unsafe behaviour (Zohar, 2000). Therefore, a careful evaluation of workers' perception of supervisors' safety response should be useful for safety intervention (Chhokar, 1990). Supervisor's Safety Response can be considered in the logic of Zohar's (2000) a group-level climate scale. However, this two-level view of safety climate can be integrated in a multilevel view of safety climate (Meliá, 2003; Zohar & Luria, 2005). Meliá, Silva, Mearns, and Lima, (2006), exploring the dimensionality of safety climate in a sample of construction employees, identify five factors. The Supervisors' safety response was the first factor, followed by Perceived risk, Organizational safety response, Co-workers' safety response and Worker's safety response.

From the point of view of the supervisor's organizational position his/her safety response has three faces: ascending, self-applied, and descending. The *ascending face* is related to the safety response that a supervisor provides to his/her superiors. It may include (a) feedback about safety results in his/her area of responsibility; (b) information about risks in his/her work area, and job and task hazard analysis; (c) incident and accident investigation; and (d) suggestions about what needs to be done to strengthen the overall safety program. The *self-applied face* concerns the supervisor's own work behaviour, including: (a) the degree to which the supervisor performs his/her tasks in accordance with the safety norms; (b) his/her use of protective equipment when required; (c) his/her personal contribution to the cleaning, order and safety in his/her area of responsibility; and (d) the degree in which he/she considers safety in the decisions that he/she has to make. Finally, the *descending face* of supervisor's safety response concerns the safety response that the supervisor gives to the workers. This descending face may include: (a) safety training with regard to risks, prevention, safe work procedures and methods, and emergency and rescue operations; (b) safety information; (c) safety instructions; (d) surveillance and control to assure that the workers in his/her area of responsibility perform their tasks in accordance with the safety norms; and (e) safety social contingencies and encouragement, including feedback about workers' safe or unsafe behaviour.

Given that workers can't usually see the ascending face of the supervisors' safety response, from the point of view of the workers, the supervisor's safety response has two main facets: (1) what he/she does about workers' safety behaviour, i.e., the behaviour of the supervisor related to the safety of the worker, implying a social interaction between supervisors and workers; and (2) what he/she does in his/her own tasks, i.e., his/her own safety involvement while he/she is performing tasks and actions that are not socially orientated. These two facets are somewhat related to the deeds and words that Dedobbeleer and Béland (1991) mentioned. Zohar's (2000) group-level model of safety was centred in facet one. Following this three facet analysis, supervisors perform three ordinary safety functions in their relationship with the workers: (a) *Modelling:* Supervisors offer a model of safe or unsafe behaviour; (b) *Communication:* Supervisors communicate safety policy, safety procedures and rules and safety instructions; and (c) *Guide:* Supervisors control the workers' safe or unsafe behaviour and deliver feedback and social contingencies, and sometimes material contingencies and encouragement. Observational learning (modelling function), supervisors' feedback (guide function) and adequate instructions (communication function) may support workers' efforts to strive for safety (Hoyos & Ruppert, 1995). With regard to workers, the first function may be affected by the supervisors' own self-applied safe or unsafe behaviour, and the other two as part of the safety response that the supervisors give to the worker.

The assessment of safety climate has been considered a preliminary step in order to plan a behavioural safety intervention. To be fully useful the assessment of safety climate should allow a separate identification and measurement of the state of safety for the various social agencies implied in it. Although organizational safety policy, safety officers and representatives, coworkers and supervisors can configure together a general state of the safety climate, the particular contribution of each of these main sources of influence should be measured separately in order to develop a psychosocial safety assessment useful for the planning and monitoring of interventions. The perception of the main agencies involved in the safety climate should be measured separately in order to identify precise targets for organizational safety intervention.

Following these assumptions, the General Safety Questionnaire (GSQ) was devoted to the separate measure of several distinct psychosocial variables usually included together in safety climate questionnaires (Melià, 2000). The GSQ included the Supervisors' Safety Response Scale (SSRS), conceived as a specific indicator of safety dynamics at this organizational level. This scale was applied in a sample of 155 injured and non-injured workers (Melià, Sesé, Tomás, & Oliver, 1992). Using both exploratory and Confirmatory Factor Analysis (CFA) data proved to be coherent with a monofactorial model. The CFA obtained an almost acceptable fit (= 29.121, df= 14, p= 0.01; NFI= 0.97; NNFI= 0.98; CFI= 0.98). Cronbach's alpha was 0.88. Supervisors' safety response correlated 0.53 with an index of organizational safety actions and polices, 0.53 with coworkers' safety response and 0.50 with worker's safety behaviour.

The SSRS was developed to measure the supervisors' safety response as perceived by workers involving two facets: (1) supervisors' response toward workers' safety behaviour; and (2) supervisors' self-applied safety response. A bifactorial model sustains that workers' perception of the supervisors' safety response can differentiate between these two facets. A monofactorial model implies that the workers perceive the both facets as a whole. If the supervisors' safety response presents manifest differences between the self-applied commitment to safety and the descending workers' orientated safety behaviour, and if workers' perceive the difference, then a bifactorial model is plausible. On the other hand, if supervisors' safety response is empirically homogeneous, or both facets are highly correlated, or workers do not perceive the

difference between them, then a monofactorial model should be an adequate representation of the measure.

In order to achieve a further understanding of the construct representation (Embretson, 1983) of the supervisors' safety response, the aim of this paper is to test both a bifactorial and a monofactorial theoretical model of the supervisors' safety response by means of a multisample confirmatory factor analysis.

Method

Participants

Sample 1 was obtained from occupational accident reports of the government of València (Spain). Questionnaires were addressed to 600 workers, from randomly selected companies located in the metropolitan area of Valencia. 110 valid questionnaires were obtained from workers who had been involved in work related accidents in the previous five years: 65.5% suffered one accident, 17.3% suffered two accidents and 17.2% suffered three or more accidents. The average age was 38.27 (SD= 10.59), 94.5% were males, 70% were permanent employees and 70.9% of the respondents belonged to the private sector.

The second and third samples were drawn from a list of organizations provided by a work insurance company. During a three month period, questionnaires were administered in an interview format to injured workers who had been recently involved in a work related accident. Sample 2 presented 123 workers: 54.5% suffered only one accident during the previous five years, 28.5% suffered two accidents and 17% suffered from three to seven accidents. The average age was 32.10 (SD= 11.43), 85.4% were males, 41.5% were permanently employed, and 68.3% worked in private companies.

Sample 3 was composed of 104 workers: 58.7% suffered one accident during the previous five years, 31.7% suffered two accidents, and the remaining 9.6% suffered from three to eight accidents. The average age was 27.36 (SD= 8.89), 78.8% were males, 28.8% were permanent employees and 75% were members of private companies.

Tabachnick and Fidell (2000, p. 659) recommend a minimum sample size of 200 subjects for SEM and CFA; however, they qualify this by saying that «fewer than 10 subjects per estimated parameter may be adequate if the estimated size of the effect is large and the measured variables are normally distributed». Although, given the number of parameters to be estimated, the sample size is more than adequate for the overall sample, the use of these three individual samples should be justified by the size of the effect obtained.

Instrument

The SSRS is a 7 item three-point scale designed to measure supervisors' safety response as perceived by workers. The contents of the items are: (1) Supervisors' response toward workers' unsafe behaviour, (2) Supervisors' response toward workers' safe behaviour, (3) Supervisors' support of the fulfilment of safety rules, (4) Supervisors' safety communication with workers, (5) Supervisors' safety attitude, (6) Supervisors' effort to work safely, and (7) Supervisors' response toward workers' unsafe behaviour. The items 1, 2, 4 and 7 represent the first facet, supervisors' response toward workers' safety behaviour. The items 3, 5 and 6 represent the second facet, supervisors' self-applied safety response.

Hypothesis

Two distinct models of structure can be applied to the SSRS: bifactorial and monofactorial. The *bifactorial model* hypothesizes that the supervisors' safety response as perceived by workers is composed of two factors. Factor 1 refers to the supervisors' response toward workers' safety behaviour. Factor 2 refers to supervisors' self-applied safety response. Following the bifactorial model, it is expected that items 1, 2, 4 and 7 saturate the first factor and items 3, 5 and 6 the second factor. The first factor is orientated to the supervisor's descending social relationships, that is, the supervisors' response to the workers' safety behaviour. The second factor deals with the supervisors' own safety behaviour, that is, with their own fulfilment of safety rules and their general effort to work safely.

The monofactorial model hypothesizes that both facets of supervisors' safety response as perceived by workers can be described using a single dimension. Therefore, if this model fits to the data all of the 7 items are expected to saturate a single factor.

Procedure

To test the models two EQS procedures were applied (Bentler, 1989). The first step was to use Confirmatory Factor Analysis (CFA) to estimate the parameters of the model in each sample separately. In the second step a Multisample Confirmatory Factor Analysis (MCFA) was done constraining the free parameters to be equal across the three samples. This two-step procedure provided the goodness of fit of each model in each sample and the goodness of fit across samples. In all analyses chi-square, chi-square divided by degrees of freedom (df), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI) were calculated (Bentler, 1989).

Results

The standardized maximum likelihood solution for the *bifactorial model* is shown in Figure 1. In sample 1 items 1, 2, 4 and 7 saturated factor 1 with standardized structural coefficients between 0.588 and 0.776, and items 3, 5 and 6 saturated factor 2 with coefficients between 0.624 and 0.855. Covariance between both factors was a free parameter estimated by the maximum likelihood procedure to be equal to 1. All coefficients were significant ($p<0.01$).

Sample 2 and sample 3 show, in general, similar coefficients, all of them also significant with $p<0.01$. The covariance between factors in sample 2 was 0.93 ($p<0.01$) and in sample 3 it was 0.89 ($p<0.01$). In the three samples all parameters relating factors with items were significant with $p<0.01$ and the covariances between the two factors were also significant with $p<0.01$.

Table 1 presents the summary of fit for the bifactorial model. Sample 1 presented a non-significant chi-square, a chi-square divided by degrees of freedom lesser than 2 and NFI, NNFI and CFI indexes greater than 0.9. All these indexes indicated that the

bifactorial model was not rejected by sample 1. Sample 2 and sample 3 followed the same pattern of results as sample 1. Therefore, the bifactorial model can be used to describe the data in the three samples.

Because the bifactorial model was not rejected in any of the three samples a MCFA is justified. The chi-square for the MCFA was non-significant, and also the chi-square divided by the degrees of freedom and the NFI, NNFI and CFI indexes showed a good fit to the data. Therefore it was concluded that the bifactorial model cannot be rejected by the data and that the coefficients that relate factors and items are the same except for sampling variations across the three samples.

Figure 2 shows the standardized maximum likelihood estimation for the *monofactorial model* in the three samples. For sample 1, sample 2, and sample 3 the parameters relating items to the factor ranged between 0.386 and 0.855 (p<0.01).

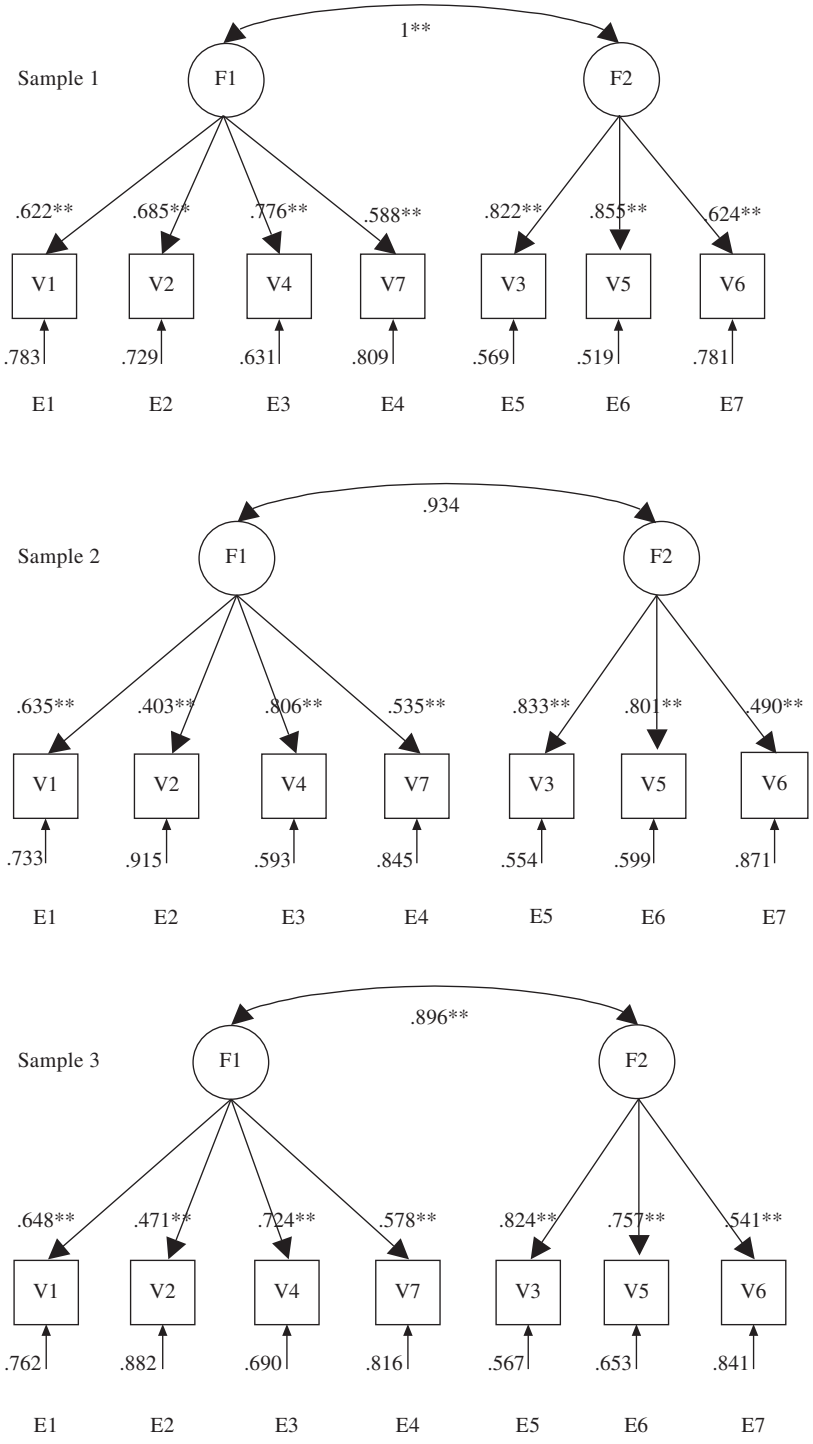

Figure 1. *Standardized maximum likelihood solution for the bifactorial model (**= p<0.01)*

Table 2 presents a summary of the indexes of fit for the monofactorial model. Sample 1 presented a non-significant chi-square (p= 0.109), a chi-square divided by degrees of freedom equal to 1.479 and NFI, NNFI and CFI greater than 0.9. These results showed that the monofactorial model also fits the data in sample 1. For sample 2 results were very similar, showing a good fit to the data. For sample 3 chi-square was also non-significant (p= 0.4) and all the other indexes showed a good fit as well. Given that the monofactorial model showed an adequate fit to the data, a MCFA was justified. The MCFA obtained a non-significant chi-square (p= 0.09), a chi-square divided by degrees of freedom lesser than 2 and NFI, NNFI and CFI indexes greater than 0.9. All these results allowed us to conclude that the monofactorial model also fits the data in the three samples and that the parameters that relate items and the factor are the same across samples except for sampling variation.

The first factor under the bifactorial model (4 items) obtained alpha coefficients of 0.7, 0.59 and 0.64 for samples 1, 2 and 3 respectively. The second factor (3 items) obtained alpha coefficients of 0.85, 0.85 and 0.80. In the case of the monofactorial model (7 items) alpha coefficients were 0.87, 0.82 and 0.82 for samples 1, 2 and 3 respectively.

Discussion

Supervisors' attitudes, behaviours and contingencies toward workers' behaviour have a significant effect on workers' safety attitudes and performance (Chhokar, 1990; Cox & Cox, 1991).

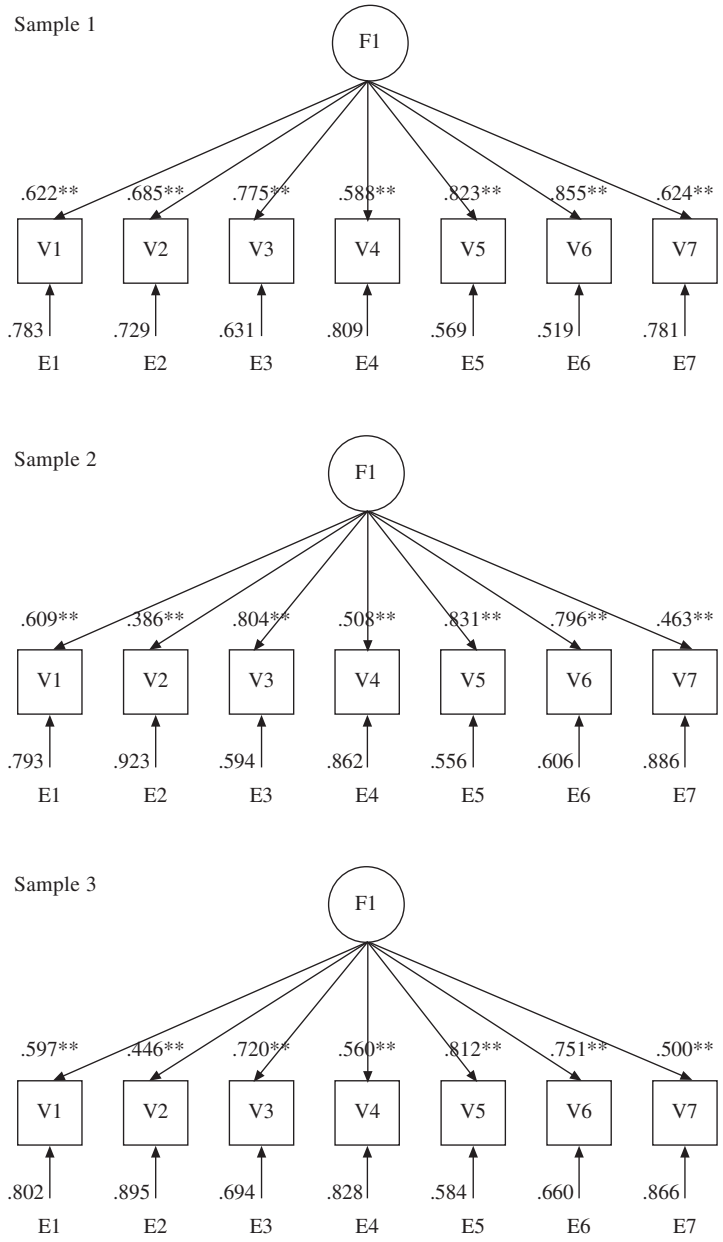

Figure 2. *Standardized maximum likelihood solution for the monofactorial model (**= p<0.01)*

Table 1
Summary of fit for the bifactorial model in the three samples

SAMPLE	N	χ^2	DF	P	χ^2/df	NFI	NNFI	CFI
1	110	20.706	13	0.07896	1.592	0.942	0.963	0.977
2	123	18.192	13	0.15036	1.399	0.939	0.970	0.981
3	104	12.251	13	0.50714	0.942	0.945	1.006	1.000
Multisample		64.198	53	0.13940	1.211	0.927	0.984	0.986

χ^2= chi-square, df= degrees of freedom, NFI= Normed Fit Index, NNFI= Non-Normed Fit Index, CFI= Comparative Fit Index

Table 2
Summary of fit for the monofactorial model in the three samples

SAMPLE	N	χ^2	DF	P	χ^2/df	NFI	NNFI	CFI
1	110	20.706	14	0.10942	1.479	0.942	0.970	0.980
2	123	19.304	14	0.15364	1.378	0.935	0.971	0.981
3	104	14.672	14	0.40094	1.048	0.935	0.995	0.997
Multisample		70.438	56	0.09278	1.257	0.920	0.980	0.982

χ^2= chi-square, df= degrees of freedom, NFI= Normed Fit Index, NNFI= Non-Normed Fit Index, CFI= Comparative Fit Index

Workers' perception of supervisors' safety response is an important reference for their own safety behaviour. Items measuring the workers' perception of supervisors' safety response used to be included in the broad concept of safety climate (Brown & Holmes, 1986; Dedobbeleer & Béland, 1991; Zohar, 2000), but following this overall measurement of safety climate it was difficult to achieve a fine-grain assessment of these particular variables. Given the recognized importance of supervisors in safety, distinguishing an independent, short, easy to apply and well-founded measure of the supervisors' safety response should be useful for a practical intervention in organizational safety.

Supervisors' safety response can be analyzed by distinguishing the main three social fronts of the supervisor's organizational relationships: the ascending safety response, the self-applied safety response and the descending safety response. Supervisors' safety response as perceived by the workers involves the second and the third facets. The supervisors' self-applied safety response refers to the commitment of the supervisors in safety when they perform their own tasks and duties. It implies the supervisors' fulfilment of safety rules, and their effort to do their own work in a safe way. The supervisors' descending safety response refers to their safety communication with workers, the supervisors' response to the workers' safe behaviour and the supervisors' response to the workers' unsafe behaviour. If these two facets of supervisors' safety response operate independently, i.e. some supervisors preach safety to the workers but they do not apply safety to their own tasks, and if that difference between the two facets is perceived by the workers, then the two facets of supervisors' safety response can be reflected in data and a bifactorial model should be plausible. On the contrary, if the two facets of supervisors' safety response operate in an integrated way, if both facets are highly correlated or if workers do not perceive real differences between facets, then a monofactorial model should fit the data. A monofactorial model implies both (a) that supervisors' descending and self-applied safety response are consistent between them; and (b) that workers perceive them as being consistent.

Results of the CFA and MCFA applied to three samples support the plausibility of the bifactorial and the monofactorial model. In each sample both models present statistically significant ($p<0.01$ in all cases) structural coefficients between items and factors. Also in each sample, both models present a non-significant chi-square, a chi-square divided by the degrees of freedom lesser than 2 and NFI, NNFI and CFI indexes greater than 0.9, all of these indexes implying a good fit. In addition, both models present a good fit to the data in the MCFA when the hypothesis of equality of structural coefficients relating items and factors across samples is tested.

These results suggest that both interpretations of the scale, the bifactorial and the monofactorial, are formally acceptable. The bifactorial model supports the use of separate measures for the two facets of supervisors' safety response, the descending facet and the self-applied one. The monofactorial interpretation assumes that the supervisors' safety response as perceived by workers can be seen as unidimensional and, therefore, that the use of a single score that summarizes all items is justified.

Results regarding the bifactorial model have some similarities to Zohar's (2000) group-level model of safety climate. Zohar found that a set of items related to the descending facet of supervisors' safety response could be represented by a two-factor structure when an exploratory principal-components factor analysis was applied. One factor included items directly related to supervisory reactions to workers' safety behaviour. These reactions included positive and negative feedback to safe and unsafe workers' behaviour and communication related to safety. Zohar named this first factor «action». The contents of this factor are similar to the descending-facet factor found in the bifactorial model of the SSRS. The second factor in Zohar's (2000) analysis «refers to supervisory expectation rather than action and gives priority to noncommensurate task facets, mostly safety versus productivity». Zohar did not introduce a difference between the

two facets of supervisors' safety response, centring instead on the measure of the supervisors' safety response related to workers. Therefore, Zohar did not try to measure the self-applied facet of supervisors' safety response, but a careful analysis of the meaning of the items included in the second factor suggests that in some items this self-applied facet may play a role. Items like «My supervisor pays less attention to safety problems than most other supervisors in this company» and «My supervisor only keeps track of major safety problems and overlooks routine problems» are general statements that may involve at least partially the self-applied facet of the supervisors' safety response. Supervisors' attitudes toward safety practices and supervisors' safety behaviour, both considered by Dedobbeleer and Béland (1991), Brown and Holmes (1986), and Mearns et al. (1998) imply the self-applied facet of supervisors' safety response. Introducing the self-applied facet of supervisors' safety response should be useful to (a) assess a singularly important aspect of safety climate; and (b) introduce the consideration of the effect that the function of modelling on the part of the supervisors might have on workers' safety behaviour.

From an applied point of view, the fit of both models for the SSRS data can be interpreted as supporting the simultaneous use of a total score for the whole scale and a subtotal for each of the two facets of the supervisors' safety response (bifactorial model). The total score can be interpreted as a general indicator of the quality of the supervisors' safety response with low scores suggesting the need for intervention at this organizational level.

From the point of view of the psychosocial safety assessment and intervention in organizations, providing a separate indicator for the two factors should be useful to identify separately two main sources of difficulties and to establish two possible targets for intervention. A low score in the descending facet (factor I) implies that the supervisor fails in providing adequate responses to workers' safe or unsafe behaviour. Given that social and material contingencies have proven their importance in the modification of safe and unsafe workers' behaviours, a low score in this factor suggests that supervisors should be trained in some of the following items: (1) identifying safe and unsafe behaviours of workers; (2) applying adequate social (and material in some cases) contingencies to workers' safe and unsafe behaviours; and (3) safety communication skills in order to provide sufficient and appropriate communication with workers about safety issues, both ascending and descending, including safety information and safety instructions. A solid change in the supervisors' safety response in one or more of these three categories might require a change in the supervision that supervisors themselves receive from middle or high management.

The score in the self-applied facet of the supervisors' safety response (factor II) should also be useful for assessment and intervention purposes. A low score in this factor suggests that supervisors fail to work in a safe way. This not only implies a risk for themselves but also a risk for others given that supervisors' work often involves responsibilities that affect others. A supervisor who fails in the self-applied facet of his/her safety response, also fails as a model for others. For workers supervisors are models invested with authority, and, therefore, their safe or unsafe behaviour defines what is acceptable and what is not in a clear and practical manner. For example, a supervisor that demonstrates each day that work can be done without the use of the required protective equipment cancels out any message with regard to this kind of safety protection. Therefore, a supervisor who obtains a low score in the self-applied facet of the supervisors' safety response should be (1) trained to identify unsafe behaviour in his/her own work; (2) trained to perform his/her work in a safe manner; and (3) motivated to perform his/her work in a safe way.

From a theoretical point of view, the results suggest that both an integrated and a two-facet model of the supervisors' safety response can be accepted. The fact that the bifactorial model has not been rejected can be interpreted as supporting the two-facet model that underlines the content of the items. Nevertheless, self-applied and descending safety responses as perceived by the workers are strongly related and perceived in an integrated way. Considering that both the bifactorial and the monofactorial models are statistically acceptable representations of the data, the two factors appear to be highly correlated, and the internal consistencies are small in factor I, according to the principle of parsimony, the monofactorial model should be chosen as the more acceptable representation of the structure of the Supervisors' Safety Response Scale. Although developing the questionnaire with an increased number of items will increase reliability and the representation of behaviours, short scales are often preferred at organizational settings where workers' time is a valuable resource.

The SSRS measures two key facets of the supervisors' safety response: the safety interaction with workers and the self-applied safety performance. Scores in the whole scale and in each of these facets should be useful to establish accurate targets for safety intervention at the supervisors' level in organizations.

The fit of the three samples and the fit of the additional multi-sample confirmatory factor analysis tests reinforce the confidence in the results. However, this research has some limitations related to the sample. First, the sample size is adequate for the overall sample, given the number of parameters to be estimated, but the size of the three individual samples relies on the size of effect obtained. Second, the three are samples of injured workers. Additional research is needed in order to confirm the identified structures in non-injured workers. Third, the first sample was a self-selected sample, and it is possible that non-selected workers differ on some non-measured variable from self-selected workers.

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