



Effects of safety and health training in metalworking small-sized enterprises: a comparative study of two training methods

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Abstract

Safety and health training is an essential tool to reduce occupational accidents and diseases. However, the method applied is critical for the effect of a training programme in Occupational Safety & Health (OSH) related outcomes. Additionally, studies about the appropriateness of OSH training methods involving small-sized enterprises are scarce. This study aims to compare the effect of two training methods when applied in metalworking small-sized enterprises: an active method, with group discussion, and an expository method, with formal exposure. The effect of these two methods was assessed at the level of risk perception (perceptions of susceptibility, severity, barriers and benefits), safety behaviour (safety compliance and safety participation) and OSH knowledge. A sample of 212 workers was divided in three groups: one experimental group and two control groups (passive and active). In order to evaluate the effect of OSH training in the different dependent variables, a questionnaire was applied before and one month after the training sessions. The results showed that OSH training had a positive, but limited, effect on the variables under study. Significant differences were found between both moments for perception of susceptibility and OSH knowledge. However, no significant differences between both training methods after the intervention were observed in this study.

1. INTRODUCTION

The rate of occupational accidents and diseases remains high, in particular in Small- and Medium-sized Enterprises (SMEs) (Cagno et al., 2011). Smaller sized businesses is particular critical in what regards to Occupational Safety & Health (OSH), since they face several constraints (see, e.g., Bonafede et al., 2016; Hasle et al., 2012; Masi & Cagno, 2015; Reinhold et al., 2015; Barbosa et al., 2019). In order to change this scenario, several studies attach importance to training in OSH (see, e.g., Burke & Sarpy, 2003; Burke et al., 2011; Jacinto et al., 2009; Robson et al., 2010; Stave & Törner, 2007).

Training has been associated with a positive effect in several OSH related outcomes, such as OSH knowledge (Aluko et al., 2016; Evanoff et al., 2016; Nielsen et al., 2015), risk perception (Evanoff et al., 2016; Williams et al., 2007; Vale, 2015), safety commitment (Leiter et al., 2009) and safety behaviours (Arezes & Miguel, 2008; Burke et al., 2006). However, according to several authors, for the training be effective it is

necessary to adopt appropriate methods, considering the reality of each organization (Burke et al., 2006, 2011). In addition, it is also important to identify the determinants of behavioural change so that the applied method approaches them (Bryan et al., 2002).

Previous studies suggest that more engaging methods, the ones that involved the participation of workers, are the more effective in promoting safer behaviours (Zimmer et al., 2017; Rodrigues et al., 2018). It was also verified that traditional training methods (expositive) have more positive results when they are coupled with techniques that require the involvement and the active participation of the workers (Zimmer et al., 2017; Jeschke et al., 2017). This is in line with what has been pointed out in other studies, which indicate that the training that requires the active participation of the trainees is more effective than the traditional expository training.

Besides the training methods, when an OSH intervention that intends to change workers behaviours is being designed, existent models should also be considered. Several models were developed along the last decades. In this study, particular emphasis will be given to the Health Belief Model (HBM), initially applied in the health care area to understand and explain the variables that constrain human behaviours (Cao et al., 2014; Cheraghi et al., 2014; Haghghi et al., 2017). In occupational settings, this model assumes that when a worker feel to be susceptible to a certain risk tends to consider the situation as a serious problem, and that the benefits of adopting target behaviour are higher than the barriers, which could lead them to adopt safe behaviours. Although there are studies that show the success of this model when applied to OSH (see Cao et al., 2014; Haghghi et al., 2017), there is insufficient evidence on the effect of a training method supported in this model, especially with respect to small-sized enterprises. Therefore, the present study aims to compare the effect of two training methods on OSH (the active method with group discussion and the expositive method with formal exposure) with absence of intervention, in workers risk perception, safety behaviours and OSH knowledge, when applied in metalworking small-sized enterprises.

2. LITERATURE REVIEW

2.1 OSH as a challenge for SMEs

OSH is frequently pointed as a challenge for SMEs. Several factors have been identified to explain differences in OSH performance between SMEs and large enterprises, in particular the following ones: limited financial, human and technological resources; reduced knowledge about OSH matters by the employers; limited time to deal with these matters by the employer; attitudes of employers and workers away from OSH issues; difficulties in fulfil with legal requirements (Barbosa et al., 2019; Bonafede et al., 2016; Cagno et al., 2011; Champoux & Brun, 2003; Hasle et al., 2012; Mayhew, 2000; Micheli & Cagno, 2008; Masi & Cagno, 2015; Reinhold et al., 2015; Zorpas et al., 2008).

Compared to the large enterprises, the small-sized have less effective health and safety management systems (Fera & Macchiaroli, 2010; Walker & Tait, 2004). These enterprises have higher accidents rates, and their workers are at higher risk (Eakin et al., 2000; Gunnarsson et al., 2007; Hasle & Limborg, 2006; Lentz & Wenzl, 2006; Schlunssen et al., 2001; Sørensen et al., 2007). Additionally, smaller sized enterprises are less prepared to assess and control the occupational risks (Champoux & Brun, 2003; Hasle & Limborg, 2006; Rigby & Lawlor, 2001). In fact, risk assessment is a problem for SMEs. Risk assessment quality is positively related to the enterprise's size (ESENER-2, 2015). Although more than a half of smaller-sized enterprises claim to be carrying out this document, most of them are poorly performed and incomplete (Fera & Macchiaroli, 2010; Walker & Tait, 2004). In addition, the most commonly used methods are qualitative, which are often characterized as comprehensive and subjective methods (Fether & Macchiaroli, 2010; Hetherington et al., 2006; Rodrigues et al., 2015a).

Additionally, another disadvantage of SMEs in relation to large enterprises is the type of preventive services provided. Due to the difficulties of these enterprises, OSH is

frequently outsourced to external consultancy companies which are, in some cases, less rigorous in identifying and assessing the risks (EU-OSHA, 2010; Hasle et al., 2010).

2.2 Effect of training in OSH outcomes

OSH training is considered an important strategy to improve OSH performance, contributing to the reduction of occupational accidents and diseases (Burke et al., 2006, Burke et al., 2011, Robson et al. 2010; Rodrigues et al., 2018). Several studies have proven the effectiveness of training in improving safety commitment and safety behaviours (Arezes & Miguel, 2008; Burke & Sarpy, 2003; Burke et al., 2006; Burke et al., 2011; Colligan & Cohen, 2004; Robson et al., 2010). There is also evidence of its importance in acquiring knowledge and skills to perform work more safely (Aluko et al., 2016). In turn, the level of OSH knowledge has been related to the level of risk perception (Fruhen et al., 2014; Rundmo & Hale, 2003) and to safety compliance (Griffin & Neal, 2000). However, according to Hora et al. (2003) and Kwon & Kim (2013), OSH knowledge alone is not enough to lead to behavioural change.

Another advantage of training is the improvement in the level of risk perception (Rodrigues et al., 2018; Vale, 2015), which in turn has a significant impact on the level of employee behaviour (Arezes & Miguel, 2008; Flaten et al., 2005; Rodrigues et al., 2015b; Stewart-Taylor & Cherries, 1998). The perceived severity, perceived barriers and perceived benefits are also considered important dimensions in the adoption of safe behaviours. According to Cao et al. (2014), the perceived benefits have a greater influence on the induction of behaviour compared to the perceived barriers. However, Lu et al. (2015) in a study involving SMEs, show that these variables had no impact on the use of personal protective equipment (PPE). One possible explanation, according to the authors, may be the study has been developed on SMEs, i.e., including workers with low education level that could influence the knowledge about the benefits and barriers of the PPE use.

2.3 Health Belief Model

The HBM, initially developed by Rosenstock (1966) applied in the health care area, has been recently used in occupational settings (see e.g., Cao et al., 2014; Haghghi et al., 2017). It is one of the behavioural models focused on the cognitive factors of the behaviour, as a causal mediators of this. According to this model, the behaviour results from a set of beliefs. When applied to the OSH, a worker who considers a situation to be serious and feels susceptible to it, considers the benefits of adopting safe behaviours higher to the barriers associated with them, becoming more predisposed to safe behaviours.

3. METHODOLOGY

3.1. Sample

A total of 12 enterprises from the metalworking industry were part of this study, of which 6 enterprises were part of the group subject to the intervention and 6 of the group without intervention. From these enterprises, 212 workers were included in the study, which were divided into three groups: two intervention groups and one non-intervention group, which will be referred to below as experimental group - EG (subject to the active method - discussion group), active control group - ACG (subject to the expository method - formal exposure) and passive control group - PCG (group without intervention). Most of the participants were males (92.5%) with mean age of 40 years old ($M = 40.2$ yr; $SD = 12.1$ yr). Regarding the level of education, most of the respondents have 4 to 9 years of formal education (44.3%), with the youngest having the highest level of education.

3.2. Study design

This study aimed to analyse and compare the effect of two training methods in the field of OSH (active method and expository method) when applied to metalworking small-

sized firms. The defined dependent variables were: i) perceived susceptibility, ii) perceived severity, iii) perceived barriers and perceived benefits; iv) self-reported safety behaviour, which has been assessed through two dimensions, safety compliance and safety participation; and v) OSH knowledge. The independent variables were the two training methods.

The study encompassed six phases summarized in Figure 1. In the first phase, focus groups was carried out with OSH practitioners, in order to determine the training needs. Subsequently, visits were made to the enterprises by an OSH practitioner. A checklist was used to evaluate the existing conditions. A registration form was also applied for each worker in order to verify the adopted safety behaviours. Through the information collected, the training programme and the questionnaire were designed. In a subsequent phase, the questionnaire was applied to the three groups to assess the variables under study. Then, the training programme designed as a 90-minute session was applied to the groups that were subject of intervention using the previously defined training methods. The objective of this study was to analyse the effect of different training methods using the same time for the training session as it is usually given by the external consultancy companies to this type of firms and workers. Therefore, the duration of the training was based on the existing reality with regard to the training time. Finally, one month after the intervention, the workers of the three groups were again asked to complete the questionnaire to verify the existence of possible changes in the variables under study.

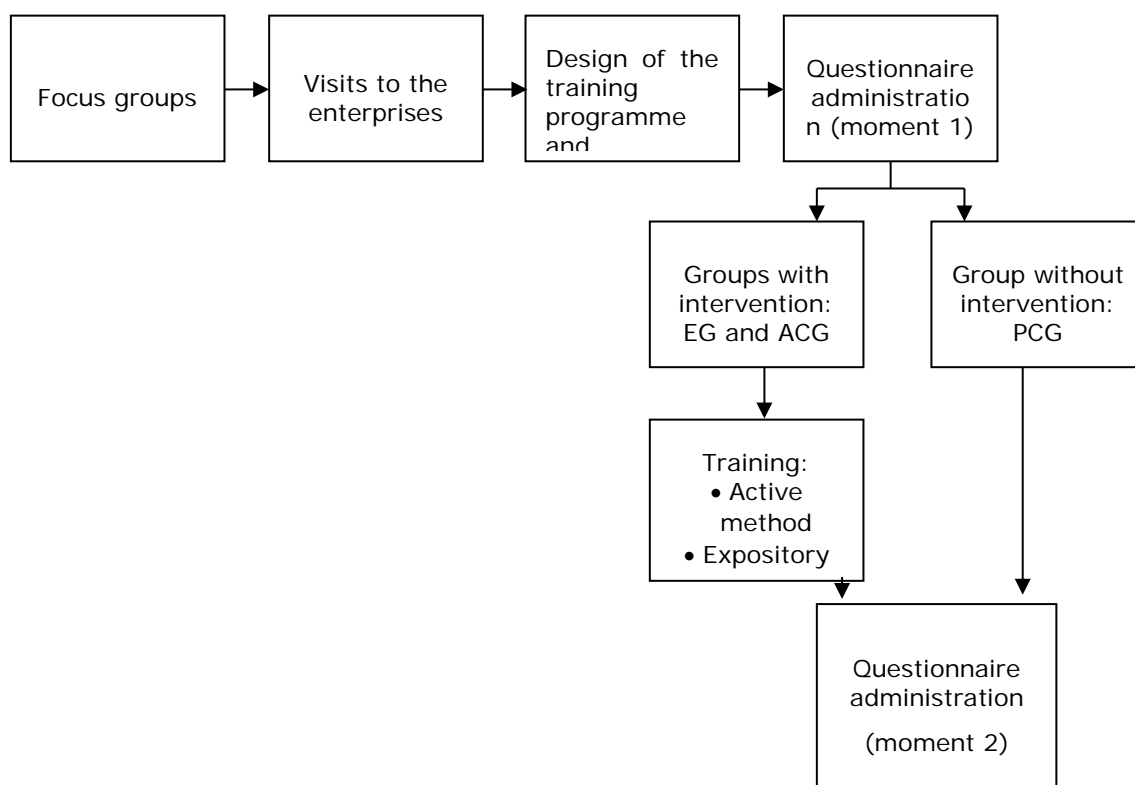


Figure 1. Summary of the study phases

3.3. Focus groups

In order to design the pedagogical programme, a focus group was carried out with 6 senior OSH practitioners that collaborate in external consultancy companies and with large experience with small-sized metalworking industries. This number was considered adequate for the application of the method (Baxter, Courage & Caine 2015; Wilson, 2014). The objective of this method was to collect information about the reality of the sector under study, namely with regard to workers' risk perception, frequent unsafe

behaviours and their level of OSH knowledge, in order to structure the training program and the tools for data collection: checklist, registration form and questionnaire.

3.4. OSH Pedagogical Programme and training methods

The pedagogical programme was developed based on the information gathered from the focus group and observations made during the visits to the enterprises. Existent training materials were also used to design the programme, such as the ones delivered by the Workplace Safety and Health (WSH) Council (WSH, 2016). The OSH pedagogical programme was organized in three parts. In the first one, occupational accidents and diseases in metalworking industry were introduced. The legal framework was also presented, giving particular emphasis to employer and employees responsibilities and duties in the field of OSH. The second part addressed the most relevant risk factors of the metalworking industry: physical, chemical, mechanical and ergonomic. The last part consisted in the identification of risk control measures.

Two training methods were applied in this study to each of the 6 enterprises subject to the intervention: the active method, with group discussion, supported on the HBM and the expository method with formal exposure. Both methods were taught by a senior OSH practitioner. For the expository method, a power point presentation was prepared and used. This presentation was tested with a sample of 10 workers that were not part of the present study. The contents given in both methods were the same. To dynamise the sessions, images (representative of the risks and unsafe behaviour observed during company visits), videos and case studies were used as triggers for discussion.

3.5. Training effectiveness assessment

With the objective of evaluating the effect of the OSH training on risk perception, safety behaviours and OSH knowledge, a questionnaire composed of four parts was developed and applied before and one month after the training sessions, including the group without intervention.

In the first part of the questionnaire, sociodemographic and professional variables were analysed: age, gender, educational level, seniority in the metalworking sector and in the enterprise, department, function, seniority in the current function, work shift, employment agreement and occupational accidents and diseases. In the second part, a 5-degree Likert scale was used to assess risk perception dimensions under study. These dimensions were supported in the HBM, adapted from Haghghi et al. (2017): i) perceived susceptibility (3 items), ii) perceived severity (3 items), iii) perceived barriers (5 items) and iv) perceived benefits (4 items). Each item was assessed through a 5-point Likert scale (1=Strongly disagree; 5=Strongly agree). The third part assessed safety behaviours with a scale adapted from Griffin & Neal (2000) that included two dimensions, safety compliance (4 items) and safety participation (4 items). Items were scored on a 5-point Likert scale (1=Strongly disagree; 5=Strongly agree). In the last part, OSH knowledge was assessed through sixteen items. Subjects were asked to classify each item as "True", "False" or "I don't know". Items were developed based on the information collected from both focus groups and literature review (Glendon & Litherland, 2001; Mostafa & Momen, 2014).

A pre-test was performed to determine the validity and reliability of this tool. To this end, it was applied in a pilot enterprise to a sample of 30 employees.

3.6. Data analysis

The variables under study were firstly prepared for statistical analysis. In order to have agreement in data analysis, classifications of barriers perceptions were inverted. In what regards to OSH knowledge, the percentage of correct answers were determined.

An independent Exploratory Factorial Analysis (EFA) was performed for risk perception and safety behaviours scales, with the objective of studying the correlations between the variables and, consequently, to group the items into dimensions. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and the Bartlett's Test of Sphericity were firstly

applied to assess the quality of the correlations between the items for the EFA. A principal components analysis with varimax rotation was then performed with the objective of selecting the items of each dimension under study and increasing the interpretation of the dimensions. Items with factor loadings greater than 0.4 were selected to define dimensions, as suggested by Hair et al. (1995). Internal consistency of each dimension was determined through the Cronbach's alpha coefficient. As a result of this analysis, 8 items of the original scale were eliminated (two items from each subscale) for risk perception. For safety behaviour, 2 items were deleted (1 item from each subscale).

Descriptive analysis was performed for all the variables. Parametric tests were applied (t-test for paired samples, t-test for independent samples and ANOVA) to verify the existence of significant differences in the dependent variables between the two moments (before and after the intervention), to compare differences between interventions, as well as differences between groups.

The significance level was considered as $\alpha = 5\%$. Data analysis procedures were performed using the statistical software Statistical Package for Social Sciences (IBM SPSS® version 22, Inc., Chicago, Ill).

4. RESULTS AND DISCUSSION

4.1 Factor analysis and Cronbach's alpha

According to the KMO measure the data was considered adequate for the analysis: KMO = 0.73 for risk perception scale and KMO = 0.74 for safety behaviour scale (Hair et al., 1995; Pestana & Gageiro, 2014). Bartlett's sphericity test was significant ($p < 0.05$) for both scales, indicating a significant correlation between the variables (Hair et al., 1995; Pestana & Gageiro, 2014).

For the risk perception scale, four factors were obtained from EFA, which explained 59% of the total variance: Perceived susceptibility, Perceived severity, Perceived barriers and Perceived benefits. These results are in accordance with the theoretical model (Haghighi et al., 2017). The Cronbach's alpha obtained was: 0.81; 0.68; 0.71 and 0.83 for the Perceived susceptibility, Perceived severity, Perceived barriers and Perceived benefits, respectively, which is considered satisfactory for basic research (Pestana & Gageiro, 2014).

For the safety behaviour scale, two factors were obtained from EFA, confirming the two dimensions proposed by Griffin & Neal (2000), which explained 56% of the total variance: safety compliance and safety participation. The Cronbach's alpha obtained was: 0.82 and 0.69 for the safety compliance and safety participation, respectively, which is considered satisfactory for basic research (Pestana & Gageiro, 2014).

The factor loads from the exploratory factorial analysis as well as the Cronbach's alpha values for each scale are presented in Table 1. The total scores determined for each dimension and used in the subsequent analyses were determined considering the obtained loadings, in the same way as in previous studies (see, e.g., Rodrigues et al., 2018).

4.2 Analysis of the effect of pedagogical intervention

Table 2 presents the effects of the pedagogical intervention, through the two methods, on risk perception, safety behaviours and OSH knowledge, before and after the training intervention.

It was verified that, before the intervention, no significant differences were observed in the three groups, except for the Perceived susceptibility ($p < 0.05$) variable, which was lower in the passive control group. However, it should be noted that the mean values for the three groups were close.

After the intervention, it was observed that, in general, although there was a small increase in the scores of the dimensions of risk perception and OSH knowledge, in the

groups subject to intervention, the differences between the two moments were only significant for Perceived susceptibility and for OSH knowledge ($p < 0.05$). These results may indicate an higher knowledge by the workers about the existing risks in the sector and a greater perception of their susceptibility to suffer an occupational accident at work or developing an occupational disease.

Table 1. Factor loads and Cronbach's alpha values for each subscale of perception of risk and safety behaviour

<i>Variable</i>	<i>Loading</i>
Perception of risk	
1. Perceived susceptibility ($\alpha = 0.81$)	
1.1. In the future, it is likely that I have an occupational accident	0.758
1.2. I am at risk for accident while working, even if I regularly comply the safety rules	0.805
1.3. It is very likely for me to have a work-related injury	0.896
2. Perceived severity ($\alpha = 0.68$)	
2.1. In our enterprise, unsafe behaviours may result in serious health consequences	0.690
2.2. If I do not work safely, my emotional and mental health will be affected	0.654
2.3. Safety equipment use while working will diminish the possible effects of harmful agents	0.667
3. Perceived barriers ($\alpha = 0.71$)	
3.1. Brave and strong men never use personal protective equipment (like helmets, safety gloves and ...) while working	0.500
3.2. Sometimes conditions such as heat or harassment resulting safety equipment (e.g. helmets, safety gloves, etc.) hamper me to work safely	0.721
3.3. Sometimes it is necessary to disobey the safety rules at work to increase the production rate	0.723
3.4. In my opinion, occupational accidents depend on the chance of individuals	0.492
3.5. Safe working results in slow progress of the jobs	0.753
4. Perceived benefits ($\alpha = 0.83$)	
4.1. I believe that I can prevent occupational accidents by complying the safety rules	0.447
4.2. In my opinion, all employees should know on how to use personal protective equipment to prevent occupational accidents	0.700
4.3. Using appropriate and safe working methods/instruments while working is necessary to prevent occupational accidents	0.680
4.4. It is necessary to continuously emphasize the safety issues at work to prevent occupational accidents	0.735
Safety behaviour	
1. Safety compliance ($\alpha = 0.82$)	
1.1. I use all the personal protective equipment needed to do my job	0.847
1.2. I use all the safety protections of the machines needed to do my job	0.812
1.3. I guarantee high levels of safety when I do my work	0.745
1.4. I keep my workplace clean and organized	0.474
2. Safety participation ($\alpha = 0.69$)	
2.1. I make an extra effort to improve the safety of my workplace	0.747
2.2. I warn my co-workers when I see them working in dangerous conditions	0.631
2.3. Voluntarily, I perform tasks or activities that help improve safety in my workplace.	0.665
2.4. I report incidents that occur to me or to my co-workers	0.716

Comparing the two intervention groups, it was not possible to verify significant differences between, which does not reinforce previous studies that claim the importance of more engaging methods. Burke et al. (2006) stated that to enhance learning, it is important to create conditions that promote dialogue and reflective thinking. Previous studies also found that the use of images, videos and real cases studies implies higher

levels of engagement and an higher effect in different OSH outcomes (see e.g. Linker et al., 2005; Rodrigues et al., 2018).

Table 2 - Comparison of the mean scores of the dimensions of risk perception, safety behaviour and OSH knowledge, a before and after the training intervention

Scale	Variable	Group	Before training x(sd)	After training x(sd)	P-value
Risk perception	Perception susceptibility	ACG	10.54 (2.10)	11.37 (1.89)	0.001
		EG	10.47 (3.09)	11.24 (2.23)	0.017
		P-value	0.899	0.754	-
		PCG	9.41 (2.42)	9.58 (2.55)	0.056
		P-value	0.008	0.000	-
	Perceived severity	ACG	12.01 (1.32)	12.00 (1.68)	0.952
		EG	12.25 (1.64)	12.49 (1.41)	0.316
		P-value	0.433	0.105	-
		PCG	11.97 (1.67)	11.98 (1.68)	0.657
		P-value	0.582	0.149	-
	Perceived barriers	ACG	18.26 (2.95)	18.76 (3.75)	0.349
		EG	18.66 (3.01)	18.72 (3.63)	0.903
		P-value	0.488	0.953	-
		PCG	18.25 (3.36)	18.22 (3.42)	0.703
		P-value	0.720	0.569	-
Perceived benefits	ACG	16.74 (2.11)	16.93 (1.66)	0.443	
	EG	16.85 (2.45)	17.21 (1.66)	0.249	
	P-value	0.807	0.382	-	
	PCG	16.54 (1.73)	16.58 (1.76)	0.320	
	P-value	0.641	0.086	-	
Safety behaviour	Safety compliance	ACG	15.26 (2.19)	15.17 (2.25)	0.654
		EG	15.15 (2.54)	15.47 (2.07)	0.212
		P-value	0.814	0.468	-
		PCG	15.43 (2.46)	15.50 (2.41)	0.127
		P-value	0.777	0.673	-
	Safety participation	ACG	14.76 (2.26)	15.00 (2.40)	0.264
		EG	14.57 (2.41)	14.34 (2.03)	0.357
		P-value	0.668	0.128	-
		PCG	14.32 (2.57)	14.44 (2.55)	0.181
		P-value	0.554	0.282	-
OSH knowledge	ACG	69.33 (16.53)	87.27 (15.36)	0.000	
	EG	68.04 (15.10)	88.80 (13.83)	0.000	
	P-value	0.675	0.590	-	
	PCG	68.45 (14.92)	68.63 (14.91)	0.083	
	P-value	0.905	0.000	-	

However, according to Robson et al. (2010), the evidence in favour of the engagement hypothesis is weak and needs further study. Also, Adams et al. (2013), in their study with the aim to induce the use of goggles in workers of quarries, did not verify significant differences between the two methods applied (traditional versus new education paradigm).

In what regards to safety behaviours, it was found that for both dimensions (safety compliance and safety participation) the results between both moments (before and after intervention) were similar and there were no significant improvements after the intervention. These results were not expected, since previous studies have found a significant effect of training in the adopted or intended safety behaviours (see e.g., Arezes & Miguel, 2008; Burke & Sarpy, 2003; Rodrigues et al., 2018). However, Williams et al. (2007) obtained similar results to the ones found in this study.

Table 3. Level of knowledge in percentage of correct answers, by intervention group

Occupational safety and health knowledge	ACG				EG			
	Q1 (%)	Q2 (%)	Q2-Q1	P-value	Q1 (%)	Q2 (%)	Q2-Q1	P-value
1. Chemicals can enter the body through the skin	88.9	98.1	9.2	0.058	92.5	98.1	5.6	0.182
2. It is only above 87 dB(A) that I am exposed to dangerous noise levels	42.6	81.5	38.9	0.000	39.6	75.5	35.9	0.000
3. Deafness is a reversible occupational disease	57.4	81.5	24.1	0.000	43.4	81.1	37.7	0.000
4. If a worker uses vision correction glasses, they no longer need to wear protective eyewear	81.5	94.4	12.9	0.033	71.7	100.0	28.3	0.000
5. It is possible to remove the protections of the machines, as long as it is to increase production	85.2	92.6	7.4	0.159	84.9	90.6	5.7	0.261
6. It is not necessary to use the hearing protectors during all the day of work, since the important thing is to use it most of the time	72.2	83.3	11.1	0.135	69.8	90.6	20.8	0.004
7. The worker is responsible for purchasing his personal protective equipment	53.7	75.9	22.2	0.002	52.8	86.8	34	0.000
8. If an accident at work occurs at the premises of the company, the responsibility for its repair is always from the employer	48.1	68.5	20.4	0.010	62.3	71.7	9.4	0.200
9. Safety at work is of the sole responsibility of the employer	79.6	92.6	13	0.033	84.9	88.7	3.8	0.485
10. The repair of an occupational disease is carried out by the insurance company	16.7	83.3	66.6	0.000	17.0	81.1	64.1	0.000
11. Whenever there is a risk of projection of filings the worker must wear protective goggles	92.6	94.4	1.8	0.659	94.3	100.0	5.7	0.083
12. I must wear steel toe boots because they prevent smashing of the fingers due to falling objects	96.3	98.1	1.8	0.569	98.1	100.0	1.9	0.322
13. To extinguish a fire in an electric panel an extinguisher of category ABC is the adequate one	20.4	64.8	44.4	0.000	9.4	64.2	54.8	0.000
14. Removing machine protections helps increase productivity and reduce workplace accidents	94.4	94.4	0	1	86.8	100.0	13.2	0.007
15. Employees who use respirators should wear goggles, protective gloves and hearing protection	94.4	98.1	3.7	0.322	96.2	100.0	3.8	0.159
16. To reach the higher shelves the worker can use the truck to be lifted	85.2	94.4	9.2	0.058	84.9	92.5	7.6	0.044

Note: Q1=Before the intervention; Q2=After the intervention.

A possible justification may be related to the fact that, in the present study, there was only a single training session, rather than a continuous intervention, important for the promotion of safe behaviours (Rodrigues et al., 2018). This was done intentionally in this study, in order to simulate the current practices that SMEs adopted in what regards to OSH training. In fact, the reduced training opportunities in SMEs constitute a determining factor of workers' knowledge, in particular about the benefits and constraints of some behaviours. This issue is even more critical due to the difficulty in reconciling production against safety requirements in that firms (Masi & Cagno, 2015). It is also important to emphasize that more hours of training do not necessarily result in higher safety behaviours (Arezes & Miguel, 2005), being the training method applied also important to change safety behaviours (Rodrigues et al., 2018).

As previous denoted, significant differences were found between both moments for OSH knowledge. In view of this, a detailed analysis of the correct answers is described in Table 3. According to the obtained results, before the training sessions, workers had lower levels of knowledge in what regards to noise exposure, workers and employers duties and fire safety. After the intervention there was an increase in the percentage of correct answers. Significant improvements were found for questions about noise exposure, PPE, repair of occupational and fire safety diseases for both groups. Significant differences were also observed in the active control group in what regards to accident repair responsibilities and responsibilities about occupational accidents.

5. CONCLUSIONS

The aim of this study was to evaluate the effect of training in OSH related outcomes, in particular risk perception, safety behaviours and OSH knowledge, comparing two different training methods. The results showed a positive but limited effect of the intervention on the analysed variables. Significant differences between both moments were identified for perception of susceptibility and OSH knowledge. However, higher improvements were expected in the active method compared to the expository method, given the level of engagement that it requires. However, in this study, no significant differences between both training methods were observed.

Despite the importance of the results obtained, additional research is needed to better understand how training programs can be effective in small-sized enterprises.

This study was limited by the sample size for each assessed group and by the lack of on-site verification of self-reported safety behaviours. Another limiting factor may have been the duration of the intervention, since it was a single intervention lasting 90 minutes. In addition, the fact that the two intervention groups are part of the same enterprises may have allowed the exchange of information and diverted the results.

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