



Effects of an occupational safety programme: A comparative study between different training methods involving secondary and vocational school students



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ABSTRACT

Strategies for incorporating proper training in occupational safety at secondary schools are important, since young workers are more likely to be injured at work. However, for a successful educational intervention, an effective Occupational Safety Programme (OSP) with appropriate training methods should be designed and implemented. This study intends to analyze and compare the effects of an OSP in students from diverse school settings, when different training methods are applied. An OSP was designed focusing on the risks related to handling machinery and maintenance tasks and delivered to 301 students from two secondary schools and two vocational schools from the North of Portugal. The sample was divided into three groups, and for each group, a different training method was applied: theory-based; demonstration-based or testimonies-based. To assess its effectiveness, a questionnaire was developed for evaluating the following dimensions: risk acceptance, safety commitment, intended safety behaviors and safety knowledge. The questionnaire was applied two weeks before and after the OSP. A significantly positive effect of the OSP was identified in all dimensions. Comparisons between the three methods showed a greater effect of the testimonies-based intervention in risk acceptance and intended safety behaviors; however, for safety knowledge and safety commitment this was the least effective method. The influence of school type was observed for the safety behaviors and safety commitment dimensions. In conclusion, this study's results suggested that more engaging methods had larger effects on student risk acceptance and intended safety behaviors, while expositive and demonstrative methods were more suitable to improve safety knowledge and commitment.

1. Introduction

Many students wish to enter the job market right after finishing their secondary education. Some of them even accumulate jobs during their studies, working during summer, after school and/or at weekends, to get some income. However, it is broadly acknowledged that young workers (those within the age group of 15–24 years; ILO, 2012) are particularly vulnerable to injuries at work (Delp et al., 2002; Schulte et al., 2005; Breslin and Smith, 2005; Lavack et al., 2008). In fact, high rates of injury among this subgroup of workers led some authors to report this phenomenon as a pressing public health issue (see e.g. Schulte et al., 2005; Apostolico and Shendell, 2016).

The main reasons pointed out for the vulnerability of young workers to suffer an occupational accident are their low experience and knowledge on how to deal with the required tasks and the risks they may face (Thamrin et al., 2010; Webster, 2013; Laberge et al., 2016). Young workers also have traits of immaturity and willingness to face

challenges and responsibilities, which might lead them to accept performing tasks for which they are not yet prepared (Lavack et al., 2008; NIOSH, 2015). They are also likely to experience more unsafe working conditions than older workers. They are frequently involved in jobs that require low technical skills, working long and late hours and often without safety training (Zierold and Anderson, 2006; Breslin et al., 2007a). Furthermore, working contracts characterized by part-time and temporary employment are common among young workers (Breslin et al., 2007b), which has been related to poorer safety conditions (Quinlan et al., 2001; Aronsson et al., 2002; Breslin and Smith, 2005).

Vocational school students are also an interest group in what regards to this matter. Vocational programmes are intended to provide individuals with the necessary knowledge and skills for different careers they may wish to pursue, involving industry in education and linking curricula to the needs of the labour market (Schulte et al., 2005; OECD, 2014). These programmes include training hours in a working context, where students begin their apprenticeship. During the training

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period, students can be exposed to the same occupational risks as workers. Raykov and Taylor (2013) found a high incidence of injuries among youth who had participated in high school apprenticeship programmes in Canada.

Against this background, it has been widely recognized that trainees and young workers should attend a proper safety training programme before being integrated in a working context and while working on site (Goldenhar et al., 2001; Pisaniello et al., 2013; NIOSH, 2015). However, because several companies do not provide appropriate training programmes to newly-hired employees and apprentices (Goldenhar et al., 2001; Runyan et al., 2007; Smith and Mustard, 2007; Thamrin et al., 2010), the role of schools in endowing youths with the fundamental knowledge and skills for a safe work becomes particularly important (Schulte et al., 2005; Thamrin et al., 2010; Pisaniello et al., 2013). According to Schulte et al. (2005), what students can learn during this kind of programmes sets the foundation that may affect their work experiences for many years. Thamrin et al. (2010) and Pisaniello et al. (2013) went even further, asserting that, by making its attendance compulsory in secondary education, it would be possible to ensure that all young workers receive a minimum level of education on safety. In Portugal, efforts to incorporate Occupational Safety & Health (OSH) topics in secondary and vocational school curricula are ongoing (see for further information the National Strategy for Safety and Health at Work 2015–2020, Resolution of the Ministries Council n° 77/2015).

A school-based Occupational Safety Programme (OSP) is a primary intervention strategy to prevent injuries among young workers. Its purpose is to empower students with the necessary knowledge and skills to deal with the hazards that they may face in the future at their workplace. It must address concepts and issues about workplace risks, workers' protection and exposure control, as well as workers' rights and duties (Balanay et al., 2014). However, to an OSP be effective, appropriate training methods should be applied. The literature describes some methods to be applied in training programmes aimed at the prevention of work accidents and diseases (see e.g. Burke et al., 2006; Lavack et al., 2008; Twisk et al., 2014; Liao, 2014); but still, there appears to be limited evidence about their effectiveness. While previous research in this field indicated its positive effect on safety indicators (see e.g. Linker et al., 2005; Liao, 2014), there is still no consensus about the real impact of an OSP or the factors that enhance its effectiveness. Furthermore, previous studies did not consider some important indicators related to safe behaviors, such as safety commitment and risk acceptance (Rodrigues et al., 2015a,b).

The main objective of this study was to compare three training methods applied to an OSP in school settings, analyzing their effects on students' risk acceptance level, safety commitment, intended safety behaviors and safety knowledge. Considering that vocational-school students may have unique characteristics and study conditions when compared to other students, the following hypotheses were defined:

- H1. The OSP has a positive effect on the levels of knowledge, intended safety behaviors, safety commitment and risk acceptance.
- H2. Different training methods have different effects on safety knowledge, intended safety behaviors, safety commitment and risk acceptance.
- H3. There are significant differences between the effects of safety interventions in secondary schools and in vocational schools.

2. Methodology

2.1. Sample

Data collection involved four upper-secondary schools from the Porto Metropolitan Area, of which two were common secondary schools and two were vocational schools. A total of 301 students were involved in this study: 47.5% were students from scientific-humanistic courses (secondary schools) and 52.5% from vocational courses (vocational

schools).

All the subjects were recruited by their school teachers, considering the existing classes and their readiness to take part in the study. Most of the students were males (65.2%) and aged on average 17.4 years (SD = 1.3).

2.2. Study design

An OSP was designed based on previous guidelines and delivered to the students using three different training methods: theory-based, demonstration-based, and testimonies-based.

In this study, a quasi-experimental design was used, which involved a comparison between pre- and post-test scores. The independent variables were training methods and school type, and the dependent variables were risk acceptance, safety commitment, intended safety behaviors and safety knowledge. The study design included quantitative data obtained from questionnaires, which assessed the short-term effect of each independent variable on each dependent variable under analysis. The same questionnaire was applied to collect data and to test the effectiveness of each intervention method two weeks before and after delivering the OSP. The period between the intervention and the post-assessment was limited to the time available for this study. However, to assess a short-term effect, this timespan was considered sufficient. This procedure was previously adopted by Liao (2014). Furthermore, it was not the aim of this study to assess the effect of an OSP on behavioral changes, but only on the students' intentions to adopt some safe behaviors. Unlike knowledge, behavior changes need a larger period between pre- and post-test to be assessed (Burke et al., 2006).

The study was performed in accordance with the ethical standards set in the 1991 declaration of Helsinki. All the participants received detailed information prior to the study and, when applicable, parental authorizations were requested.

2.3. Training sessions

2.3.1. Occupational safety programme

The topics covered in the OSP were chosen based on the "Youth@Work: Talking Safety" (NIOSH, 2015) and on the "Worker's Health and Safety Awareness in 4 Steps" (Ontario Ministry of Labour, 2012) curricula. Technical bibliography, particularly handbooks, were also used as a support to the OSP contents (e.g. Harms-Ringdahl, 2001). All the contents were focused on the main hazards and the corresponding risks related to handling machinery and performing maintenance tasks in industrial settings, since most of the vocational students involved in this study were in courses related to this field, and the number and severity of accidents related to these tasks remains high (Eurostat, 2009).

The contents that constituted the OSP were organized into four parts. The first part included a brief introduction to industrial accidents and injuries among young workers. Statistics about occupational accidents were presented, and explanations about why young workers are more likely to be hurt on the job were provided. Fundamental concepts on occupational safety were also clarified. In the second part, duties of employers and workers, as well as workers' rights were presented, considering the current legal framework. Subsequently, in the third part, common hazards and the corresponding risks to the safety of workers were addressed. Risk control measures were also explained. The topics for analysis were: mechanical risk, chemical risk and other specific risks, such as electrical risk and explosive atmospheres. Risks related to physical agents, such as noise and vibrations, were also covered, because some schools mentioned them as being important and fitting the theme. In the last part, issues linked to worker involvement in the improvement of occupational safety were addressed.

A pilot version of the OSP was tested in a group of 10 students, which helped to understand if the contents were suitable for the time available for the sessions and if they were easily understandable.

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