



Review

Active behaviour change safety interventions in the construction industry: A systematic review



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ABSTRACT

The aims of this paper were to systematically review the evidence for the effectiveness of active behaviour change safety interventions in the construction industry; and to determine the intervention characteristics most commonly associated with effectiveness in reducing injury rates and improving safety behaviour – intensity/frequency/duration, behaviour change techniques (BCTs) and theory-base. An electronic literature search (June 2014) was conducted to identify eligible interventions: those involving active involvement from workers/management in the construction industry; targeted one/both of the primary outcomes. All intervention designs involving construction workers aged >18 years, published in English and in a peer-reviewed journal were included. Fifteen studies were included, half of which successfully improved injury rates. Longer interventions and those that included active/volitional BCTs (feedback/monitoring rather than instruction/information) were more effective. The methodological quality of the interventions was poor and use of theory was inconsistent and infrequent. Despite some positive results, very few interventions achieved all their aims. More rigorous, theory-driven research is needed to structure intervention efforts and determine the mechanism of action of effective interventions.

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1. Introduction

Workplace injuries are widespread; in the UK from 2010 to 2011 nearly 150 people were killed in workplace accidents, 27 million working days were lost, and societal costs approximated £14 billion (Health and Safety Executive, 2013). In the USA, the cost of all work-related injuries in 2011 was \$189 billion (National Safety Council, 2013). The construction industry ranks as one of the highest for work-related injuries (International Labour Organization, 2011), accounting for 27% of fatal injuries and 10% of major injuries in the UK, despite representing only 5% of workers. In the USA in 2002, costs of injuries in the construction industry were estimated to be \$11.5 billion.

A 2008 review of construction-related injuries interventions identified only five eligible studies (Lehtola et al., 2008). The major finding was that the introduction of safety legislation alone was not effective in reducing injuries (Lehtola et al., 2008). The remaining interventions were effective but poor methodological quality and significant heterogeneity meant that the means by which these interventions changed behaviour was unclear. In an updated review in 2012 (13 studies; van der Molen et al., 2012), it was similarly concluded that there was no evidence that the introduction of safety legislation/regulations alone or that regionally-oriented interventions such as inspections or training were effective in reducing injuries. There was, however, low-level evidence that company-oriented interventions (e.g., multifaceted safety campaign, drug-free workplace) resulted in reduced injuries (van der Molen et al., 2012). Another review of three interventions specifically to reduce falls in the construction industry also found limited evidence for effectiveness (Rivara and Thompson, 2000).

The purpose of the present review was to extend the previous reviews (Lehtola et al., 2008; van der Molen et al., 2012), firstly by including interventions that targeted safety behaviours in addition to those that solely measured injury rates; and secondly, by focusing more explicitly on the intervention characteristics (e.g., use of theory, behaviour change techniques (BCTs), and intensity/frequency/duration) that were most commonly associated with effectiveness. Indeed, this was identified as a limitation of the previous review (van der Molen et al., 2012) and thus represents an important research question. Given the lack of evidence for the effectiveness of legislation in reducing injuries (Lehtola et al., 2008; van der Molen et al., 2012), the specific focus of the current review was on interventions that *actively* involved workers or management in changing their behaviour. Thus, interventions that involved legislation/regulations or environmental modifications as their sole method of changing behaviour were excluded. Additional impetus for this work comes from research demonstrating that behaviour change interventions are more effective if they are based on a theoretical understanding of the behaviour, and are designed using theory to select the BCTs with which to target relevant factors (Webb et al., 2010). Indeed, several theory-based interventions in other health-related behaviours developed using this method have been shown to be effective (Kothe et al., 2012; Milton and Mullan, 2012; Sainsbury et al., 2013).

1.1. Research questions

- What active/behaviourally-focused safety interventions have been conducted in the construction industry?
- What is the effectiveness of these safety interventions in: (1) reducing the incidence of injuries; (2) prompting improvements in safety behaviours, which may, in turn, reduce injuries (e.g., increased use of personal protective equipment or adherence to safety regulations)?
- Was effectiveness related to the frequency, intensity, or duration of the interventions?
- What theoretical basis, if any, underpins these interventions?
- Were particular BCTs more strongly related to effectiveness than others?
- What is the quality of the evidence reviewed?

2. Method

2.1. Search strategy

In June 2013 (updated in June 2014) a systematic literature review was conducted based on the PRISMA guidelines (Moher et al., 2009) and the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green, 2011). Electronic literature searches were performed in PsychINFO, Medline, Web of Science, and PubMed. Key word search terms included the following: (Injuries OR Industrial Accidents OR Occupational Injury) AND (Health Promotion OR Accident Prevention OR Injury prevention) AND (Intervention study OR Intervention research); (Construction) AND (Health Promotion OR Accident Prevention OR Injury Prevention) AND (Occupational Safety OR Work Safety).

2.2. Eligibility criteria

All peer-reviewed studies including randomised-controlled trials (RCTs), cluster-RCTs, controlled pre-post studies, and interrupted time-series (a design in which data is collected over a period of time, including prior to the introduction of an intervention, in order to determine whether the introduction led to changes over and above any existing trends over time; Ramsay et al., 2003) were eligible for inclusion. There was no specific time-based (pre- or post-introduction of intervention) criterion for the inclusion of interrupted time-series studies. Only studies in English were included. The target population consisted of adult (aged >18 years) workers in construction and construction-related industries (e.g., metal workers, tilers, roofers, road workers, and labourers). Eligible studies were interventions in which construction workers or management actively participated, conducted in a real-life setting, and that targeted injury rates within the workplace and/or the uptake of safety behaviours. Passive interventions (e.g., introduction of safety legislation/regulations or environmental modifications/equipment) without an active training component were excluded.

Extracted data included type of construction, participant and intervention characteristics, study design, control/comparison group, injury type/safety behaviour targeted, and results. Studies

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