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Identifying safety beliefs among Australian electrical workers

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ABSTRACT

The current study explored underlying beliefs regarding work safety among a sample of experienced Australian electrical workers. A qualitative research methodology using the theory of planned behavior as a framework was employed. A series of interviews and focus groups with licensed electrical workers ($N = 46$) were analyzed using thematic content analysis. Beliefs were classified as advantages (e.g. personal safety of self and co-workers), disadvantages (e.g., inconvenience to customer/clients and workload), referents (e.g., supervisors, work colleagues, customers), barriers (e.g., time and cost), and facilitators (e.g., training and knowledge, equipment availability) of safety adherence. The belief basis of the theory of planned behavior was a useful framework for exploring workers' safety beliefs. The identified beliefs can inform future research about the important factors influencing safe work decisions and inform strategies to promote safer workplace decision making within the electrical safety context.

1. Introduction

1.1. Background

Electrical workers operate in high risk environments, where exposure to live power can lead to serious injury or death (Albert and Hallowell, 2013). Hospitalization as a result of an electrical injury is estimated to be around 3.78 cases per 100,000 population in Australia annually, with over half of these occurring while an individual was working at the time of the injury (Australian Institute of Health and Welfare, 2007). It is critical for electrical workers to use appropriate equipment and adhere to strict procedures to preserve their own safety and the safety of others. However, despite the provision of guidance regarding electrically safe work practices, electrical incidents continue to occur, and a number of electrical workers are injured, sometimes fatally, each year (Electrical Regulatory Authorities Council, 2008). In the state of Queensland, Australia, over 100 serious electrical incidents occurred between July 2008 and June 2009, five of which directly involved an electrical worker (Electrical Safety Office, 2009). While the number of deaths due to electrocution (per million population) in Australia decreased between 2001 and 2008, in Queensland the number of deaths has increased during the same time period (Department of Employment and Industrial Relations, 2008).

These rates are similar internationally. For instance, the Occupational Safety and Health Administration (OSHA) in Washington, D.C. estimates there are approximately 350 electrical-related fatalities per year in the US. Electrical workers suffered the highest number of electrocutions per year (34% of the total deaths caused by electrocution). Electrocution is actually the third-leading cause of death at work, accounting for 12% of all workplace deaths. The leading category of on-the-job electrical deaths is contact with overhead power lines. During the period of 2003–2007, 43% of all occupational electrical fatalities could be attributed to contact with overhead power lines. The second leading category of electrical fatality involves workers coming in contact with wiring, transformers, or other electrical components, and occurs more often for employees who routinely work with electrical components, such as electricians or contractors. This category accounted for 28% of electrical fatalities and 37% of non-fatal electrical injuries. The third leading category of electrical fatalities involved workers coming in contact with electric current from machines, tools, appliances, or light fixtures. This type of incident occurs more often to workers whose job duties included mechanical and electrical maintenance. Accidental electrocution due to contact with tools and apparatus whose grounding conductors were faulty or missing would be included in this category. This type of incident accounted

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for 18% of all electrical fatalities and 35% of non-fatal electrical accidents (Brenner, 2009). These statistics highlight the potential level of risk of working in the electrical industry.

Governments in many countries recognize that reducing workplace injury due to electrocution should be a priority area. There are a number of policies and regulations within Australia and internationally to regulate work conducted with electricity. These policies and regulations were created with the intention of reducing injury and fatality rates by providing specific guidelines on electrically safe work practices. However, it is unclear how people have responded to these policies and regulations. Despite the vast amount of research undertaken examining workplace safety attitudes and barriers more generally (e.g., Cavazza and Serpe, 2009; Clarke, 2006; Henning et al., 2009; Lombardi et al., 2009; Myers et al., 2012; Newman et al., 2008; Probst and Graso, 2013; Probst et al., 2013; Zierold et al., 2012), based on our searches of relevant literature to inform the present study it appears that very little research has been conducted on the attitudes, barriers, and facilitators specifically related to workplace and governmental electrical safety guidelines and programs.

Another limitation in the literature is that safety is often evaluated according to negative outcomes including deaths, injuries, and number of compensation claims (Diaz and Cabrera, 1997; O'Toole, 2002; Varonen and Mattila, 2000; Vredenburgh, 2002), with less attention historically given to positive outcomes such as compliance (O'Toole, 2002) and proactive safety behaviors (Neal and Griffin, 2006). This imbalance, however, has been addressed over time with many workplace safety studies continuing to measuring positive outcomes such as compliance and participation (e.g., Lievens and Vlerick, 2014; Turner et al., 2012; Vinodkumar and Bhasi, 2010), other studies ensuring that positive outcomes such as compliance are assessed in addition to negative outcomes like accident/injury frequency (e.g., Gyekye and Salminen, 2009; Li et al., 2013), as well as researchers examining proactive constructs such as safety-related organizational citizenship behavior (e.g., Probst et al., 2013).

The purpose of the current research is to examine qualitatively licensed electrical workers' beliefs about and attitudes toward electrical safety, which can inform future engagement, educational, and compliance programs for electrical workers to improve safety records and reduce workplace injuries and fatalities involving electrocution. The aims of the current research, then, were to: (1) obtain a better understanding of what drives electrical workers' safety behavior; and (2) identify potential obstacles that may prevent workers from engaging in safe workplace behaviors.

1.2. Theory of planned behavior

As electrical safety behavior choices by workers involve a decision-making process, the current research drew from a commonly used decision-making model, Ajzen's (1991) Theory of Planned Behavior (TPB). The model proposes both direct predictors of people's intentions (plans) and actual behavior, as well as indirect (belief-based) determinants of people's decision making.

1.2.1. Direct predictors of intention and behavior

According to Ajzen's (1991) TPB, intentions are the most proximal determinant of behavior. In the TPB, intentions are defined as the indication of an individual's willingness to perform a given behavior. This approach involves a consideration of the antecedents of intentions, which includes: attitudes toward the desired behavior (defined as positive or negative evaluations of performing a behavior); perceived social pressure to perform or not perform the desired behavior (subjective norm); and perceptions of personal control about performing the desired behavior (termed perceived behavioral control; also thought to directly influence a person's behavior).

1.2.2. Indirect (belief-based) determinants of intention and behavior

An important part of Ajzen's (1991) TPB framework is that the direct predictors of attitudes, subjective norm, and perceived behavioral control are informed by underlying behavioral, normative, and control beliefs, respectively. Attitudes are determined by behavioral beliefs, which are the important beliefs about the advantages (e.g., improved site safety) and disadvantages (e.g., increased costs to customer) of performing a desired behavior. Subjective norm is a function of normative beliefs, reflecting a person's expectation that specific individuals (e.g., employer) or groups (e.g., co-workers) would approve or disapprove of them performing the desired behavior. Perceived behavioral control is informed by control beliefs about the motivators (e.g., rewards and recognition) and barriers (e.g., time pressures) that facilitate or impede performing a desired behavior. The model, including the beliefs, is depicted in Fig. 1. It is important to note that the underlying beliefs for any given behavior are specific to the target population under investigation. The most important beliefs are commonly identified by qualitative analysis of a representative sample of the target population with Ajzen (2006a) stating that the only part of TPB methodology that requires qualitative research is the elicitation and coding of readily accessible behavioral, normative, and control beliefs. Importantly, in addition to informing further quantitative research testing other tenets of the model (e.g., by a survey examining identified beliefs and the direct TPB constructs), the identification of beliefs can play a key role in informing interventions designed to encourage behavioral performance by altering existing beliefs or exposure to new beliefs (Ajzen, 2006b).

1.2.3. Evidence in support of the TPB: general and safety-specific

The TPB has garnered considerable empirical support for its utility across a broad range of behaviors, with meta-analytic results stating that the direct TPB predictors explain, on average, 39% of variability in intentions and 27% of variability in behavior (Armitage and Conner, 2001). More recent meta-analytic evidence shows support for the tenets of the model specifically for health-related behaviors (McEachan et al., 2011). In the context of understanding and predicting workers' performance of safety-related behaviors, the direct predictors of the TPB, as well as modifications/extensions, have been applied successfully to a number of safety-related work practices (Colemont and Van den Broucke, 2008; Fogarty and Shaw, 2010; Fuga et al., 2012; Jenner et al., 2002; Johnson and Hall, 2005; Newnam et al., 2004; Ponnet et al., 2015; Quick et al., 2008; Welbourne and Booth-Butterfield, 2005; Wills et al., 2009), although not previously utilized to examine electrical workers' safety behaviors.

1.3. The present study

A necessary step in understanding the contribution of underlying beliefs to workplace safety decisions for electrical workers is to identify the range of beliefs held. The present study employed qualitative research methods through focus groups and individual interviews of licensed electrical workers in Queensland, Australia to identify the most important behavioral (advantages and disadvantages), normative (important people and groups of people), and control beliefs (barriers and motivators) among this population. Thus, in the present study comprising the first stage of a TPB program of research, we expected to identify a range of (i) advantages and disadvantages, (ii) important people and groups who approve or disapprove, and (iii) barriers and motivators to performing safe work behaviors. In sum, the identification of salient beliefs (i) will allow the establishment of belief items for future quantitative research within the industry where the prevalence of these beliefs can be established