THE IMPACT THAT INTEGRATING SAFETY INTO JOB ENTRY PROCESSES EXERTS ON SAFETY VOICING: THE ROLES OF GRATITUDE, RECIPROCITY, AND OBLIGATION

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Abstract

Generative safety cultures increase safety at work, and this experiment investigated whether simulating a generative safety culture using safety integrated job entry processes induced gratitude, obligation, and caused new employees to reciprocate with hazard voicing and hazard correction. In this randomised controlled Hazard Laboratory experiment at the University of Canterbury, 24 students participated in stranger pairs, with half assigned to the experimental condition and half to the control. The experimental group received a simulated generative culture entry process, whereas the control group's entry process only focussed on task performance. Participants undertook a series of manual tasks. Post task completion, questionnaires were used to investigate participants' self-reported gratitude and obligation. Reciprocity was measured in the form of voicing and hazard correction. Planned analyses were not appropriate because of the constrained sample size. Results are presented as descriptive statistics. The practical significance of developing ways to implement generative safety culture, and methodological refinements for future studies are discussed.

Overview

The aims of this experiment were to induce a safety culture of excellence—called generative safety culture—and test those working in such a culture for demonstrations of a safety behaviour called safety voicing in response to discovering unsafe conditions. To develop a safety culture at work, safety must be integrated within all capabilities. For this experiment, safety was integrated throughout every process undertaken during simulated job-starting processes from recruitment onwards. Safety voicing behaviours have the potential to increase safety, and the present research aimed to experimentally test whether developing a simulated generative safety culture by integrating safety within the recruitment, selection, induction, socialisation, and supervision processes, could increase safety voicing rates. Safety voicing occurred when participants warned colleagues of danger, requested supervisory intervention, or corrected hazards either independently or with supervisory assistance (Mullen, 2005; Tucker et al., 2008). A further aim of the experiment was to test whether gratitude, obligation, and reciprocity, developing in response to a simulated generative safety culture, formed a psychological mechanism that could explain reciprocal safety behaviours.

This study was conducted in an Applied Psychology Hazard Laboratory, where faux-dangerous items (e.g., Hollywood broken glass, items with exposed wiring, and a fan heater that appears to spark dangerously) were set up for use in such experiments. The dependent variables were gratitude, obligation, reciprocity, voicing, and hazard correction. The independent variable was receiving (compared to not receiving) safety integrated entry processes.

Voicing and hazard correction were hypothesised to be greater in the group receiving the generative safety cultures with safety integrated job entry processes. Gratitude, obligation, and reciprocity comprised a hypothesised psychological mechanism predicted to increase safety behaviours (e.g., voicing) more for those in the group receiving the generative (than pathological) safety cultures.

Introduction and Rationale

Several theorists have argued that workplace safety culture exists on a spectrum that extends from pathological to generative, describing cultures ranging between bad across all systems to those where every system is good (Parker et al., 2006; Westrum, 2004). Safety culture must be shaped within workplaces (Parker et al., 2006), and the *generative* end of the safety culture spectrum is characterised by all organisational functions contributing. A generative safety culture has the potential to prevent accidents and improve worker safety (Kim et al., 2016). Thus, to develop safety culture excellence at work, safety must be integrated within all capabilities (Casey et al., 2017) from job entry onward; including within recruitment, selection, induction, socialisation, and supervision processes (Zacharatos & Barling, 2004). Employees' behaviour is shaped by their interactions with those capabilities and the systems in which they operate. Employees respond psychologically—with gratitude (Fehr et al., 2017) or perhaps cynicism (Solom et al., 2017)—when encountering safety integrated capabilities. Gratitude is linked to obligation, and obligation to reciprocity. Therefore, an extensive set of positive interactions within organisational systems leads to many positive job attitudes; for example, employee engagement (Frazier et al., 2013), trust in management (Zacharatos & Barling, 2004), psychological safety (Newman et al., 2017), motivation, energy (Casey et al., 2017), learning orientation (Jeffcott et al., 2006), affective commitment (Zacharatos & Barling, 2004), perceived organisational support (Eisenberger et al., 1986), job satisfaction (Frazier et al., 2017), safety commitment (Burt, 2015, p. 102), and the additional advantage of reciprocated behaviour (Tregaskis et al., 2013). This experiment measured safety behaviour, a *participation behaviour*, as voicing. The independent variable was the manipulation of the entry system into the experimental tasks. Deep deception was used, and the participants were placed in a high hazard simulated environment. More embedded safety components in the entry system were predicted to cause more safety participation (voicing).

Safety Culture Theorists

Early theories of safety culture originated in sociological theory (e.g., Westrum, 1993) and focussed on ways that companies reacted to information about threats to safety. Westrum (1993) described utopic safety culture excellence that encouraged early problem detection within organisations and similar systems; so that dangers could be neutralised, and design faults corrected before hazards materialised. Westrum's (1993) model of safety culture had three divisions called pathological, bureaucratic, and generative to describe the treatment of information and the treatment of those providing information; but Westrum did not suggest the process that should be undertaken to improve organisational safety culture. Reason (1997) described ways of improving the safety culture within organisational and industrial systems and suggested two further categories—proactive and reactive—that Parker et al. (2006) later incorporated within their safety culture development framework.

The Parker et al. (2006) framework contains "five levels of safety culture" including: pathological, reactive, calculative, proactive, and generative. Each level has several different dimensions of safety culture (e.g., manager attitudes and behaviours, care for other workers, and safety motivations and rewards). The framework uses behaviourally and attitudinally anchored rating scales to demonstrate how different safety culture levels manifest within organisations, and the attitudes commonly displayed by those working in such cultures. Each of the safety culture levels are explored further below.

Pathological Safety Culture

Companies operating within a *pathological* safety culture are primarily concerned with workers' rate of production: safety is of little concern (Parker et al., 2006). The human and financial costs of safety breaches are not considered by companies at the pathological stage of safety culture development, and Parker et al. (2006) explained that safety voicing is suppressed, particularly when accidents occur. In an apparent example of a pathological safety culture, Newman (2020) reported recent examples of failures by the New Zealand food processing company, Talley's, in their duty of care for workers. Mead (2021) reported that there were 174 injuries at three Talley's sites in the space of one year, and also noted silencing behaviour by senior executives and lawyers (including the use of threats) to suppress worker voicing at Talley's. Whistle-blowers from Talley's, secretly confided in reporter Thomas Mead (2021) about their extensive knowledge of dangers within the Ashburton factory. They were scared for their own and others' safety and wanted managers and supervisors to help make their workplace safer. Without accident reporting or danger warnings voiced by workers, there is no opportunity for systems analysis or improved workplace safety.

Wright (1986) demonstrated that economies applied to safety training, equipment, or contractor management increased injuries and deaths; however, in pathological safety cultures production speed and (false) economy take precedence over effective health and safety planning. Parker et al. (2006) explained that where there was little support for safety, and where those in management did not show an interest in worker safety behaviours, and where excellent safety performance does not elevate one's status within an organisation, safer behaviours are not reinforced, so safer behaviour is unlikely to develop. Parker et al. (2006) reported that the option of not offering health and safety knowledge may seem cheaper and quicker to companies operating at the pathological level of safety culture; however, Wright (1986) negated that view and showed that such economy caused accidents and deaths, leading to increased expenses and delays.

Reactive Safety Culture

Companies working within *reactive* safety cultures are particularly active in their attempts to enhance safety once an accident has occurred; yet any activity falls short of achieving safety because individuals are blamed for accidents, and companies operating within a reactive safety culture react to accidents by only trying to prevent exactly the same type of accident in the future (Parker et al., 2006). For companies operating within a reactive safety culture, both health and safety are perceived to be costly in terms of time and money (Parker et al., 2006). In contrast to an individual blame approach to accidents, Reason (1997) explained that accidents were caused by a combination of factors, so exact patterns preceding accidents were unlikely to reoccur; therefore, deeper systemic analysis was more likely to reveal the source of future safety breaches. Within reactive culture any reporting is associated with blame; but Reason (1997) explained that reporting was necessary for preventative learning to occur. Unless deeper patterns are analysed to reveal the combination of causes for incidents and accidents, reactive safety culture systems are likely to continue producing similar domain-related variations of past incidents and accidents.

Safety training is imposed upon workers within a reactive safety culture because workers are considered to be the direct cause of accidents; therefore, it is assumed that individual workers can be trained to be safe (Parker et al., 2006). The problem with a reactive strategy for safety improvement is that systemic factors like work-related fatigue, machinery that is impossible to operate safely, production pressure that encourages unsafe acts, and other systemic latent risks are not altered by training that focusses on preventing the reoccurrence of individual accidents (Lenné et al., 2012).

Calculative Safety Culture

Learning is required to develop improved organisational safety culture, but learning is problematic within the bureaucratic approaches to safety improvement used by those companies operating within *calculative* safety cultures (Hudson, 2007; Westrum, 1993). Although data is extensively displayed by companies at the calculative stage of safety culture development (including data about accidents) there is a lack of analysis aimed at learning and understanding why accidents are occurring and how to prevent future incidents (Parker et al., 2006). Employees are told how to be safer in a top-down process usually run by managers, but opportunities for workers to design improvements or offer safer ways of operating are unlikely (Parker et al., 2006). To prevent future accidents, workers from within calculative safety cultures are sent on many generic safety courses that may be suitable for meeting bureaucratic (and legal) requirements but may not be applicable to the real work situations that workers face (Parker, 2006).

Safety is considered a challenge to profitability (Parker et al., 2006) even within calculative safety cultures. A trade-off is considered necessary between safety and earnings within calculative safety cultures (Parker et al., 2006), as demonstrated by Tony Hazlett, the chief executive at the food processing company, Talley's. Hazlett opined that the cost of food safety must be paid for by compromising worker safety—in the mistaken belief that food and worker safety are mutually exclusive—according to a report by Newman (2020) that described unsafe food processing machinery crushing one worker's hand and breaking another worker's arm in two places while they cleaned equipment at Talley's. Food safety should not come at the cost of worker safety and a preferable alternative would be simultaneously enhancing food and worker safety by investing in newer equipment that is safer to clean.

Proactive Safety Culture

In a *proactive* safety culture, analysis is focussed on learning and understanding why accidents are occurring and how to prevent future incidents (Parker et al., 2006). Accident reporting is encouraged, and at this level of safety culture development learning can happen, so making accident prevention via modifications to processes, equipment, and systems is also encouraged (Parker et al., 2006; Reason, 1997). Reciprocal safety-related communication replaces top-down safety lectures that are employed in less developed safety cultures. At a proactive level of safety culture development, companies are likely to find their workers become increasingly motivated to discuss (voice) safety gaps with managers and may be able to identify training and development areas where their own knowledge should be extended (Parker et al., 2006).

The process of sharing (voicing) information between work teams is called bridging, and that begins to occur in proactive safety cultures (Parker et al., 2006). Bridging brings improved communication processes and promotes safe and successful job completion by contractors (Westrum, 1993).

Employee selection processes that include safety criteria are one way workers can observe that safety is valued, because the importance of safety is modelled within a proactive safety culture (Bandura et al., 1961). In a proactive safety culture, the candidate selection and task assignment processes for new workers (e.g., contractors) include safety criteria, and companies provide further specific training to teach new recruits about the idiosyncrasies of the job (Parker et al., 2006). Contractors working in less developed safety cultures are often put at considerable risk because they may not have adequate skills for the job, must upskill themselves, and often have to work under considerable time constraints (Parker et al., 2006; Wright, 1986). Contractors are comparatively safer working in companies with proactive safety cultures because their selection depends on whether they meet qualifying standards and have safety processes in place (Parker et al., 2006).

Generative Safety Culture

A generative safety culture is synonymous with safety culture excellence. At the generative level of safety culture, organisations welcome the voicing of information about areas that require improvement (Westrum, 1993). At this level the equipment and systems should be excellent (Kim et al., 2016). Safety culture should form the operating framework (Parker et al., 2006). There are less equipment problems and so more focus rests on behaviours, including behaviours from those heading organisations, managers, supervisors, and workers (Parker et al., 2006).

At the generative level of safety culture, Parker et al. (2006) explained that thinking and operating safely becomes automatic. Everyone within an organisation checks for dangers. External contractors are properly qualified (or provided with appropriate training) to enhance safety for contractors and permanent workers; and permanent workers ensure contractors have all the information they need (via bridging, see Westrum, 1996) to do jobs safely (Parker et al., 2006). All staff are free to suggest learning areas that need development, because workers are well placed to identify gaps in their own learning (Parker et al., 2006).

Generative Safety Culture Development

Hudson (2007) demonstrated how changes found within the generative domains of the Parker et al. (2006) and the Westrum (2004) organisational and industrial safety culture models should be implemented. Specifically, Hudson (2007) suggested bottom-up processes—whereby workers could be psychologically motivated to participate in safety culture improvements. Further suggestions by Casey et al. (2017) advocated using systems approaches for implementing a generative safety culture, by integrating safety culture into all organisational processes. Systems approaches acknowledge that the pursuit of safety is dynamic, with safety culture improvements causing simultaneous changes in other areas (e.g., innovation or performance improvements, Neves & Eisenberger, 2012); and according to Reason (1997), relentless, because absolute safety is elusive.

Integrating Safety Within Capability Systems

Organisational and industrial capability systems are manageable and changeable; and by interspersing safety within every capability, capability systems can be harnessed to develop a generative safety culture (Casey et al., 2017). That is because a complex array of interacting systems—rather than simple linear relationships (Yawson, 2012)—contribute to accident causation. Industrial and organisational settings are "complex adaptive systems" (Sterman, 2001); therefore, safety culture development needs to be performed using a systems approach (Hudson, 2007) to progressively change individual fragments of such systems (e.g., employee recruitment and selection; employee induction, socialisation, and training; employee supervision; communication and information systems; etc.) and to improve the overall safety culture within organisations. Several key work entry systems offer opportunities to add safety components, beginning with recruitment and selection.

Recruitment and Selection Systems. New employees present considerable safety risks to themselves (Burt, 2015; Butani, 1988; Groves et al., 2007) and others in their workplace (Burt, 2015). Therefore, the opportunity that recruitment and selection present to influence organisational safety culture (Christian et al., 2009) should be seized—by making safety culture an additional recruitment aim—so safety attitudes and behaviours included in recruitment and selection criteria (e.g., ability to perform the job and intention to continue in the job) ensure recruited staff exceed basic requirements.

Presenting honest and frank information about safety risks within a job constitutes an important component of a realistic job preview (Wanous, 1978), ensuring that recruits develop accurate job expectations around safety (Breaugh & Starke, 2000), increased job commitment, and lower turnover intentions once employed (Wanous, 1978). Safety information about job risks also promotes safety culture awareness by potential recruits

(Burt, 2015). Moreover, with such information some will abandon their interest in being recruited, while those that remain interested will become aware that the employer is concerned enough about safety risks on the job that they pre-warn applicants about danger (Burt, 2015). During recruitment, new recruits should receive the strong impression that safety matters to the company they intend joining. That impression should be reasserted during selection to further develop the psychological contract (Aselage & Eisenberger, 2003) so that safety attitudes and safety behaviours are supported.

The selection process should include criteria around job seekers' safety attitudes, safety performance abilities (Burt, 2015), and safety behaviours (Turner et al., 2004) because safety attitudes, abilities and behaviours are associated with safety outcomes. Safety performance may be affected by recruits' perception of (or failure to perceive) danger, and the awareness that tasks or situations are dangerous (Ramsey, 1985). Measurement of the perceptions of hazards and the knowledge that a situation presents a hazard (Ramsey, 1985) can be included in job selection criteria (Burt, 2015), because both contribute to workers' knowledge and ability pertaining to accident and injury avoidance (Ford & Wiggins, 2012). In addition to tests of safety attitudes and hazard cognitions, tests for safety behaviour should form part of a safety integrated selection program; however, Burt (2015) reported on the dearth of commercially available safety behaviour predictors with criterion related validity (where a selection test actually predicts later performance) for predicting safety behaviours performed on the job.

Socialisation, Induction, and Training Systems. Following the realistic job preview and safety integrated selection processes (before a new employee begins their new job) one of the next opportunities to introduce safety culture is during socialisation, induction, and training. For a generative safety culture, it is recommended that safety values evident throughout an organisation are shared with new employees, so new employees learn safety is an important value shared throughout the workplace, by everyone from colleagues to the CEO (Cooper-Thomas & Anderson, 2006). If new employees perceive organisational support for safety performance, that should lead to feelings of obligation to perform safely, leading in turn to the performance of safer behaviours (Aselage & Eisenberger, 2003).

Managed socialisation processes correlate with improved social integration within work groups (Menguc et al., 2007), better knowledge of colleagues (Burt et al., 2008), increased psychological safety (Frazier et al., 2017) and increased caring shown by workers for colleagues (Didla et al., 2009; Geller, 2001). Increased caring causes more safety citizenship behaviours like voiced warnings about dangers and risks to others in the workgroup, increased willingness to keep others safe by whistle-blowing if safety violations occur, and increased suggestions made by workers to improve on-the-job safety (Hofmann et al., 2003).

Induction and training prior to job commencement usually comprise information about basic safety, how to use equipment, how to do the job, and company rules; however, the induction and training period is another opportunity to integrate safety within a capability (Burt, 2015). Newly recruited job inductees are a population particularly vulnerable to accidents and death at work (Leigh, 1986), and Burt (2015) suggested new workers with little relevant previous experience in the same industry should be made aware that their expectations of responsibility for performing safety behaviours on the job may be very different compared to their experienced colleagues' perceptions of their responsibilities for safety behaviours while doing the job. Scales can be used and discrepant results—for how much safety can be left to colleagues and how much inductees must take responsibility for (e.g., Burt et al., 2012)—should be returned as feedback to inductees. Similar ratings for new job risk perceptions by inductees, compared to perceptions of danger by supervisors and experienced employees (Burt et al., 2012), are useful for raising realistic danger awareness (Burt, 2015). When targeted safety processes are added to the induction capability then safety behaviour among new job inductees should improve (Burt, 2015).

Job training is designed to teach new workers how to complete job tasks and use company equipment, but job training that is done well can also improve inductees' knowledge of other team members—including which team members have the right experience to contribute to inductees' job clarity—and that in turn can lead to improved safety performance (Burtscher & Manser, 2012) in concert with better overall job performance (Menguc et al., 2007). For example, as a locum pharmacist in London this author found there were particular pharmacists one could ask for assistance acquiring fresh prescription maggots to treat resistant leg ulcers (and other pharmacists that one could not); all team members need to know who to ask for information because by knowing who holds job knowledge and performance ability, safer outcomes (e.g., expedited maggot deliveries) are hypothesised (Cannon-Bowers & Salas, 2001).

Work Assignment. Workers that are new to the job are those most at risk of death and injury at work (Bentley et al., 2002); and adjustments to who assigns work to a new employee is one way to decrease the risk of mortality and morbidity (Burt, 2015). Forty four percent of the accidents suffered by New Zealand forestry workers responsible for skid work (i.e., preparing and sorting freshly cut logs to the correct size for transport or milling) occurred within their first year on the job (Bentley et al., 2002). McCall and Horowitz (2005) reported similar results for accidents suffered by truckers in the American state of Oregon, with 51% occurring in their first year on the job. In a generative safety culture adjustment to the work assignment process can mitigate some risk by ensuring suitable jobs are assigned to newer and more vulnerable workers.

New workers risk being assigned undesirable and unsafe jobs—particularly if colleagues (rather than supervisors) are permitted to assign those tasks to new employees—despite job-related danger being the reason some tasks are considered undesirable (Burt, 2015). When colleagues and supervisors were both permitted to assign tasks to new workers (compared to supervisors alone), new workers were asked to complete more unexpected tasks they felt they didn't have the knowledge or skill to perform safely (Quek, 2018). In jobs with a generative safety culture the job assignment capability can have safety integrated into the process—so that only supervisors are permitted to be responsible for new employee job assignment—because supervisors should be aware of the dangers of unsafe job assignment and understand their obligation to assign safer tasks to new workers.

Supervision. Lenné et al. (2012) performed a systems analysis of accidents in the mining industry, and found inadequate supervision was a root cause. Supervision is a modifiable capability and adequate supervision provides opportunities for teaching workers the idiosyncratic skills required in their new job. Good supervision ensures support is provided when a new worker needs it, so they are not tempted to create their own solutions when a problem is encountered (Shappell & Wiegmann, 2003).

To improve newcomer safety outcomes, the new worker supervision capability should include ensuring workers have adequate skills to complete required tasks (either by selection or upskilling post-hire) because in 64% of accidents workers made errors related to inadequate skill (Lenné et al., 2012). It is important that supervisors model excellent behaviour without safety violations because violations committed by supervisors teach new employees that violations will be tolerated (Bandura et al., 1961). Rule violations should not be tolerated at work because violations are associated with more serious accidents (32% of aviation deaths resulted from a violation) rather than less serious accidents (just 10% of aviation accidents with no deaths resulted from a violation) while working (Shappell & Wiegmann, 2003).

Supervision should be provided for an adequate duration (Zaloshnja et al., 2012)—the longer the better (Burt, 2015; Komaki et al., 1980; Morrongiello et al., 2008)—with adequate attention provided to the supervisee, and with physical proximity allowing rapid intervention if necessary (Zaloshnja et al., 2012). While growing up on a farm, and at the age of 12 years, I was allowed to use a new three-wheeled motorbike myself, while supervised by my father. The motorbike had much heavier steering than the utility truck I was accustomed to, and when I tried turning, the motorbike did not respond as fast as I had anticipated, flipping mid-turn on a grain shed buttress and landing on top of me. Morrongiello et al. (2008) noted similar, describing that even with adequate continuity of supervision, the risk of accidents remained possible depending on supervisory proximity.

Equipment Selection. Equipment selection is another capability that can have safety integrated within the process to decrease safety risks. There is evidence that old equipment presents extra safety burdens (McLaughlin & Mayhorn, 2011) but that may not be widely known. Common wisdom on the farm where I grew up held that “flash new equipment doesn’t make you any more money.” There was a range of quite old tractors and other equipment in use, and one piece of equipment (a vintage tractor) was originally purchased and used by my great grandfather but more recently was repurposed into a crop sprayer because it had very thin tyres that would flatten less crop during spraying. Certain old equipment (e.g., an old combine harvester and the crop sprayer) was only used by my father, because using it was so complicated that teaching others how to do so safely was too difficult. Older equipment may lack strengthened cabs, seatbelts, effective braking, steering differentials (to make turning effective on farm-motorbikes), power steering and other refinements. Burt (2015) agreed that more skill may be needed to safely use old equipment; but despite user skill amongst experienced equipment users, McLaughlin and Mayhorn (2011) found evidence linking the continued use of older equipment to deaths among experienced users also.

Modern equipment has improved safety features and is easier to learn to use, and the newest workers are usually less skilled operators so some risks they are exposed to can be ameliorated by allocating them the newest and safest equipment (Burt, 2015). Although new equipment may not make more money directly, it offers additional protection against injuries, lost time injuries, and fatal injuries and associated costs and delays (Wright, 1986). Supervisors should ensure that new employees receive the protective benefits of newer equipment by ensuring they are allocated the use of new equipment (Burt, 2015).

Psychological Mechanisms of Behaviour Change

The safety-based selection of new employees, who are assigned the safest equipment to complete manageable tasks, while receiving excellent supervision, provides important foundations for generative safety culture development (Burt, 2015). Moreover, when new employees encounter the safety integrated capabilities inherent within a generative safety culture, that causes safety behaviours to increase (Tregaskis et al., 2013).

Gratitude is one psychological mechanism predicted to cause safety behaviour emergence among new recruits that experience working in a generative safety culture (Kim et al., 2017). Kim et al. (2017) emphasised the values-driven nature of gratitude; demonstrating that under the right conditions (e.g., motives displayed by supervisors) gratitude could *cause* behaviour to occur. If new employees perceived the expense involved (e.g., because supervisors had invested a lot of time and the new employer had invested a lot of money) in safety integrated work entry processes, results from Yu et al. (2018) suggest that feelings of gratitude would be induced in new employees; particularly when employees understood and appreciated that safety integrated work entry processes benefitted them.

In this experiment safety considerations were applied to those in the safety group during all task entry processes—with the aim of inducing gratitude and obligation—to induce subsequent reciprocation. Among safety considerations employed to develop a generative safety culture for the experimental (but not the control) group in the laboratory the experimenter used safety performance as the criteria for assigning participants to tasks; providing various safety equipment appropriate for tasks; and emphasising safety during job induction and supervision processes. Reciprocation was expected to occur (Tholén et al., 2013; Zhang & Li, 2015) because participants would feel grateful for safety integration during all task entry processes and would then feel obligated to perform safety compliance behaviours and safety participation behaviours (e.g., warning fellow participants about dangers, reporting dangers to the experimenter, and correcting hazards) in return.

Gratitude Greases the Wheels of Obligation

Gratitude has several useful effects within organisations (Fehr et al., 2017), because gratitude can be used by humans to measure the value of a shared relationship in response to benefits that have been received within that relationship; and gratitude is also thought to offer an estimate of whether similar ongoing benefits are likely to be received from the same source (McCullough et al., 2001). Gratitude can present as feelings of appreciation that emerge in response to prosocial contributions, gifts, or assistance provided by another (Froh et al., 2011; Wood et al., 2008), but a common prerequisite for engendering gratitude is that the assistance or gift offered should be discretionary rather than required (Bartlett & DeSteno, 2006). Legislation requires safety in all organisations (Health and Safety at Work Act, 2015); however, some organisations may choose a basic approach like calculative safety culture, that is barely compliant, while others strive for a generative safety culture by adding seemingly discretionary benefits (e.g., newer, safer equipment) that cause workers to experience gratitude.

Gratitude persuades (Kolyesnikova et al., 2011) the grateful to spend more time helping those to whom they are returning a favour, than to people they do not know, according to the experiments of Bartlett and DeSteno (2006). Consistent with the argument of Beeler-Duden et al. (2020) that gratitude has an evolutionary origin—whereby gratitude prompts humans to "fulfil our obligations to others"—experiments have shown that gratitude sweetens the costly process of meeting our moral obligations (Bartlett & DeSteno., 2006). Although meeting our obligations is morally supported, it can prove expensive in terms of time, energy, or money (Bartlett & DeSteno, 2006). Therefore, the positive nature of gratitude suggests that it has evolved as a psychological mechanism to grease the wheels of obligation, making cooperative, and prosocial behaviour (Bartlett-DeSteno, 2006) more palatable to the grateful, thus ensuring that cooperation and social support flourishes (Beeler-Duden et al., 2020).

Obligation

Gratefulness and obligation are sometimes conflated because both can be caused by benevolence (Komter, 2004); however, they are not the same (Goei & Boster, 2005). When one receives good treatment by another (i.e., an employee is integrated into a generative safety culture) , one may report being "much obliged" to one's benefactor; suggesting the receipt of a favour causes one to become *obligated.*

Thibaut and Kelley (1959) used Social Exchange Theory to describe the transactional nature of receiving a benefit (e.g., the use of safety equipment or the safest vehicles) and the obligation that Social Exchange Theory predicts workers should experience when they receive these benefits, so that the greater the benefit received, the more likely an obligation is to develop. When workers experienced such good treatment that obligations developed, they were likely to return the favour by performing behaviours valued by the leader (e.g., safety behaviour if that behaviour was valued); especially when encouraged by high quality leader interactions (Hofmann et al., 2003).

When something is given, done, or performed for one's benefit, one experiences feelings of obligation, or owing something in return (Kolyesnikova et al., 2011). An element of pressure is included in the obligation construct (Kolyesnikova et al., 2011) and obligation requires self-interest to be suppressed (Brummel & Parker, 2015). Although obligation may sometimes be described as negative and coercive, obligation acts as a motivator (Tomasello, 2019) that promotes responding via *reciprocation* (Mustapha et al., 2011).

Reciprocity

Gouldner's (1960) early reciprocity literature explained reciprocity in the manner of a debt being repaid in response to asserted moral pressure (i.e., feelings of obligation) to reciprocate. Atwood (2008) warned that reciprocity and debt sometimes become unbalanced—for a time—and also noted that the pressure to reciprocate can last until death! Therefore, because the moral norm of reciprocity (Gouldner, 1960) has the potential to generate behaviour, reciprocity could be employed to generate safety behaviour (Zhang & Li, 2015).

To encourage workers to reciprocate, supervisors need to put a high value and a strong emphasis on safety during job entry processes and beyond (Hofmann et al., 2003). That is suggested to calibrate worker perceptions of supervisor and employer concern for worker safety, contributing to the organisational safety climate (Tholén et al., 2013). A generative safety culture supported by clear safety signalling to workers, so they understand that their supervisor and employer care about their safety (Tholén et al., 2013) should stimulate feelings of gratitude and obligation, encouraging new workers to reciprocate (Chang et al., 2012) using safety behaviours (Zhang & Li, 2015).

Generating Repeat Reciprocity. Once reciprocation occurs, however, the implication is that one's debt has been repaid (Atwood, 2008)! Therefore, there must be ongoing dedication to worker safety in organisations, with debts of gratitude that require safety behaviours to reciprocate continually being added to workers' mental tally of debt (Tregaskis et al., 2013). For example, in this study the recruits in the safety group (but not the control group) are told about an anti-slip rubber safety mat provided to protect them, and safety gloves that are provided to shield them from small shocks. Similarly, workers in real jobs should be told about the money their employer is spending on safer equipment each time safety equipment spending occurs (Kletz, 2001). Supervisors should tell workers about any safety-linked maintenance that is being performed before equipment has already become dangerous or likely to fail; and any opportunity to demonstrate genuine safety efforts that are being made should be clearly signalled to workers (Kletz, 2001). Signalling should occur in an ongoing way, to continually add debt and form an improved safety climate, so that safety behaviours can be performed by workers wanting to reciprocate.

Successful creation of a generative safety culture, with safety components embedded within work systems, precedes increased knowledge about safety and increased motivation perceived by workers to reciprocate by performing their jobs safely (Christian et al., 2009; Neal & Griffin, 2002). With increasing safety knowledge, motivation, and the requisite skills to perform safely, comes improved safety performance, comprising safety compliance and safety participation (Campbell et al., 1996; Christian et al., 2009; Neal & Griffin, 2002).

Safety Compliance Behaviour Demonstrates Reciprocity

"Following procedures," "using protective equipment," and "practicing risk reduction" are all examples of the safety compliance construct (Christian et al., 2009); and safety compliance behaviours are one way for workers to demonstrate reciprocity in response to experiencing safety within a generative safety culture (Zhang & Li, 2015). Safety commitment among workers (Hofmann & Morgeson, 1999; Zhang & Li, 2015) was associated with more workers reporting safety concerns to supervisors (Hofmann et al., 2003). Hofmann and Morgeson (1999) suggested safety compliance was predicated on organisational support for safety being perceived by workers and also on excellent "safety-related communication" being exchanged between workers and supervisors. When organisational support for safety caused an excellent safety climate to be perceived by workers, Zhang and Li (2015) found reciprocation via safety compliance increased.

Several job entry interventions are known to effect increases in safety compliance behaviours, and that is important because high safety compliance among workers is associated with decreased accidents and injuries experienced by workers complying with organisational safety rules (Christian et al., 2009; Goodman & Garber, 1988). For example, Vinodkumar and Bhasi (2010) confirmed that job entry processes could contribute to safety compliance (e.g., safety training contributed via the parallel mediators "safety knowledge" and "safety motivation"). Training new workers about "safety rules and procedures" had a direct effect (and an indirect effect mediated via safety knowledge) on safety compliance.

Safety Participation Behaviour Demonstrates Reciprocity

Safety participation behaviour is another type of safety reciprocity behaviour; however, participation behaviours are "voluntary behaviours that" reach throughout an organisation to provide safety benefits in the manner of organisational citizenship behaviours (Christian et al., 2009). Examples of safety participation can include *voicing* to supervisors or management to warn about safety risks; helping workmates, to keep them safe as they complete dangerous tasks (Vinodkumar & Bhasi, 2010); and promoting "safety-related change[s]" (Christian et al., 2009). The safety behaviours examined in this experiment are voicing and hazard correction; because Burt et al. (2008) proposed that workers based in a job with a strong safety climate—implying the presence of strong safety cultural antecedents (e.g., Christian et al., 2009)—would actively communicate safety concerns via increased voicing and perform more hazard removal behaviours as measured by hazard neutralisation. The voluntary nature of voicing behaviour suggests that voicing could be used as an indicator of safety reciprocity behaviour predicted to occur in a generative safety culture.

The Present Experiment

This applied psychology experiment tested the independent variable—receiving compared to not receiving safety integrated work entry processes—with pairs of strangers randomly assigned to experimental or control conditions in the University of Canterbury Hazard Laboratory. The purpose of the experiment was to explore whether integrating safety into job entry processes (e.g., recruitment, selection, induction, socialisation, and supervision) to simulate a generative safety culture (experimental condition) could cause the dependent variables gratitude, obligation, and reciprocity, to increase, compared to those in the control condition. Generative safety culture should build gratitude, thus increasing obligation, that in turn facilitates safety focussed reciprocity by participants wishing to repay the good treatment they have received at work. The following hypotheses were tested:

Hypothesis 1: Those receiving safety integrated work entry processes were predicted to have higher levels of self-reported gratitude than those not receiving safety integrated work entry processes.

Hypothesis 2: Those receiving safety integrated work entry processes were predicted to have higher levels of self-reported obligation than those not receiving safety integrated work entry processes.

Hypothesis 3: Those receiving safety integrated work entry processes were predicted to have higher levels of self-reported reciprocity than those not receiving safety integrated work entry processes.

This research also experimentally tested whether integrating safety into job entry processes could cause higher levels of voicing and hazard correction, for those in the simulated generative safety culture (experimental condition) compared to those in the control condition. Within-dyad voicing, reporting voice, and hazard correction are all voluntary behaviours workers may use to express their gratitude, obligation, and reciprocity. Burt et al. (2008) predicted active voicing and hazard correction were more likely to emerge among those working in a generative safety culture.

Hypothesis 4: Within-dyad safety voicing was predicted to occur more often among those receiving, compared to those not receiving, safety integrated work entry processes.

Hypothesis 5: Those receiving safety integrated work entry processes were predicted to have greater within-dyad word counts each time safety voicing occurred than those not receiving safety integrated work entry processes.

Hypothesis 6: Those receiving safety integrated work entry processes were predicted to report more hazards to the researcher (reporting voice) than those not receiving safety integrated work entry processes.

Hypothesis 7: Those receiving safety integrated work entry processes were predicted to correct more hazards within the hazard laboratory than those not receiving safety integrated work entry processes.

Method

Prior to participant recruitment and data collection, this study was registered with AsPredicted.org in the interests of open science. This study was approved by both the Ngāi Tahu Consultation and Engagement Group, and the University of Canterbury Human Ethics Committee. All faux hazards within the Hazard Laboratory were designed to be entirely safe for participants to touch (e.g., broken Hollywood glass was made of silicone rubber, and electrical hazards were powered safely using 9-volt batteries).

Research Design

A between-groups experimental design with two conditions was employed for the present study. Conditions were manipulated so that non-safety integrated job entry processes formed the control condition and safety integrated job entry processes formed the experimental condition.

Random allocation via random number tables was used at the point of lab entry to assign stranger dyads either to the experimental or the control condition. With closed eyes the researcher chose a 10 across and five down block of random numbers from the Eton statistical and math tables (1980, pp. 36-37). The block of numbers was cut out and taped to the front of the folder of experimental and control scripts, and as each stranger-dyad entered the lab the researcher crossed off a number (from left to right in typical English reading style). Dyads with even numbers were assigned to the experimental condition (safety integrated job entry processes) and dyads with odd numbers were assigned to the control condition (non-safety integrated job entry). Participants were unaware that there were two conditions.

The purpose of random allocation at the start of the experiment was to avoid the biasing effect (Weisberg et al., 1996, pp. 41-42) of studying all the experimental (or alternatively, all the control) dyads first. Ideally that ensures any observed effects reflect the experimental study treatment alone. Without random allocation, results may be confounded by spurious variables (e.g., if conscientious participants tend to enrol earlier, they may display other similarly conscientious behaviours, like increased safety voicing, irrespective of group treatment).

Bias Reduction Methods and Avoiding Demand Characteristics

Experiments with human participants are subject to biases that experiments with animals or inanimate objects (e.g., metals) are not. Demand characteristics biases may cause participants to behave in ways they think a researcher would want them to behave (Orne, 1962), however, deception before and during experiments followed by a debrief after, to explain the true purpose of the experiment, was one method employed during the experiment to reduce demand characteristics (Baumrind, 1985). Questionnaires may be answered in socially desirable (and inaccurate) ways, causing the emergence of social desirability bias errors (Nederhof, 1985); an illusion of privacy was provided in this experiment when completed questionnaires were posted in a slotted box so participants would feel less observed, reducing social desirability bias and allowing more honest and accurate questionnaire self-reporting (Bova et al., 2018).

Pilot Trials

Three pilot trials with two participants per trial were conducted prior to beginning the main research. All six pilot trial participants were recruited through the Psychology Department participant pool (SONA). Pilot trials were conducted to refine the specific script wording for experimental and control groups, so scripts sounded natural when delivered; and to establish a precise timeline of occurrences from participants' arrival in the laboratory until their departure. Trials demonstrated that each dyad took approximately 30-35 minutes to complete the experiment. The refined scripts presented a step by step account of what happens for each participant dyad in the laboratory, from arrival until departure. The pilot trials showed that the best time to activate a sparking heater faux hazard was five minutes after the experiment room door was closed—while dyad-members were busy working on the wire-tracking task. At that stage the experiment had not progressed to the point of three completed task-repetitions when participants had been instructed to call the researcher.

Sampling

Participants self-selected into timeslots the researcher made available for completing the study. Participants that were first year psychology students undertook their own blind enrolment into a stranger-pair via the SONA pool. Undergraduates of any discipline that responded to poster advertisements, emailed the researcher, and were offered the first date and time with one enrolment space remaining, so the researcher could complete a stranger-pair. Stranger dyads were necessary for the experiment because Hodges (2018) showed participants that were friends performed more within-dyad voicing (Hodges, 2018); thus, strangers were required to avoid introducing a confound. A dyad was required because within-dyad safety voicing requires two participants to engage in safety voicing among themselves about hazards they observe. Therefore, after being welcomed into the hazard laboratory, prospective participants were asked if they were strangers; whereupon all confirmed their stranger status. Aron et al. (2014, p. 92) described the non-random sampling method used in the present study as "haphazard selection."

Participants

Undergraduate students at the University of Canterbury were invited to enrol in the study via the Psychology Department participant pool (SONA), comprising first year psychology students (see SONA advertisement in Appendix A), and via university noticeboard advertising for undergraduate participants of any discipline (see noticeboard advertisement in Appendix B). The study involved a gender-relevant deception, purporting to be about the effects of gender on hand-eye coordination, and those of all genders were invited to participate.

One hundred participants were sought, and 26 participants were recruited from among the undergraduate student body at the University of Canterbury into the study, with 25 from SONA and 1 from noticeboard advertising. A sudden Covid-19-Δ lockdown from August 17th, 2021, stopped data collection; thus, limiting the sample size. Despite the subsequent reopening of the University of Canterbury, the introduction of compulsory masking would have confounded the experiment, because all participants would be required to wear safety equipment (masks) rather than the experimental group alone. Data from 24 participants was retained, with 23 from SONA, and one from noticeboard advertising. The 24 participants comprised 16 identifying as female, seven identifying as male, and one identifying as non-conforming, with ages that ranged between 17 and 37 years (*M* = 21.63, *SD* = 5.02). Data from two stranger participants was excluded from analysis because the participants found by chance that they shared a non-English regional language, and they switched language during the covert audio-recording, preventing their audio data from being coded.

Materials

Participants were recruited using the deception that the experiment was about the effect of gender on hand-eye coordination, so the information sheet and consent form were congruent with that (see Appendix C for the information sheet and Appendix D for the consent form).

The present experiment was designed to simulate job entry processes (e.g., recruitment, selection, and induction). Inspection of Table 1 shows conditions were manipulated to create a control condition that focussed on performance alone, and an experimental condition that was focussed on safety and performance. Smaller manipulations included personal equipment (e.g., gloves for performance, versus safety and performance) and laboratory equipment (e.g., an Anglepoise lamp and a rubber mat for performance, versus safety and performance).

Table 1

Group Treatment for Control and Experimental Participants' Job Entry Processes

Group treatment	Control	Experimental
Recruitment	SONA[a] pool and noticeboard posters	SONA[a] pool and noticeboard posters
Induction – general	Reading the information sheet that features a gender/hand-eye coordination deception	Reading the information sheet that features a gender/hand-eye coordination deception
Selection – task assignment using rotary pursuit task	Emphasis on performance only	Emphasis on safety and performance
Equipment provision – gloves	Cotton for performance	Nitrile rubber to stop shocks
Equipment provision – rubber mat	For improved flexibility and stability to improve performance	Anti-slip for stability to improve safety
Equipment provision – Anglepoise lamp	Illuminates wire for better performance (perform as a noun was included among control treatments in the present study).	Illuminates wire so one can perform task more safely (perform as a verb was not included among control treatments in the present study).
Induction – to wire-tracking and error counting task equipment	Emphasis on performance only	Emphasis on safety and performance
Supervision – mid task check	Emphasis on performance only	Emphasis on safety and performance

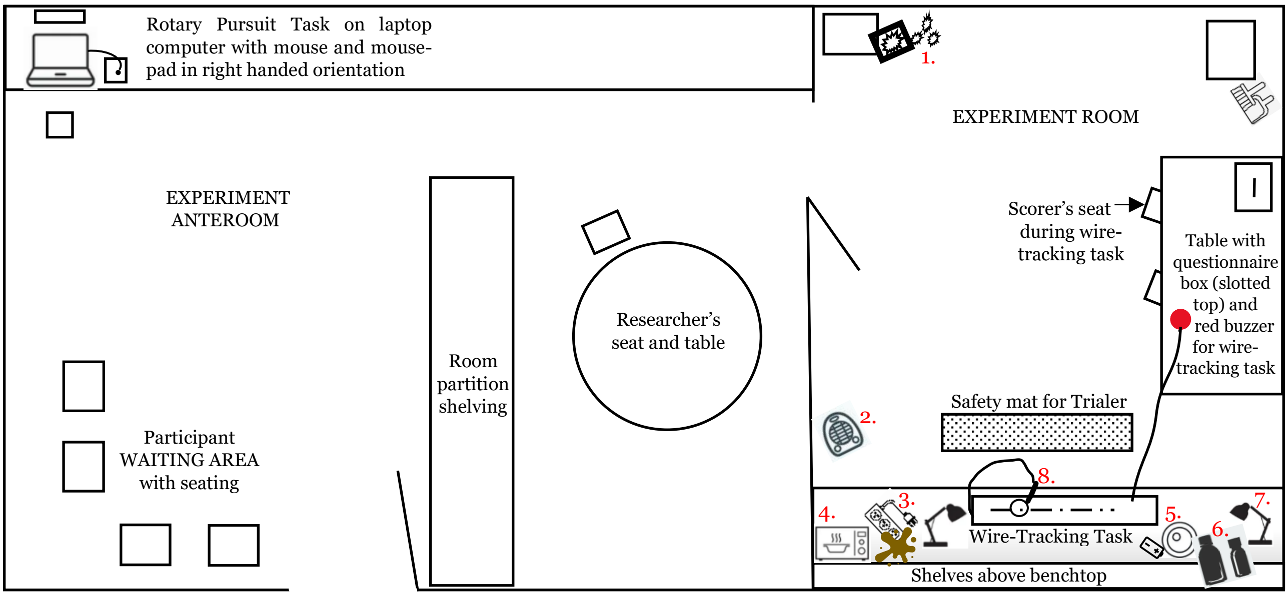
Note. [a] The SONA platform provided an online method for recruiting first year psychology students as experimental participants in exchange for course credit on psychology papers at the University of Canterbury.

Hazard Simulated Environment

The laboratory was designed to simulate a work environment and contained testing equipment (e.g., the rotary pursuit task) for simulating job entry processes (e.g., job assignment) according to task results. Inspection of Figure 1 shows the layout of the laboratory, including the experiment anteroom where participants were welcomed to the experiment, through to the experiment room complete with the placement of faux hazards and the wire-tracking task.

Figure 1

Hazard Laboratory Floor Plan with Configuration of Faux Hazards



Note. Faux hazards placed in the experiment room were: 1. a picture frame with shattered glass; 2. a sparking heater; 3. coffee spilled on a multi-board plug; 4. a metal container in a microwave; 5. a smoke alarm beside a replacement battery; 6. precariously perched chemical bottles; 7. an Anglepoise lamp with exposed wire presenting an electrocution threat; and 8. the wire-tracking task handle with exposed wire presenting an electrocution threat.

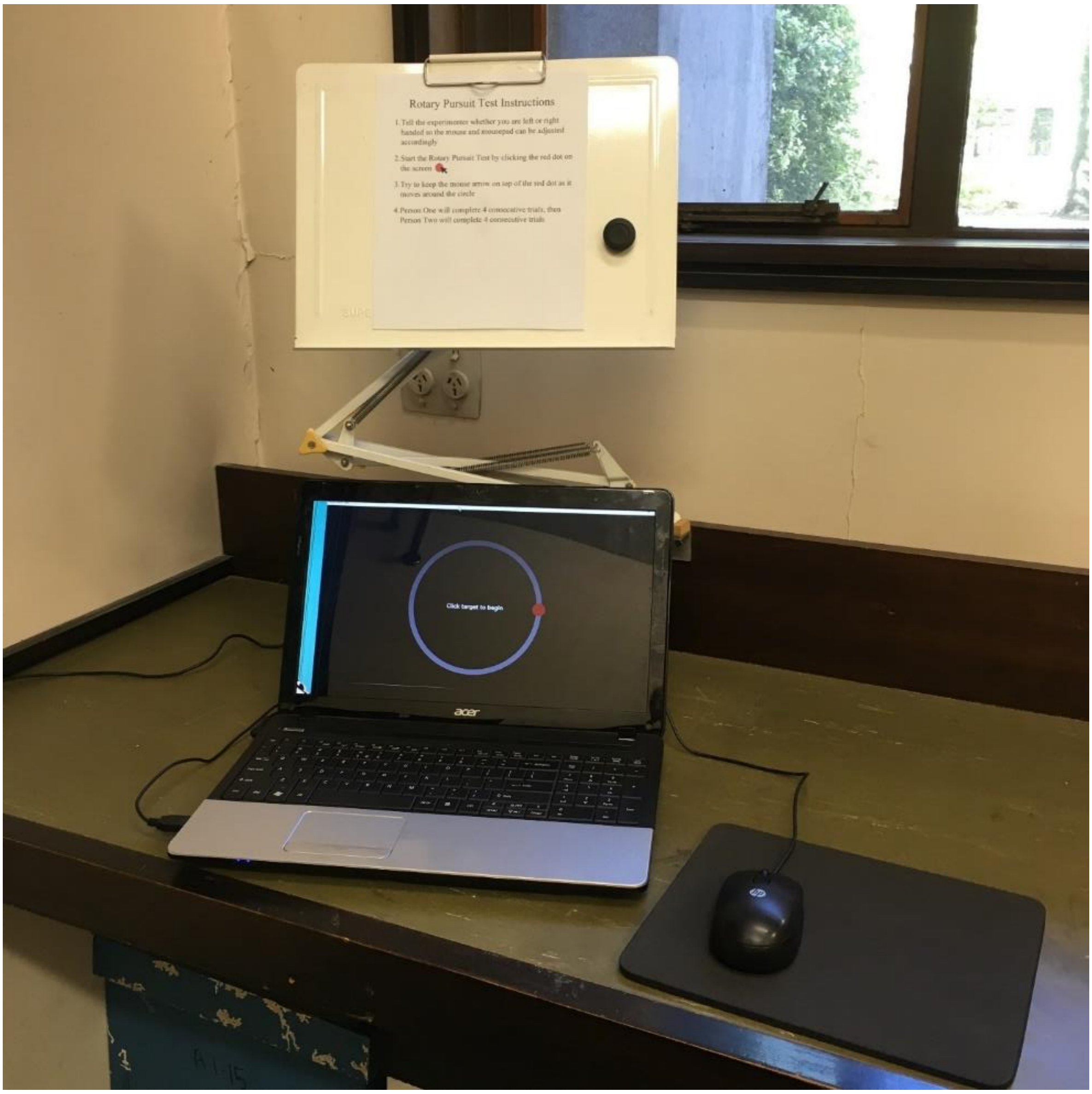
Eight artificial hazards displayed in participants' line of sight during the experiment set the scene for safety voicing while wire-tracking tasks were completed. Voicing methods that were measured included within-dyad safety voicing, reporting voicing to the experimenter, and hazard-corrective behaviours. Safe and accurate measurement of hazard voicing between participants (via covert audio recording), and voicing to the experimenter, was possible in the laboratory. Furthermore, participants attempting to correct hazards were protected from electrocution (e.g., by the multi-plug in a pool of coffee faux hazard), lacerations (e.g., by the broken glass faux hazard), chemical toxicity (e.g., by the precariously perched chemical bottle faux hazard), and fire (e.g., by the sparking heater faux hazard).

Rotary Pursuit Task

Each participant completed the rotary pursuit task (Adams, 1952) on a computer in the Hazard Laboratory anteroom. Rotary pursuit tasks are typically used to test hand-eye coordination, and in this study the participants were asked to complete the rotary pursuit test four times as a simulated selection task that was used to determine task assignment. The rotary pursuit task was available as open source software (Mueller, 2012) and was downloaded on a personal laptop computer for the present study. The computer was positioned on a high bench in the experiment anteroom. Inspection of Figure 2 shows the rotary pursuit task displayed on the laptop, with the mouse used to control the onscreen arrow cursor placed alongside. The rotary pursuit task formed part of the overall deception whereby participants were told the purpose of the experiment was to study hand-eye coordination by gender (e.g., Piper, 2011).

Figure 2

Rotary Pursuit Task and Instructions with Right Handed Mouse and Mouse-Pad Position



Faux Hazards Within the Hazard Laboratory

Faux hazards are described in detail in Table 2. Inspection of Table 2 shows a named photograph of each faux hazard; hazard placement within the experiment room; safety measures used to make faux hazards safe; and the methods participants could use to neutralise hazards.

Table 2

Explanation of Faux Hazards Within the Hazard Laboratory

Hazard	Description and Location	Hazard Mitigation	Corrective Actions
Broken Glass 	Glass shards appeared to have been thrown across the floor inside the experiment room by a fallen picture frame that had smashed on a bin, thus presenting a cutting risk.	Shards were constructed from a safe, easy to tear silicone rubber material, that appeared sharp and conducted light in the same manner as glass.	A nearby dustpan and brush provided the opportunity for participants to safely remove glass and place it in the bin on which the frame appears to have broken.
Sparking Heater 	A fan heater in the experiment room (activated by the researcher from the experimenter's table outside the experiment room) buzzed and sparked as though a live wire was arcing within, appearing to have the potential to cause a fire hazard.	A decommissioned fan heater was attached to a 9-Volt battery to power the heater's red on light (giving the appearance that the heater was on), the audio recording, and the blue LED light (synchronised to flicker in time with the audio) to give the appearance of electrical arcing.	There was the option of turning off the power to the heater using either a dial on the heater or a wall switch.
Coffee Spill on a Multi-Board Plug 	Coffee was spilt over a multi-board plug and had run onto the benchtop beneath, presenting with the appearance of an electrocution risk for participants.	A decommissioned multi-board plug was attached to a 9-Volt battery to power the red LED on light and give the impression the multi-board was receiving 250-Volts from the wall plug. The wall plug had been made safe by placing a wooden gang between it and the power supply beneath, so power was unavailable.	The multi-board could be switched off at the wall and tissue was available close by on the benchtop to clear the coffee.
Metal Container in Microwave 	A metal container within a working microwave oven on the experiment room benchtop presented a potential fire risk.	A normal wall plug powered the microwave, and the clock gave the appearance of a working microwave oven. The magnetron was removed from the oven, to prevent micro-wave generation, sparks, and fire if the microwave was activated with the metal container inside.	The metal container could be removed from the oven.

Hazard	Description and Location	Hazard Mitigation	Corrective Actions
Smoke Alarm Beside a Replacement Battery 	A smoke alarm was left abandoned on the benchtop near the wire-tracking task. A new battery (with black protective cap) awaiting installation lay nearby. Smoke alarms that remain inactive during a fire pose a threat to survival.	Battery-powered smoke alarms were unnecessary because the university had permanent hard-wired smoke/fire alarms.	The new battery could be connected and placed inside the alarm.
Precariously Perched Chemical Bottles 	Chemical bottles were precariously balanced on the edge of the shelves above the benchtop in the experiment room. One large acetone bottle seemed on the brink of falling.	Bottles contained water in lieu of dangerous chemicals. The precariously balanced acetone bottle was secured from behind by a pivoting arm, and that in turn was attached to a heavy weight, to prevent the faux acetone bottle from falling.	The bottle could be pushed back so all parts were safely supported by the shelf.
Exposed Anglepoise Lamp Wiring 	The *unused* Anglepoise lamp with exposed wiring sat on the experiment room benchtop, to participants' left as they completed the wire-tracking task. The lamp was plugged in, and switched on at the wall and cord switch, posing an electrocution risk.	The wall plug had been made safe by placing a wooden gang between it and the power supply beneath, so power was unavailable to the lamp.	The lamp could have been turned off at either the wall or cord switches.
Wiring Exposed on Wire-Tracking Task Handle 	The wire-tracking task located on the experiment room bench had exposed wiring on the cord connecting the handle to the game. A repair seemed to have been attempted using electrical insulation tape, but wires emerging through the tape suggested the was the potential for receiving an electric shock.	The hazard was made using a piece of stripped wire that was insulation-taped to the exterior of the properly insulated and electrified wire that linked the handle to the wire-tracking task. A small amount of stripped wire was arranged poking through the insulation tape, but because the stripped wire was not electrified there was no electrocution risk.	Electrical insulation tape was lying on the bench close to a pair of scissors, so participants had the option of taping over the exposed wire to protect against electric shocks.

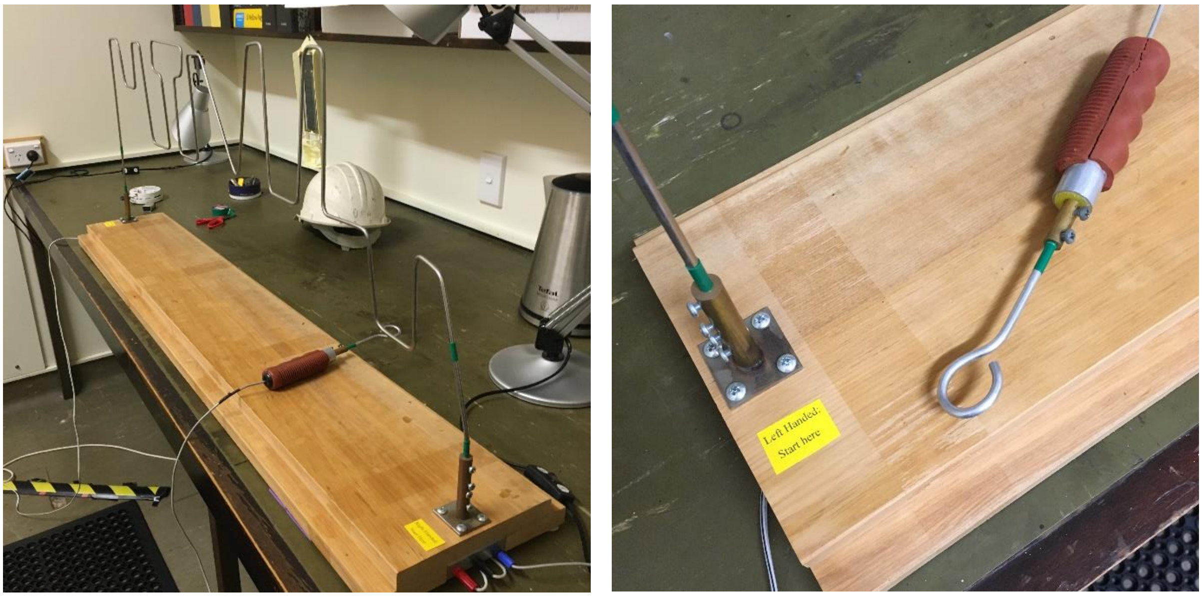
Wire-Tracking Task

Participants completed a wire-tracking task in the experiment room, using a handle with an open metal loop that was placed over the wire of the wire-tracking task. The wire-tracking task comprised a convoluted wire that was embedded into a wooden block for support. The task required the open metal loop to be engaged over the convoluted tracking wire, and then traced from one end of the task to the other without touching the convoluted wire. Inspection of Figure 3 shows the wire-tracking task positioned on the experiment room benchtop and the handle with an open metal loop.

Participants in both groups (experimental and control) were led to believe that this task was the focus of the study, and their hand-eye coordination may be related to their gender. The task was part of the deception; providing a premise to have participants in the experiment room to observe hazards. The task also provided a performance focus among the control group, and a safety and performance focus among the experimental group.

Figure 3

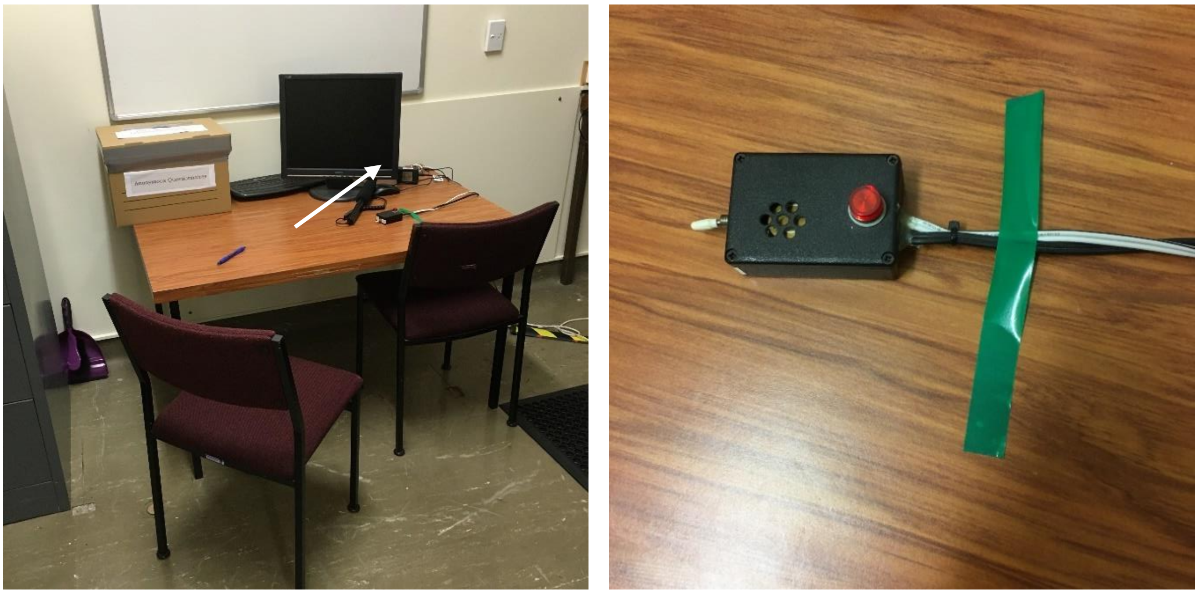
Wire-Tracking Task and Handle with Open Metal Loop



When the loop contacted the wire, that constituted an error. The device shown in Figure 4 was wired from the scorer's table to the wire-tracking task, and emitted a red light accompanied by a buzzing sound, so the scorer could record the error data using tally-marks. The scorer faced in the direction of most hazards while monitoring the lighted error indicator, and the trialer also faced toward most hazards while performing the wire-tracking task. Performance data obtained by the scorer was not analysed.

Figure 4

Error Indicator Featuring Red Light and Buzzing Sound, Taped to Table by Scorer's Sea



Note. The arrow points toward the error indicator. The left seat is positioned to encourage the scorer to sit facing toward the taped down indicator and the wire-tracking task.

Covert Audio Recording

Covert audio recordings were required for measuring within-dyad safety voicing by participants while they were unsupervised and working at their assigned tasks among hazards in the experiment room. The researcher waited outside the experiment room at the researcher's seat and table, to give participants the opportunity to voice to one-another. The digital voice recorder in the experiment room was activated by the researcher and then concealed beneath the hardhat displayed in Figure 5.

Figure 5

A Hard Hat Conceals a Small Digital Recording Device Used During Covert Recording

Note. A digital voice recorder was activated and then concealed in shadows under a hard hat, as indicated by the white arrow, to covertly record participant's speech.

Safety and Performance Scripts Used as a Reliability Tool

From the time of participant entry until participants completed the debrief form at the conclusion of the experiment each visit was scripted, to ensure all participants in each group were exposed to identical treatment as others within their group, and to enhance the reliability of the experimental (and control) interventions. The script for the control group focussed solely on performance, while the script for the experimental group focussed on safety and performance. Experimental and control scripts included approximately equivalent numbers of words from the researcher (699 and 697 respectively) and equivalent interactions with the researcher during the experiment. That was to ensure groups received equivalent researcher interaction.

Scripts were placed on the researcher's clipboard, so the script was accessible for performing to participants (e.g., welcoming participants to the laboratory), for asking scripted questions (e.g., different questions for safety and control groups), for recording data (e.g., during the rotary pursuit task) and for reading instructions to participants (e.g., at the start of the wire tracking task). On the script for the experimental manipulation, all manipulations were emphasised using red writing; thus, ensuring the selection and delivery of the correct (experimental or control) version to participant dyads. Figure 6 shows the safety integrated experimental group script and Figure 7 shows the control group script.

Equipment Provision

Equipment provision, like task assignment, was another job entry process that provided opportunities for safety integration. Using scripts, control participants were told that some equipment (e.g., an Anglepoise lamp and a rubber mat) had performance benefits; but experimental participants were told the same equipment had safety benefits. Different gloves were provided for control and experimental participants to complete the wire-tracking task (e.g., cotton gloves were for performance in the control condition and rubber nitrile gloves were for safety in the experimental condition).

Figure 6

Safety Integrated Experimental Group Script Used by the Researcher

Script – Safety – Even No. - Experimental

Hi there! Welcome! I'm Lizzy the researcher! Come on in and take a seat to wait for your partner…

This experiment requires stranger pairs, or people that neither know each other well nor are friends. Do you consider yourselves to be people that know each other well or are friends? No? ☐ Yes-reschedule ☐

Have a read of this information sheet about the experiment before you sign the participation consent form.

…Thank you, that's lovely! Thank you! (hold out hand to receive signed forms).

Now we have a quick questionnaire:

ParticA)How many paid jobs have you had? ☐ Did you have any accidents? ☐ Have you ever undergone a work safety induction? ☐ - Thank you,

ParticB)How many paid jobs have you had? ☐ Did you have any accidents? ☐ Have you ever undergone a work safety induction? ☐ - Thank you,

Now let's decide on task assignment. For that you will each complete the Rotary Pursuit Safety Classification Test . We use this test to determine who is best suited to safely perform each task. You each take four turns and (read out specific instructions)…(Turn on Audio)…(Record Participant A results & participant B results)…

Participant A	Participant B

…So now you are The Trialer who is expected to be safest at the buzz-wire task, and so you will do the buzz-wire task for the whole experiment, and you will be The Scorer doing recording.

Come on through to the lab…

This is where I will be if you need me during the experiment…(indicate right)

Here's the lab…

…And the buzz-wire task…(pull on gloves and pick up wand)…I am interested in your performance, but it is also important that you are protected from buzz-wire shocks which are only tiny but that some people may find uncomfortable. Here's a fresh pair of rubber safety gloves to stop shocks for The Trialer…

So, The Trialer completes the task 6 times…and then an error total can be added up here (indicate at the base of the recording form)…obviously you want to perform well, with low errors…but safety is also important, so avoid skin-contact with the buzz-wire…If you're right handed start on the right. If the wire wobbles after you bump it, you're free to steady it with your hand before continuing.

This is where it is best to stand, on the anti-slip rubber mat that improves stability, so the task can be completed safely.

The Trialer puts the loop over the wire and attempts to pass the loop from one end to the other without it touching the wire, with errors not counted until you reach the beginning at the higher tape. The Trialer says "GO" to start, and "STOP" when they reach the higher tape at the end. It's important that you perform very accurately, but you also need to keep safety in mind, so keep your safety gloves between you and the buzz-wire to stop shocks. Consider adjusting the Anglepoise lamp to illuminate the wire, because it can help you perform the task more safely.

The Scorer will be sitting here and counting the number of times the light comes on (demonstrate light) while the task is being completed. The light comes on each time an error's made, and tally-marks are used here (point to Error Counting Form) to record the errors made… Error tallying is safe, so you can confidently concentrate on completing that task with accuracy.

Now "Scorer"…would you please record these participant codes at the top of the error recording form (read out participant codes for recording)…

Before I leave you to complete the task, have you any questions for me?

I'm just on the other side of the wall if you need me for anything…I will pop back to check on you and your performance when you call me after three trials, and again at the end…(start 4 min timer…in 4 min play sparking).

*…………..(then some time later when called) Is everything going well (pause……..) …are your error rates decreasing? And your shock proof gloves are working OK?…O.K! Call me again when you're finished…

…Thank you for that. How did you go (pause……)? Oh Great! I have an anonymous questionnaire for you to fill in, and then we will go through the debrief form…

Participant Codes: Trialer______________ & Scorer__________________

Figure 7

Control Group Script Used by the Researcher

Script – Neutral – Odd No. - Control

Hi there! Welcome! I'm Lizzy the researcher! Come on in and take a seat to wait for your partner…

This experiment requires stranger pairs, or people that neither know each other well nor are friends. Do you consider yourselves to be people that know each other well or are friends? No? ☐ Yes-reschedule ☐

Have a read of this information sheet about the experiment before you sign the participation consent form.

…Thank you, that's lovely! Thank you! (hold out hand to receive signed forms).

Now we have a quick questionnaire:

ParticA)How many paid jobs have you had? ☐ Have you ever experienced a formal performance appraisal? ☐ How were your performance ratings? ☐ - Thank you,

ParticB)How many paid jobs have you had? ☐ Have you ever experienced a formal performance appraisal? ☐ How were your performance ratings? ☐ - Thank you,

Now let's decide on task assignment. For that you will each complete the Rotary Pursuit Performance Classification Test. We are going to use this test to determine who is best suited to perform each task. You each take four turns and (read out specific instructions)… (Turn on Audio)…(Record Participant A results & participant B results)..

Participant A	Participant B

…So now you are The Trialer who is expected to be perform the buzz-wire task the best, so you will do the buzz-wire task for the whole experiment, and you will be The Scorer doing recording.

Come on through to the lab…

This is where I will be if you need me during the experiment…(indicate right)

Here's the lab with the wire-tracking task…

…And here's the wire-tracking task for you to complete…(pull on gloves and pick up wand)…I am interested in your performance, and that will be evaluated as you complete the task while wearing a pair of performance gloves that are hopefully not too uncomfortable. Here's a fresh pair of cotton performance gloves that I have for The Trialer…

So, The Trialer completes the task 6 times…and then an error total can be added up here (indicate at the base of the recording form)… obviously you want to perform well, with the least errors possible…when the six trials are all totalled up… If you're right handed start on the right. If the wire wobbles after you bump it, you're free to steady it with your hand before continuing.

This is where it is best to stand on the rubber mat that improves flexibility and stability which should improve your task performance.

The Trialer puts the loop over the wire and attempts to pass the loop from one end to the other without it touching the wire, with errors not counted until you reach the beginning at the higher tape. The Trialer says "GO" to start, and "STOP" when they reach the higher tape at the end. It's important that you perform very accurately during the task, so keep that in mind. Consider adjusting the anglepoise lamp to illuminate the wire, because it can help you perform better on the task.

The Scorer will be sitting here and counting the number of times the light comes on (demonstrate light) while the task is being completed. The light comes on each time an error's made, and tally-marks are used here (point to Error Counting Form) to record the errors made… It's important that you perform your error tallying task with a high level of accuracy.

Now "Scorer"…would you please record these participant codes at the top of the error recording form (read out participant codes for recording)…

Before I leave you to complete the task, have you any questions for me?

I'm just on the other side of the wall if you need me for anything…I will pop back to check on you and your performance when you call me after three trials, and again at the end…(start 4 min timer…in 4 min play sparking).

*…………….(then some time later when called) Is everything going well (pause……..) …are your error rates decreasing? And you're managing your cotton gloves OK?…O.K! Call me again when you're finished…

…Thank you for that. How did you go (pause…….)? Oh Great! I have an anonymous questionnaire for you to fill in, and then we will go through the debrief form…

Participant Codes: Trialer______________ & Scorer_________________

Measures

Safety and Performance Scripts Used for Data Collection

In addition to their role as a reliability enhancing tool, the scripts also included measures that were used for data collection during the experiment.

Confirmation of stranger status. Recruitment advertising specified that participants would be paired with strangers, and at the beginning of each experiment (for experimental and also control groups) both participants within a dyad were asked to confirm their stranger-pair status. The following statement and question were read to participant pairs: "This experiment requires stranger-pairs, or people that neither know each other well nor are friends. Do you consider yourselves to be people that either know each other well or are friends?" Those that verbally confirmed "no" were permitted to continue participating because they qualified as a stranger-pair.

Initial questions about performance versus safety. Each participant was asked to respond to three questions included within the laboratory script that were posed verbally by the researcher. Both experimental and control participants were initially asked, "How many paid jobs have you had?" A further two questions were different for the experimental and control groups. "Did you have any accidents?" and "Have you ever undergone a work safety induction?" were the safety focussed work questions that were posed to individuals in the experimental group. In contrast, those in the control group were asked, "Have you ever experienced a formal performance appraisal?" and "How were your performance ratings?"

Rotary pursuit test. Rotary pursuit test result data was recorded on scripts and then totalled to provide results for assigning participants to different wire-tracking tasks.

Error Data Tally

The participant assigned the task of scorer collected error data for trialers using tally-marks during the wire-tracking task in the experiment room of the hazard laboratory. The scorer was responsible for recording participant codes called out by the researcher and tallying the trialer's error total using the tally chart displayed in Figure 8. Consistent with the

Figure 8

Tally Chart for Counting Errors on the Wire-tracking Task with Gender Self-Reporting

Complete **Wire Tracking Task Error Counting Form** using tally-marks like this: ~~||||~~

	Trialer – wire tracking		Scorer – error counting
Participant Codes	____________________	&	______________________

Error Tally

Trial 1:

Trial 2:

Trial 3:

Please stop and call for the experimenter (Lizzy) now…

Trial 4:
(The Trialist remains the same person for all 6 trials)

Trial 5:

Trial 6:

Trialer's Error Total (this question to be completed by Scorer) …………………… [ ]

Trialer's Gender (this question to be completed by Trialer) ………………… [ ]

Now please call for the experimenter (Lizzy) again…

deception that the experiment was investigating the effect of gender on hand-eye coordination, the scorer recorded the trialer's error data, and then handed the error tallying chart to the trialer so trialers could record their self-reported gender in an open box format. The researcher asked the trialer to hand the tally chart back to her once it was completed.

Self-Reported Gender, Age, Gratefulness, Reciprocity, and Obligation Questionnaire

The final self-report questionnaire is displayed in Figure 9 and was completed by each participant in the experiment room. The questionnaire had an open box format for reporting gender and age. Consistent with the deception that the experiment was investigating the effect of gender on hand-eye coordination, the gender question was asked along with the true questions of interest concerning the dependent variables: gratitude, reciprocity, and obligation. The self-report questionnaire was the first time scorers were asked to report their gender, and the second time trialers were asked to report their gender. Questions concerned dependent variables—gratitude, reciprocity, and obligation—that participants had experienced in response to assistance offered by the researcher when she helped them to participate in the study.

Dependent Variables

The dependent variables in the experiment were evaluated using behavioural measures for voicing and hazard correction, and by self-report questionnaire for gratitude, reciprocity, and obligation.

Gratefulness, reciprocity, and obligation. Questions shown in the questionnaire displayed in Figure 9 were adapted from a conference poster and an unpublished study, both by Adams and Burt (2015; 2018).

Figure 9

Self-Reported Gender, Age, Gratefulness, Reciprocity, and Obligation Questionnaire

Questionnaire Participant Code__________________

1) Gender

2) Age

The following items are about how you might feel and what you might do after I helped you participate in the study. Please indicate your agreement or disagreement with each statement by circling a number on the scale:

3) Based on the study guidance provided by me, you felt gratitude

1	2	3	4	5
Not at all	Slightly	Somewhat	Moderately	Extremely

4) Based on the study guidance provided by me, you would help me if you had a chance to

1	2	3	4	5
Not at all	Slightly	Somewhat	Moderately	Extremely

5) Based on the study guidance provided by me, you would be motivated to help other participants in the study if you had a chance to

1	2	3	4	5
Not at all	Slightly	Somewhat	Moderately	Extremely

Thank you for your help ~ Kia ora mō tō āwhina

Voicing and hazard correction. Within-dyad safety voicing, reporting voice and hazard correction data was collated using a scoring sheet displayed in Figure 10, that was adapted from Hodges (2018).

Figure 10

Scoring Sheet for Within-Dyad Voicing, Reporting Voice, and Hazard Correction

Dyadic Voicing & Neutralising   Participant Codes____________&____________

Trialer   Scorer

Within-Dyad Voicing Scoring Sheet   4 min heater activated at ____mins____secs

	Discussing the Hazard		
	Was hazard discussion initiated?	Time into experiment hazard discussion occurred	No. of words spent on hazard discussion
Broken glass	Yes By trialer/scorer? ? P.Code:		
Sparking heater	Yes By trialer/scorer? ? P.Code:		
Coffee spill on multi-board plug	Yes By trialer/scorer? ? P.Code:		
Metal container in microwave	Yes By trialer/scorer? ? P.Code:		
Smoke alarm beside replacement battery	Yes By trialer/scorer? ? P.Code:		
Precariously perched chemical bottles	Yes By trialer/scorer? ? P.Code:		
Exposed Anglepoise lamp wiring	Yes By trialer/scorer? ? P.Code:		
Wiring exposed on wire-tracking task handle	Yes By trialer/scorer? ? P.Code:		

Reporting Voice and Corrective Behaviour Scoring Sheet

	Reporting the Hazard		Hazard Correction	
	Was hazard reported?	Time into experiment / Post Experiment i.e. after 2nd experimenter call-in	Was the hazard corrected	Hazard corrected by whom?
Broken glass	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Sparking heater	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Coffee spill on multi-board plug	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Metal container in microwave	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Smoke alarm beside replacement battery	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Precariously perched chemical bottles	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Exposed Anglepoise lamp wiring	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter
Wiring exposed on wire-tracking task handle	Yes By trialer/scorer? ? P.Code:		Yes / No	Participant Experimenter

Sound File: Total Lab-Time:____mins________secs

Within-dyad safety voicing. Within-dyad safety voicing occured if participants noticed a safety hazard in the experiment room and discussed that safety hazard among themselves. Faux hazards provided positive stimuli for within-dyad safety voicing, so voicing could be measured via covert audio recordings using word-count and number of instances per dyad. One instance was possible for each of the eight hazards.

Reporting voice. Participants used their reporting voice if they reported a hazard directly to the researcher. Faux hazards provided a positive stimulus for participants to report hazards to the researcher, using reporting voice behaviour.

Hazard-corrective behaviours. Participants had the opportunity for hazard correction when they corrected experiment room hazards themselves or asked the researcher to correct hazards for them.

Procedure

Upon arriving at the laboratory participants were welcomed. The researcher introduced herself, and the first participant to arrive was invited to, "come on in and take a seat to wait for your partner," as the researcher indicated (using an open hand with her palm up) toward seats in the participant waiting area within the experiment anteroom. The experiment could proceed if both participants confirmed they were strangers. Participants were asked to read the information sheet (with deception) about the experiment (see Appendix C); place check-marks beside consent form items to indicate each item consented to had been read; and then sign the consent form (see Appendix D). Participants were assigned codes on their consent form to de-identify their data, and the researcher discretely transferred the codes to the self-report questionnaire, the debrief with continued participation consent form (used to confirm continued consent after the true purpose of the experiment and the use of covert recording was revealed to participants), and the researcher-reported voicing and neutralising behaviours form.

The researcher delivered scripted questions that together formed safety and performance questions for those in the experimental group, and performance questions for those in the control group. From the first scripted questions asked verbally by the researcher, those in the experimental (safety) group received questions about safety performance, saw safety used for selection criteria during task assignment, received protective safety equipment, and received safety focussed induction and supervision interactions. While the control group did not; they did receive the same amount of interaction with the researcher, but the focus was not on safety.

Participants were invited to the standing bench in the experiment anteroom where they took part in the simulated selection manipulation that used a rotary pursuit game for task assignment. Participants were shown how to perform the rotary pursuit task and to ensure the task was perceived to be fair by right and left handed participants, the mouse and mouse pad were shifted to the appropriate side of the computer depending on participants' dominant hand. Participants in the experimental group were told, "this test [is] to determine who is best suited to *safely perform* each [wire tracking] task," and participants in the control group were told, "this test [is] to determine who is best suited to *perform* each [wire tracking] task." Participants activated the test by clicking the red dot onscreen using the mouse with a corresponding onscreen arrow cursor, and then tried to keep the arrow cursor on top of the dot as it travelled in a clockwise circle on the computer screen. Each participant within a dyad completed the task four consecutive times while the researcher recorded all results and totalled each participant's score.

The participant from each dyad that scored the longest cumulative time with their arrow cursor over the moving red circle that was shown in Figure 2 was assigned the wire-tracking task in the Hazard Laboratory experiment room and was then called the *trialer*; the participant scoring the shortest cumulative time with their arrow cursor over the moving red circle was assigned the recording task and was then called the *scorer*. The researcher reiterated to those in the experimental group that the *trialer* was expected to be *safest* at the wire-tracking task; whereas she reiterated to those in the control group that the *trialer* was expected to *perform best* at the wire-tracking task.

Next, the researcher invited participants through to the experiment room and explained how the *trialer* should perform the wire-tracking task, and how the *scorer* should complete the scoring task. Opportunities for participants to use their reporting voice presented immediately upon their introduction to the experiment room. *Trialers* in the experimental group were issued rubber nitrile gloves and told they were safety gloves to prevent shocks; while *trialers* in the control group were issued with cotton gloves and told they were performance gloves. *Trialers* and *scorers* were instructed that they were only to do the task they were assigned, and not to swap tasks half-way through the experiment. The *trialer* was shown how to pick up the wire-tracking task handle and place the loop onto the wire-tracking task at the right side if right handed and the left side if left handed. To enhance participants' perceptions of fairness, and to ensure measurement quality (e.g., for questions that participants were asked later in a self-report, about gratitude they felt toward the researcher), all those assigned to the wire-tracking task (*trialers*) were told right handed participants should start the task at the right, and left handed participants, at the left. There was green insulating tape at the start and end points, and each trial only started when the *trialer* moved the metal loop past the green insulating tape to the metal wire and said, "go!" *Trialers* were told the aim of the task was to pass the wire loop from one end of the game to the other without making an error. *Trialers* were facing most of the hazards contained in the experiment room while performing the wire-tracking task. A further manipulation was the provision of an Anglepoise lamp to those in the experimental group to help with *task safety*, and to the control group to improve *task performance*. The lamp was turned off but could be switched on by participants. Participants were instructed that each trial ends when the *trialer* says, "stop!" If the wire loop did contact the task wire, that constituted an error, and activated a red lighted buzzer on the scorer's table. *Trialers* were required to repeat the task six times in total, from start to finish.

Scorers were introduced to the error tallying chart that was noted in Figure 8. The researcher asked *scorers* to record the participant codes she called out, at the top of the tally chart, for both *trialer* and *scorer* respectively. *Scorers* in the experimental group were told error tallying was safe to complete with accuracy, while *scorers* in the control group were asked to perform with a high level of accuracy. Participants from both groups had error tallying charts featuring an instruction to call the researcher into the experiment room after three trials were completed. Before leaving the experiment room the researcher told both participants, “I’m just on the other side of the wall if you need me for anything.”

The researcher activated the experiment room sparking heater four minutes after closing the experiment room door. The participants could use their reporting voice by coming out of the experiment room to tell the researcher immediately; moreover, reporting voice opportunities were further enhanced using the mid-experiment supervisory check when the wire-tracking task was half completed. At that time the researcher inquired whether everything was going well, and whether participants’ shock proof (experimental group) or cotton (control group) gloves were working. Reporting voice behaviours included reporting hazards while the researcher was explaining the wire tracking task in the experiment room, reporting hazards when participants called through the experiment room doorway mid-task to report a hazard to the researcher, and reporting hazards when the researcher entered the experiment room for the supervisory check. When reporting voice behaviour occurred it was noted on the scoring sheet that was displayed in Figure 10.

Participants could *within-dyad safety voice* to one another from the time the experiment room door closed, and the wire-tracking task began, and was also noted on the scoring sheet displayed in Figure 10. Furthermore, participants had the opportunity to use *hazard-corrective behaviours*, to fix the hazard themselves or request the assistance of the researcher. Immediately upon being alerted to a hazard, the researcher would agree that the hazard looked dangerous, and would correct the hazard (e.g., for coffee spilt on the multi-board plug the researcher would turn off the wall switch and then mop up coffee that was spilt on the plug). At the conclusion of each experiment the researcher recorded requested hazard corrections she completed, and also the hazards participants had corrected that were discovered during the post-experiment experiment room audit, and both were displayed in Figure 10.

When participants had completed all six repetitions of the wire-tracking task they were thanked, and dyad members were asked to independently complete the self-report questionnaire that was shown in Figure 9. Opportunities for participants to use their *reporting voice* persisted until participants completed the final questionnaire, but not after the debrief began.

The debrief occurred after the final questionnaire was completed. Participants read the debrief form and then the researcher discussed the true purpose of the study and why the deception was required. Participants were shown the recording device used to covertly record their within-dyad voicing. Participants were instructed that they could ask for their recording to be deleted immediately (none did). Participants were also instructed that they could change their mind and withdraw their consent later and were then asked to reconfirm their participation consent (see Appendix E). Participants were asked to maintain confidentiality about the true purpose of the experiment until data collection concluded.

Participants recruited from the first year psychology class were each thanked with two credits toward their final grade, and participants recruited from among the undergraduate student population via poster advertisements were each thanked with a $10 MTA petrol voucher.

Results

The purpose of this experiment was to examine the effect that incorporating safety into work entry processes exerted on new employees' safety behaviours. Planned analyses included performing a series of ANOVAs to test the study hypotheses presented in the introduction; however, the constrained sample size meant continuing with the planned analyses was not appropriate. The results are therefore only presented as descriptive statistics, and no attempt is made to interpret or draw any meaning from them.

Demographic data obtained from participants is displayed in Table 3, and participant flow through the experiment is detailed in Figure 11. Blind participation ensured participants did not know that there were two conditions within the experiment, and therefore, whether they were assigned to the control or experimental group. In contrast, the researcher was aware of stranger-dyads' group treatment when recording reporting voice data and hazard correction data. Within-dyad voicing data from covert audio recordings was de-identified using participant codes, and later on the day of collection data was coded blind so the

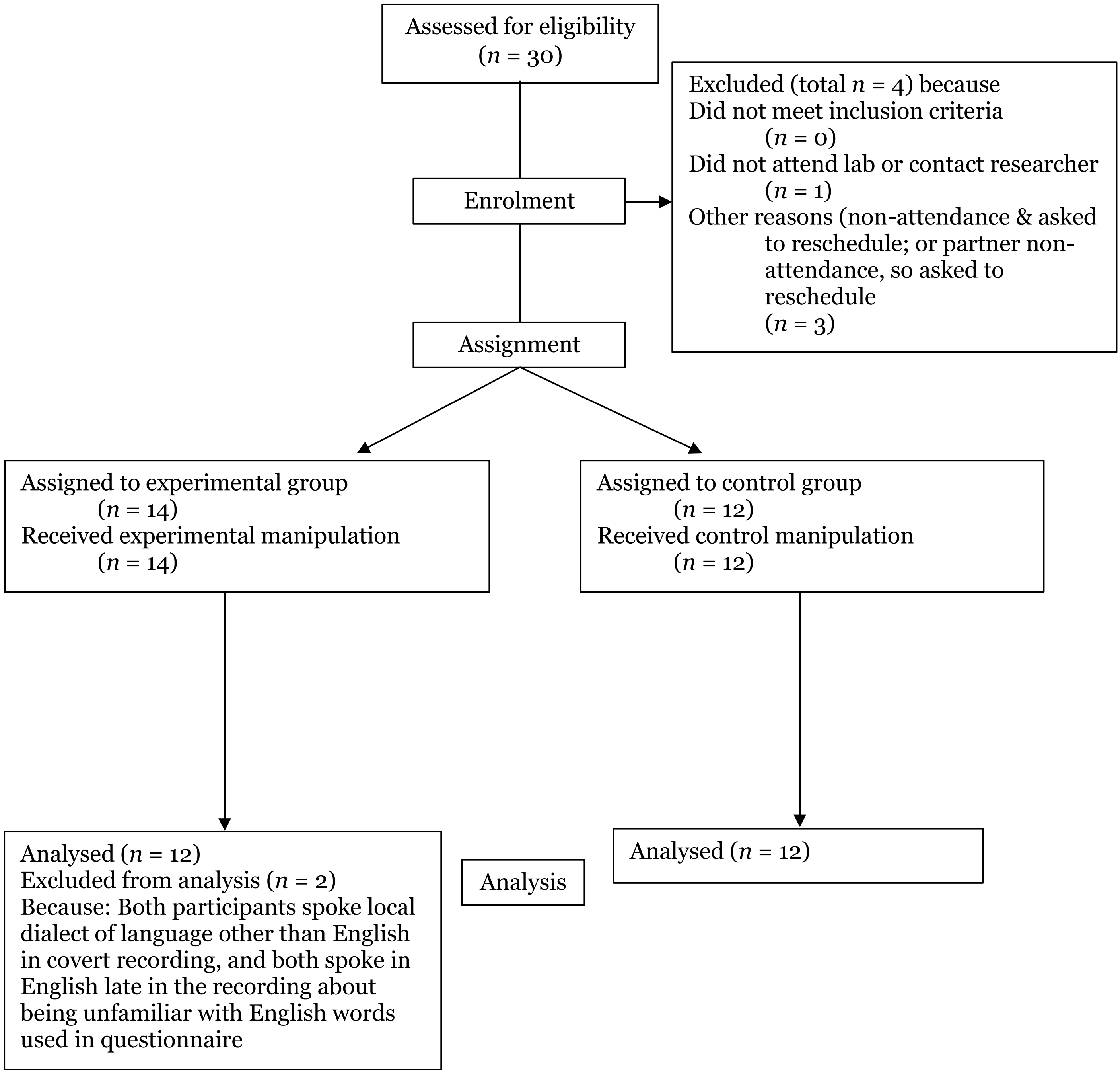
Table 3

Participants' Demographic Information by Condition

	Condition	
	Control (N = 12)	Experimental (N = 12)
Gender		
Male	3	4
Female	8	8
Non-conforming	1	
Age in years		
Mean (*SD*)	23.5 (5.82)	19.75 (3.33)

Figure 11

Participant Flow Through Stages of Safety Integrated Job Entry Processes Experiment that Measures Safety Behaviour Outcomes



Note. Flowchart recommended by Schulz et al. (2010) describes participant flow through experiments.

researcher would be unaware of group treatment while coding the audio data. Within-dyad safety voicing was coded for whether hazard discussion was initiated, and the number of words spent on hazard discussion. After audio data coding, voicing data scoring sheets were subsequently annotated according to whether participants received “experimental” or “control” group treatment.

Random group assignment usually makes planned ANOVA calculations an appropriate choice (subject to adequate sample size) for comparing outcomes on the dependent variables for control versus experimental conditions. Random assignment to conditions, combined with a sample size sufficient for errors to cancel each other out within groups, should cause noise to decrease, and the true difference signal to become relatively dominant, resulting in sufficient power to detect true differences between experimental and control groups. Assuming the planned 100 participants (50 per condition) was achieved, and a medium effect size was expected, and that increases (but not decreases) in all measured dependent variables were also expected, using a significance level of .05 would provide 80% power to detect an effect (Aron et al., 2014, pp. 324-325). The smaller than intended sample size decreased the power of the experiment to detect differences between groups (the true signal) because any signal was more likely to be obfuscated by differences within groups because of uncancelled random error (the noise). Therefore, performing ANOVA was not expected to reliably detect true differences between groups with the small quantity of data obtained, and was likely to cause a Type II error (Aron et al., 2014).

Statistical Analyses

Hypotheses 1 to 3 predicted that those receiving safety integrated work entry processes would have higher levels of self-reported gratitude than those not receiving safety integrated work entry processes; higher levels of self-reported obligation than those not receiving safety integrated work entry processes; and higher levels of self-reported reciprocity than those not receiving safety integrated work entry processes.

The small quantity of data obtained was tabulated, and descriptive statistics for participants' average gratitude, reciprocity, and obligation ratings were compared by condition. Table 4 shows the means and ranges calculated for the variables collected to test hypotheses 1 to 3.

Table 4

Descriptive Statistics for Gratitude, Reciprocity, and Obligation Mean Ratings by Condition

	Control (N = 12)	Experimental (N = 12)
Gratitude		
Mean (*SD*)	5.17 (0.83)	5.25 (1.06)
Range (min-max) [a]	3.00 (4.00-7.00)	3.00 (4.00-7.00)
Reciprocity		
Mean (*SD*)	6.08 (0.67)	5.92 (1.08)
Range (min-max) [a]	2.00 (5.00-7.00)	3.00 (4.00-7.00)
Obligation		
Mean (*SD*)	6.17 (0.58)	5.92 (1.31)
Range (min-max) [a]	2.00 (5.00-7.00)	4.00 (3.00-7.00)

Note. [a] The potential range was 6, from a score of 1.0-7.0.

Hypotheses 4 and 5 predicted that within-dyad safety voicing would occur more often, and with greater within-dyad word counts, respectively, among those receiving, compared to those not receiving, safety integrated work entry processes.

To test hypotheses 4 and 5, covert audio recordings were analysed for evidence of within-dyad safety voicing. The following examples demonstrate within-dyad safety voicing and were taken from a single covert recording of the same stranger-dyad. The first example of voicing occurred 10 seconds after participants noticed the sparking heater, and used four words, with safety voicing being initiated by Participant A. The second example of voicing occurred within the same dyad, as dyad members elaborated on the danger posed by the sparking heater. That example occurred almost two minutes after the heater began sparking and was initiated by Participant B who together with Participant A used 34 words. The dyad scored a total of 38 within-dyad safety voicing words.

Example 1:

Participant A: That’s kind of concerning!

Example 2 (34 words; safety voicing initiated by Participant B):

Participant B: I’m concerned about that!

Participant A: Yeah, that was my reaction too.

Participant B: That was short wiring!

Participant A: Yeah, I was like that the blue in there’s kinda…

Participant B: Right…

Participant A: …concerning.

Participant B: …the lady running the study; what’s her name?

Results for within-dyad safety voicing *frequency* are shown by condition in Table 5.

Table 5

Frequency of Within-Dyad Safety Voicing by Condition

Hazard	Control (*N* = 6)	Experimental (*N* = 6)
Broken glass	0	0
Sparking heater	1	1
Coffee on multi-plug	0	0
Metal in microwave	0	0
Smoke alarm	0	0
Tipping chemical bottles	0	0
Lamp wire exposed	0	0
Handle wire exposed	0	0
Total voicing frequency	1	1

Note. Within-dyad safety voicing reported at the dyad level (six dyads per condition).

Results for the *number of words* used during within-dyad voicing is shown by condition in Table 6.

Table 6

Number of Words Used in Each Condition for Within-Dyad Safety Voicing

	Condition	
	Control	Experimental
Hazard	Words used (N = 6)	Words used (N = 6)
Broken glass	0	0
Sparking heater	0 (n = 5)	0 (n = 5)
	38 (n = 1)	2 (n = 1)
Coffee on multi-plug	0	0
Metal in microwave	0	0
Smoke alarm	0	0
Tipping chemical bottles	0	0
Lamp wire exposed	0	0
Handle wire exposed	0	0

Note. Within-dyad voicing counted as number of words per dyad (six dyads per condition).

Hypothesis 6 predicted that those receiving safety integrated work entry processes would report more hazards to the researcher (reporting voice) than those not receiving safety integrated work entry processes.

Participants' reporting voice frequency for the control compared to the experimental condition was measured at the individual rather than the dyadic level and is reported in Table 7.

Table 7

Reporting Voice Frequency by Condition

Hazard	Control (N = 12)	Experimental (N = 12)
Broken glass	1	0
Sparking heater	2	1
Coffee on multi-plug	2	1
Metal in microwave	0	0
Smoke alarm	0	0
Tipping chemical bottles	0	0
Lamp wire exposed	0	0
Handle wire exposed	0	0
Total reporting frequency	5	2

Note. Reporting voice frequency at the individual level (12 participants per condition).

Hypothesis 7 predicted that those receiving safety integrated work entry processes would correct more hazards within the hazard laboratory than those not receiving safety integrated work entry processes.

Participants' within-dyad hazard correction frequency for the control compared to the experimental condition was measured at the dyadic level and is reported in Table 8.

Table 8

Hazard Correction Frequency Within Dyads by Condition

Hazard	Control (N = 6)	Experimental (N = 6)
Broken glass	0	0
Sparking heater	2	1
Coffee on multi-plug	2	1
Metal in microwave	0	0
Smoke alarm	0	0
Tipping chemical bottles	0	0
Lamp wire exposed	0	0
Handle wire exposed	0	0
Total correction frequency	4	2

Note. Within-dyad hazard correction reported at the dyad level (six dyads per condition).

As noted, it is not appropriate to interpret between group results; however, inspection of Table 9 shows the overall level of voicing and hazard correction for this experiment is very much consistent with those achieved in experiments conducted by Davies (2016), Hodges (2018), and Marwick (2017). That consistency is seen if we consider the voicing and hazard correction across groups in the various experiments. Unfortunately, the extremely low voicing and hazard correction results—Marwick (2017) got all zeroes—is testament to the difficulty organisations face generating safety voicing behaviour by employees.

Table 9

Total Voicing and Correction Frequency by Condition

	Control			Experimental		
Hazard	Dyadic voicing	Reporting voice	Hazard correction	Dyadic voicing	Reporting voice	Hazard correction
Broken glass	0	1	0	0	0	0
Sparking heater	1	2	2	1	1	1
Coffee on multi-plug	0	2	2	0	1	1
Metal in microwave	0	0	0	0	0	0
Smoke alarm	0	0	0	0	0	0
Tipping chemical bottles	0	0	0	0	0	0
Lamp wire exposed	0	0	0	0	0	0
Handle wire exposed	0	0	0	0	0	0
Total frequency	1	5	4	1	2	2

Discussion

This randomised controlled experiment was designed to test whether integrating safety within job entry processes—to simulate a generative work safety culture—would increase self-reported gratitude, obligation, and safety-focussed reciprocity, that participants would demonstrate via increased voicing and hazard correction. Safety was integrated within the job entry processes undertaken in a laboratory setting by experimental group participants, but not by control participants. At the point of simulated job entry, participants experienced selection, the provision of equipment, induction, and supervision, with participants in the experimental group receiving a performance plus safety intervention, while control participants received only a performance focussed intervention.

Sample size underpowering affected this experiment by decreasing the ability to use statistical analysis to detect differences predicted by the following hypotheses: hypothesis 1—that self-reported gratitude would be higher among those receiving compared to those not receiving safety integrated job entry interventions. Gratitude was subsequently expected to exert effects on both obligation (as predicted by hypothesis 2) and consequential reciprocity (as predicted by hypothesis 3); however, underpowering also prevented meaningful results suitable for statistical interpretation being obtained for those hypotheses.

While the discussion can not directly address the results of this study, the following discussion is structured to address the practical significance of the experiment, to acknowledge the assumptions made, to discuss the limitations and delimitations related to the study design, to suggest future research directions, and to provide a conclusion.

Reciprocity may be performed in many ways, and hazardous conditions increase the importance of organisations encouraging worker safety related reciprocity so that organisations can ensure employee safety (Burt, 2015). Burt et al. (2008) predicted those that perceived a strong safety climate because they worked in a generative safety culture would actively voice and perform hazard correction. Therefore, the fourth hypothesis predicted pairs of workers would have more discussions warning each other about safety hazards in the experimental group that received more safety integrated job entry processes than in the control group that had no safety integrated job entry processes, and the fifth hypothesis predicted that more words would be used within-dyads by the experimental group to warn each other about hazards. Hypothesis 6 predicted increased voicing to the researcher, and hypothesis 7 predicted increased hazard correction by those receiving safety integrated entry processes.

Practical Significance

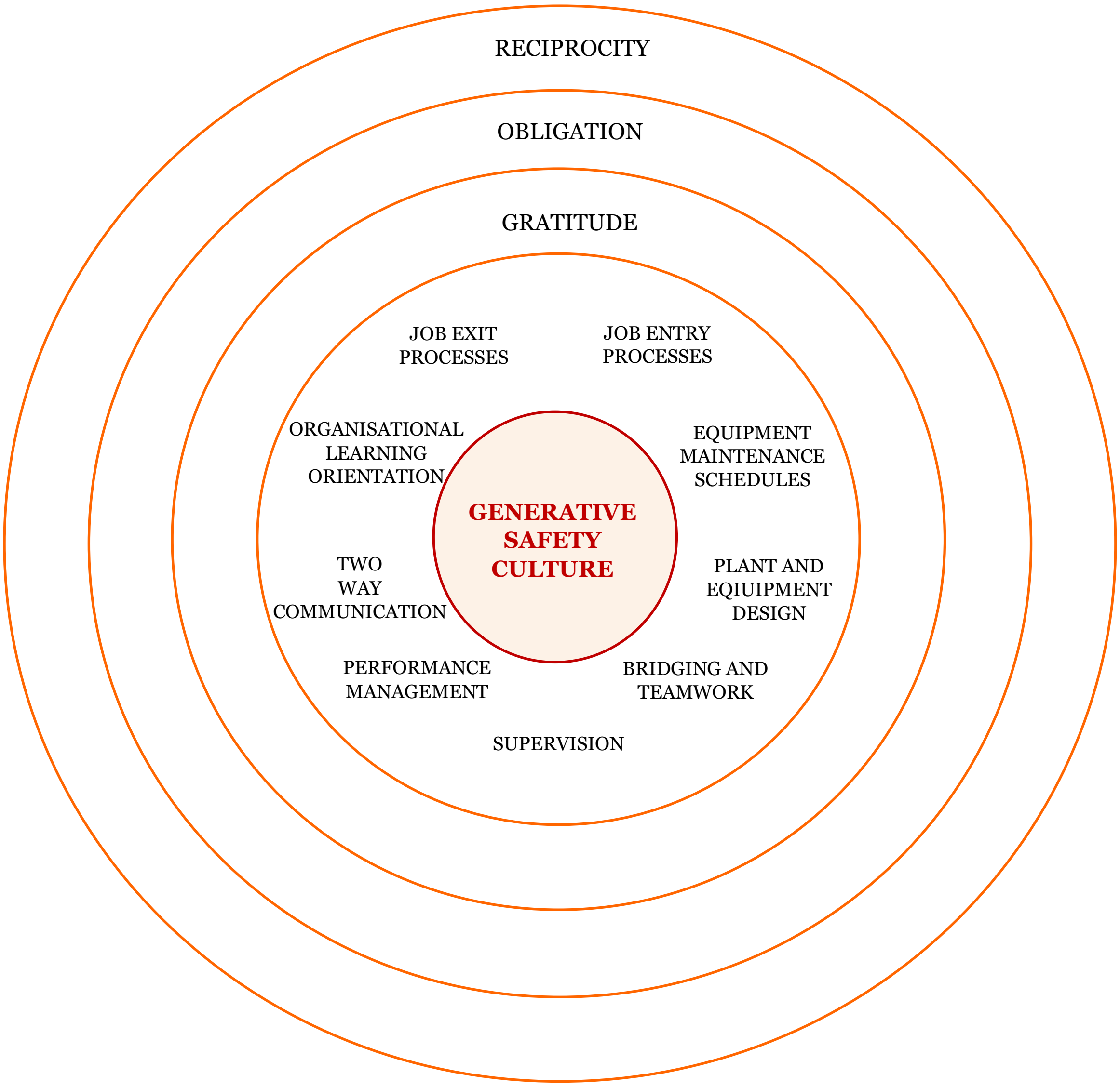
The New Zealand government created Worksafe New Zealand and introduced the Health and Safety at Work Act (2015), following the Pike River mine disaster in 2013. Worksafe New Zealand was created with an e*ducation* focus (e.g., for workers, business owners, directors, and others) to advise ways to improve safety at work (Worksafe New Zealand, 2017); and provide practical explanations of the Health and Safety at Work Act 2015 to enhance compliance. The Health and Safety at Work Act 2015 was also created to educate business owners, workers, board members and others about safety duties at work, and to provide a *legislative* response to punish failures in duty of care with prosecution and considerable financial penalties. Unfortunately, generative safety culture (Parker et al., 2006) and the perception of safety culture as safety climate (Rousseau, 1988) are not mentioned anywhere in the Health and Safety at Work Act 2015, or by Worksafe New Zealand.

Highlighting omissions concerning the development of a generative safety culture within educational materials for businesses is important, because Zacharatos and Barling (2004) demonstrated that when organisations employ work practices that are linked with generative safety culture (e.g., information sharing, hiring selectively, and training in response to agreed learning needs), improved safety climate is perceived by workers. Positive employee perceptions of safety climate can shape the development of improved safety behaviours (Moran & Volkwein, 1992); and improved safety climate improves safety performance overall (Zacharatos & Barling, 2004).

If adequate participant numbers had been achieved in this study, and assuming all hypotheses in the present experiment had been statistically supported; the practical significance offered by this experiment would be to expand knowledge about how to increase workers' compliance with safety legislation by developing a generative safety culture (Parker et al., 2006). Such results would help encourage employers, board members, and supervisors to ensure work entry processes were safety integrated. If work entry processes were safety integrated, workers could be expected to ask for help when needed, to voice about dangers to colleagues and supervisors, and to ensure hazard correction occurred. If statistical support had been provided for the gratitude, obligation, reciprocity mechanism as a mechanism of change, periodic measurements of those constructs could be made, to ensure initial rises in gratitude, obligation, and reciprocity occurred in response to safety culture and climate perceptions after new workers received safety integrated work entry treatment. Generative safety culture extends beyond job entry processes; therefore, opportunities to foster ongoing gratitude, obligation, and reciprocity could be seized, by continually adding safety components to all organisational capabilities and systems. Figure 12 shows a small selection of the various organisational capabilities available, that can be manipulated by adding generative safety culture components to cause gratitude, obligation, and reciprocal safety behaviours. Thereafter, ongoing measurements of the same could be made to ensure workers continued to report the need to reciprocate, so safety behaviours remain high over time. Measured decreases in workers' wish to reciprocate could be interpreted as a warning that a generative safety culture was compromised within an organisation, and investigation into the cause was required, followed by specific tailored advice to the affected organisation about restorative actions.

Figure 12

Generative Safety Culture Applied to Organisational Capabilities May Cause Gratitude, Obligation, and the Display of Reciprocal Safety Behaviours



Assumptions

For the purposes of this experiment, it was assumed that the safety integrated work entry process interventions performed for the safety group, but not the control group, successfully and immediately induced a state of perceived generative safety culture among laboratory participants.

It was further assumed that safety integrated entry processes were the only possible cause of increased safety behaviours like voicing. That was because although participants in the experiment would naturally vary on individual variables like personality (e.g., assertiveness and conscientiousness) just like people in the real world, the use of random assignment to groups in the experiment provided for a focussed investigation about whether voicing *increased* in response to safety integrated entry processes.

Limitations and Delimitations

Laboratory experiments may provide challenges to the ecological validity of experimental results (Barling & Frone, 2004, p. 303; Baumrind, 1985). However, naturalistic alternatives (e.g., hazardous workplaces), as suggested by Baumrind (1985), could present dangers that cause participants to suffer serious harm in a hazard research context (e.g., lacerations, burns, electrocutions, or even death). Therefore, serious ethical and moral constraints restrict the use of quasi-experimental conditions to test worker reactions to hazards; particularly because despite compromising worker safety, confounded results are possible.

The use of a sample comprising undergraduate students from the University of Canterbury may not perfectly represent the population of interest. That is because not all new workers are new to work; some have had years of work in different industries or even the same industry, when starting at a new job. Delimiting that, participants were of a similar overall age (M = 21.6, SD = 5.02, and ranging from 17 to 37 years) to many new employees undergoing job entry processes, which should enhance the ecological validity of the experiment.

The hazard laboratory used for this experiment was made to appear similar to a working office, with familiar—albeit faulty—equipment. Thus, if integrating safety into all job entry processes for students caused increased voicing in the present laboratory study, integrating safety into all job entry processes for workers should also increase voicing. Generalisability may be compromised, however, because any results obtained in a hazard laboratory based experiment would not necessarily apply to other workplaces (e.g., industrial, or agricultural etc.). Mitigating the risk of non-generalisability, the laboratory context was expected to permit the isolation of independent variables so that accurate attributions could be made about changes to levels of dependent variables. Therefore, any changes to levels of dependent variables achieved in experimental hazard settings should indicate transferrable ways of increasing safety at work (e.g., integrating safety within work entry processes to generate reciprocal safety behaviours by workers) where even small effect sizes may have lifesaving potential (Chambless & Hollon, 1998).

Generalisability may also be compromised because past experience may limit worker reciprocation in response to experiencing generative safety culture for several reasons. For example, O'Leary and Chappell (1996) described the enduring suppressive effect caused by past punishment for voicing in aviation. Delimiting that, any experimental interventions that caused some change to occur among those receiving the experimental safety intervention during the present study, would likely occur if the same intervention was applied to many of those new to work or workplaces among the population of interest.

The present study may be somewhat limited by the necessity of testing for dependent variables at a single point in time because some reciprocal behaviours may take time to develop. For example, a natural experiment involving a target company with poor safety and productivity ratings compared to similar companies was conducted by Tregaskis et al. (2013) to investigate "the adoption of high performance work practices," on safety behaviour performance and work performance. The researchers concluded that employees who experienced improved safety (culture) at work reciprocated with better work performance after 90 to 180 days, and improved safety performance sometime in the first 90 days of a safety integrated high performance work practices intervention. Therefore, it is possible that gratitude induced safety behaviour reciprocation improves more over time. The correlational nature of the study, however, meant a third variable (confound) could not be ruled out. Thus, a change in manager that occurred at the same time as the intervention was introduced may have caused the changes rather than the introduction of "high performance work practices."

Conclusions reached using the methods employed during this experiment may be subject to limitations to the effectiveness of single blinding for minimizing bias. During this single blind experiment, the participants were blind to their assigned condition. In addition, participants were unaware of the purpose of the experiment, believing that they were enrolled in a natural experiment with gender as the purported independent variable of interest to reduce demand characteristics (Baumrind, 1985) bias. Deidentification of data and the objective nature of the scoring process (e.g., counting the number of words used during within-dyad voicing) were employed because that was expected to ensure accuracy during data analysis, and further minimise the risk of biased results. While completing the analysis of covertly recorded audio data on the same evening that daily experiments were completed, the researcher was surprised to remember the occasional participant's distinctive voice and assigned condition, despite scoring sheets being deidentified using participant codes. Single blind should be sufficient to ensure biases are managed (Schulz & Grimes, 2002) with an objectively scored outcome like voicing, however bias remains a possibility if researchers know the condition participants are assigned to (Schulz et al., 1995).

During participant debriefing, one participant provided qualitative information that may prove to be an important limitation in the context of future experiments or replications that have satisfactory participant numbers for completing planned analyses. During debriefing, while the researcher discussed the reasons deep deception and covert data recording were used in the experiment, one participant expressed their belief that reporting messy hazards (e.g., spilt coffee on the multi-board plug, and broken glass) could be construed as a criticism of the researcher's housekeeping and tidiness, and would therefore be rude! If that was a widely held concern among participants, there could be a reversal of effect if grateful participants wished to reciprocate for safety integrated work entry processes by protecting the feelings of a researcher that was presumed to be messy.

Future Research Directions

In response to the limitation identified with single blinding in this experiment, whereby the researcher remembered some participants and their group assignment during recorded data analysis, any future experiment and replications should employ a double blind design. Meta-analysis by Schulz et al. (1995) showed that without double blinding, statistically significant increases were measured for the effectiveness of interventions. A double blind replication of this experiment would ensure that as with the present experiment, participants would not know which group they were assigned to. Double blinding would require data collection to be conducted by a research assistant, using the same scripts used in the present experiment (with scripts randomly assigned by the principal researcher), and a research assistant would record any reporting voice and hazard correction data. Further, covertly recorded within-dyad voicing would also be analysed by a research assistant other than the principal researcher to ensure unbiased data was obtained.

In future research, a question about whether it would seem rude to use one's reporting voice about dangers (e.g., spilt coffee that poses an electrocution risk or broken glass on the floor) should be added to the self-reported gratitude, obligation, and reciprocity questionnaire at the end of the laboratory. If feelings of perceived rudeness were shown to prevent hazard reporting to the researcher, solutions from Tucker et al. (2008) may be used to refine experimental and control scripts to facilitate reporting in future experiments. Tucker and colleagues found that workers could be encouraged by supportive supervisors that were concerned about safety and demonstrated a willingness to fix reported hazards. Those findings suggest that in the hazard laboratory experiment room, one hazard could be sacrificed to demonstrate the experimenter's support for safety; perhaps by the experimenter saying, "Oh no, that coffee must have spilt! It looks a bit dangerous; ooh dear, I think it's gone inside the plug! Here, just let me switch it off at the wall and mop up the coffee. There, that's safer!" By modelling concern, the researcher could show participants that they will be supported if they discover a hazard, and that the researcher would listen to their concerns and try to correct reported hazards (Tucker et al., 2008). By modelling safe behaviour, participants will see that if the researcher learns of a spill that is dangerous, she will be concerned enough to help, and that rather than being perceived as rude by the researcher, hazard reporting is likely to be welcomed. Such a script change would remain consistent with generative safety culture.

To adequately power the experiment, the experiment should be performed again with a total of 100 participants—divided so there are approximately 50 per condition—to permit adequate testing of all seven hypotheses. Findings by Hodges (2018) provide support for the participant numbers recommended (i.e., 100 participants). Following the completion of an adequately powered experiment, adequately powered replications are also recommended (Maxwell et al., 2015).

Longitudinal testing of self-reported gratitude and safety-focussed reciprocation may provide further evidence of the ongoing utility of safety integrated job entry processes because it is possible that gratitude and safety focussed reciprocation increase temporally (Tregaskis et al., 2013). The hazard laboratory is limited to using student participants during a small time-window during the university year, and there is no opportunity to repeat the process over time, because participants may not wish to repeat a laboratory without class credit as an incentive; and after being debriefed the participants already know about the deception. Therefore, longitudinal studies would require participants with real jobs from outside the university and would require the use of self-report data rather than measuring responses to natural dangers at work (because of safety and related ethical considerations). Self-reported data measured at a single time point is associated with inaccuracy, including self-presentation biases, and can cause inaccurate conclusions to be drawn; for example, participants may report thinking they would safety voice and hazard correct when they would not perform the behaviour if a real opportunity arose (Wetzel et al., 2016). Nonetheless, self-report data could remain somewhat useful for measuring *changes* in gratitude, obligation, and reciprocity, safety voicing, and hazard correction that occur over time in response to generative safety culture. That would require the use of single case research design, repeated with multiple participants. When measuring longitudinally with single case research design, change values would provide less noise but more signal, and biases could be presumed to remain similar over time, while true differences should be revealed because each participant acts as their own control (Cooper et al., 2020).

Conclusions

This research was conducted to experimentally test whether those receiving safety integrated work entry processes reported greater gratitude, obligation, and reciprocity compared to those not receiving safety integrated work entry processes; and if gratitude, obligation, and reciprocity combined as a mechanism to increase within-dyad safety voicing, reporting voice, and hazard corrective safety behaviours. Descriptive statistics were presented for the data that was obtained. Although hypothesised findings were theoretically supported by the introductory literature review, it was not appropriate to conduct the pre-planned statistical comparisons because interrupted data collection had reduced the power of the experiment to detect an effect for the safety integrated work entry intervention.

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Appendix A

First Year Participant Pool SONA Advertisement

Study Name	Effect of Gender on Hand-Eye Coordination
Study Type	**Standard (lab) study** This is a standard lab study. To participate, sign up, and go to the specified location at the chosen time.
Study Status	**Visible to participants :** Approved **Active study :** Appears on list of available studies
Duration	35 minutes
Credits	2 Credits
Abstract	A fun 35 minute study that investigates the relationship between gender and hand-eye coordination when stranger-pairs undertake some rotary pursuit and wire tracking tasks.
Description	To investigate the relationship between gender and hand-eye coordination, participants will be paired with a stranger and have the opportunity to complete a rotary pursuit task and a wire tracking task, followed by the completion of a survey that assesses other variables that may contribute to hand-eye coordination. If you choose to participate, you will be partnered with another participant to play the wire tracking task or count your partner's errors. The wire tracking task emits a buzz when the wire tracking loop—that is being tracked along a convoluted wire track—contacts the wire track. Following the tasks, a brief survey will be completed to assess additional variables that may exert an effect on hand-eye coordination.
Eligibility Requirements	Psychology 100-level students are eligible (e.g., PSYC 106), and will be paired with a stranger.
Preparation	The lab is on the ground floor of the psychology/sociology building in Room 107 (staff block): Please make sure you know where Room 107 is, so you are ready to start at the same time as your partner.

Appendix B

Student Noticeboard Advertisement

Seeking Research Participants!

Why: Participants are wanted for a study about the effect of gender on hand-eye coordination. All genders welcome

Who: You (if you're a student at the University of Canterbury)

How: You will be paired with another participant that can participate at the same time as you

When: At a time that will be organised to suit you

What: Participation requires approximately half an hour of your time. Your time will be spent taking turns playing a wire tracking game that requires hand-eye coordination and then completing a short questionnaire

You will be thanked for participating with a $10 Café 101 voucher

To participate in this fun experiment please email Lizzy for information:
elizabeth.stewart@pg.canterbury.ac.nz

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Appendix C

Information Sheet with Deception

Applied Industrial & Organisational Psychology
School of Psychology, Speech, & Hearing
Elizabeth.Stewart@pg.canterbury.ac.nz

UC UNIVERSITY OF CANTERBURY Te Whare Wānanga o Waitaha CHRISTCHURCH NEW ZEALAND

The Effect of Gender on Hand-Eye Coordination
Information Sheet for Participants

Kia ora! My name is Elizabeth Stewart, and I am investigating whether gender has an influence on one's hand-eye coordination. When completed, this research will contribute to a dissertation that comprises part of my Master of Science in Applied Psychology.

To investigate the relationship between gender and hand-eye coordination, participants will have the opportunity to play a wire tracking game, followed by completion of a survey to assess other variables that may contribute to hand-eye coordination.

If you choose to participate, you will be partnered with another participant to play the wire tracking game while taking turn-about counting your partner's errors with a clicker-counter. The wire tracking game emits a buzz when the wire tracking loop—that is being quickly tracked along a convoluted wire track—contacts the wire track. Performance accuracy will be recorded on a scoring sheet by your partner during trials, and you will record your own gender on your scoring sheet afterwards. Following the games, a brief survey will be completed to assess additional variables that may exert an effect on hand-eye coordination. Then a debrief will be provided, with a reminder that you may withdraw from the study at any time.

This experiment is designed to take approximately half an hour. Course credit will be provided to thank 100-level psychology students for participating, and a $10 MTA petrol voucher will be provided to thank students recruited via noticeboard poster advertisements.

Participation is voluntary and you may withdraw from this study at any time without penalty. You may request that your data be returned to you or destroyed at any time; however, once data analysis begins on the 26th of September 2021, removing the influence of your data will become progressively less achievable as time passes.

The data collected for this study will be anonymised and kept confidential. Grouped results may be published. If you agree to participate you will be given a participant code on your consent form that will be added to raw data for deidentification. The same code is available for withdrawing your raw data from the study at your request. Data will be secured in a locked cabinet within a locked room and on a computer protected with a biometric password. Only the research team will have access to the data; analysis will be at the group rather than the individual level. Data will be destroyed after five years, unless required to support journal publication. Please annotate on the accompanying consent form if you would like a copy summarising the results of this study: In addition, the dissertation that this data is contributing to is a public document and will be available to you and others through the UC library.

This research is being supervised by Chris Burt, who may be contacted at Chris.Burt@canterbury.ac.nz to discuss any concerns you have about participating in this project. Participants should direct any complaints to The Chair of The Human Ethics Committee at The University of Canterbury, by emailing human-ethics@canterbury.ac.nz .

Appendix D

Participant Consent Form

Participant Code_______________

Applied Industrial & Organisational Psychology
School of Psychology, Speech, & Hearing
Elizabeth.Stewart@pg.canterbury.ac.nz

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

The Effect of Gender on Hand-Eye Coordination
Consent Form for Participants

Tick if correct

- ▫ I have been given a full explanation of this research and have had the opportunity to ask questions
- ▫ I understand what is required of me by agreeing to take part in this study
- ▫ I understand that my participation is voluntary, and I may withdraw at any time without penalty. Withdrawal of my participation extends to the withdrawal of my data to the extent that is practically achievable.
- ▫ I understand that the information and opinions I provide will be kept confidential to the research team, and any published or reported results will not identify me.
- ▫ I understand that the dissertation (thesis) this research contributes to is a public document and will be available to me and others through the UC library.
- ▫ I understand that the data collected for this research will be secured in a locked cabinet within a locked room and on a computer protected with a biometric password. Only the research team will have access to the data, and data will be destroyed after five years, unless required to support journal publication.
- ▫ I understand the risks associated with taking part and how they will be managed.
- ▫ I understand that I can contact the researcher for further information by emailing Elizabeth.Stewart@pg.canterbury.ac.nz or her supervisor Christopher.Burt@canterbury.ac.nz . Furthermore, if I have any complaints, I can contact The Chair of The Human Ethics Committee at The University of Canterbury, by emailing human-ethics@canterbury.ac.nz

My signature is freely given and offers my consent to participate in this research

Name___________________________________ Date_______ /_______ /2021

Signature_______________________________

☐ Please tick this box if you would like a summary of the research

Please email the summary to ____

*Please **return this form** to the researcher*

Appendix E

Participant Debrief Form

Participant Code_______________

Applied Industrial & Organisational Psychology
School of Psychology, Speech, & Hearing
Elizabeth.Stewart@pg.canterbury.ac.nz

UC UNIVERSITY OF CANTERBURY Te Whare Wānanga o Waitaha CHRISTCHURCH NEW ZEALAND

Debrief Form for Participants
The Effect of Safety Integrated Employment Entry Processes on Safety Voicing

Thank you for participating in this study. Although the purported purpose of the study was to investigate the effect of gender on hand-eye coordination, the true purpose of the study was to investigate the effect of safety integrated employment entry processes on safety voicing. Examples of safety integrated employment processes include mentioning safety regularly, issuing safety equipment, and encouraging safer work practices. Those in the safety group would have used fluorescent safety gloves, whilst those in the control group would have used plain cotton gloves. Researching this important subject has the potential to save lives, by testing whether employers can influence their workers to voice safety concerns, through integrating safety into employment entry processes.

To study voicing behaviour, you and a partner were invited to undertake a game playing task in a room that contained a multitude of fake hazards. The relationship between safety entry processes and voicing was examined by counting the number of words spoken within each pair of participants about safety concerns; and the number of words about safety risks that were shared with the researcher after the games concluded. The questionnaire was used to collect standard demographics, to ensure participants were paired with a stranger, and also tested whether those receiving safety integrated entry processes reported increased feelings of gratitude and consequent feelings of obligation to voice safety concerns.

It is predicted that when job entry processes have safety integrated (where safety is constantly referred to and safe equipment is provided) then people will feel gratitude and an obligation to behave in safer ways, including voicing when dangers are encountered. Voicing within pairs and to the researcher is predicted to be higher in the experimental safety group than in the experimental control group that started without safety integrated job entry.

To measure the true level of safety voicing within participant pairs—without the researcher's influence—a covert recording of you and your partner was made within the hazard lab while you played the wire tracking game. This will be listened to by the researcher so that hazard discussions can be coded. Right now, the audio has not been heard and can be deleted. If you would like the audio deleted, please tell the experimenter now. Otherwise, do you consent to the audio being used?

☐ Yes ☐ No

Now that you understand the true purpose of this research, we request that you keep your knowledge of this study confidential until after data collection concludes at around the 6th of September 2021. It is important to avoid socially desirable responding that can occur if participants know about the study in advance.

May we still count on your valuable contribution? Please sign below to confirm your continued participation consent.

Name_________________________ Signature ____________________ Date____/____/2021

If at any stage you wish to withdraw your data from the study, please inform the researcher now, or you can email Elizabeth.Stewart@pg.canterbury.ac.nz or her supervisor Christopher.Burt@canterbury.ac.nz before analysis begins on the 26th of September 2021.

Thank you for your help ~ Kia ora mō tō āwhina