The Relationship Hazard Awareness ability has with Parenting Style and Growing up Experiences

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Cameron Rattray

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Abstract

Objective

The objective of the study was to assess the association between growing up experiences and parenting style, and hazard awareness.

Methods

A Cross sectional survey of 31 New Zealand teenagers, and a parent was conducted. Self-report data from parents was collected on their child's growing up experiences and their parenting style. Subsequently, children completed an objective, gamified measure of hazard awareness, which was correlated with parental data.

Results

In correlational analysis, no significant results were found between parenting style hazard awareness (Authoritativeness = *r* .28, Authoritarianism = *r* .23, Permissiveness = *r* -.05). Higher levels of parental permissiveness were associated with lower participation in activities growing up (-0.47, $p < 0.05$). Growing up experiences had no significant relationship with hazard awareness (*r* .07).

Limitations

The present study had issues regarding small size of the sample (n = 31). There was also a lack of control of the sample, leading to possible differences between those who chose to participate and those who did not. Lack of control over the testing environment could have lead to issues around the distraction of participants during testing.

Conclusion

Further studies will be required to establish the relationship between children's growing up experiences and parenting style with children's hazard awareness.

Introduction

Overview

The introduction begins with a discussion of the current state of health & safety globally and in New Zealand. An effort is made to convey the scale of the problem, with hundreds of thousands dying each year, which modelling by the world health organization indicates is increasing due to numerous economic and social pressures. New Zealand's legislative response is then reviewed, highlighting the different parties which are responsible and liable for safety in a work environment. The theoretical underpinnings of safety at work are discussed with a review of workplace safety models, which highlight the individual as key a component in identifying hazards. Hazard awareness in then discussed, highlighting both the sensory and recognition-based components. It is the contention of this research that hazard awareness is a learned ability, therefor the relevant literature in the field of developmental psychology is reviewed with reference to pedestrian behaviour. It is then highlighted that the most effective strategies for learning these components are behavioural approaches which most closely resemble the real-world context. Learning is complex, and so are the different ways in which experiences related to hazard can influence an individual hazard awareness, hence, episodic memory development, risky play and the development of reasoning abilities are discussed in relation to hazard awareness. Socialization is an important component of how we learn to be safe in the world. The literature on family size and observational learning is reviewed, with the lack of clear theoretical findings indicating the complexity of the area. Of principal concern in the present study, is the extent to which an individual's parents influence their hazard awareness abilities. The rational for choosing Baumrind's parenting styles as a proxy for optimal and inferior parenting is highlighted, with

reference to a range of findings supporting authoritative parenting in diverse fields, including safety. Finally, the measure of hazard awareness is discussed.

Health & Safety, a Global Problem

Every year approximately 2.78 million people die due to their work, with occupational accidents contributing 380,000 deaths and work-related diseases 2.4 million, respectively. Non-fatal accidents (requiring at least 4 days absence) total 374 million per year, over 1 million occurring every day. Work related diseases account for most of the fatalities, with occupational cancer causing one third of all work-related deaths, and exposure to hazardous materials killing over 1 million people each year, the human cost of which is terrible and immeasurable. The economic cost is estimated at 4% of global GDP (Ilo, 2020). The International Labour Organization believes these figures are subject to significant underreporting, with research indicating up to 80% of workplace accidents go unreported (Probst, Barbaranelli & Petitta, 2013). The scale of the problem, especially in developing countries with weak labour laws and systemic bureaucratic inaccuracy, is potentially staggering.

The vast majority of occupational accidents and work-related deaths occur in developing countries, where the loss or injury of persons at work can plunge whole families into poverty. Rapid industrialization, a highly competitive global labour market and lack of political will, are some of the more significant macro level forces leading to a steadily increasing work-related mortality rates (LaDou, London & Watterson, 2018). With 11 million new people entering vulnerable employment every year, the problem is only increasing (Ilo, 2017). This reliance on high risk industries creates an intractable problem, one shared by New Zealand.

Health & Safety, a New Zealand Problem

Workplace injury claims in New Zealand totalled 231,000 for the year 2017, a number which remains largely unchanged across the last 15 years (Stats.Govt). In 2019 New Zealand recorded its highest number of workplace fatalities in the last decade, with 109. In the same year 32,000 injuries requiring a week or more off work occurred. Its estimated that between 5000 – 6000 hospitalizations occur each year due to work-related illness, caused by long term exposure to hazards, with work-related deaths estimated at 750-900 a year. Calculations show that acute injuries (including fatalities) account for 11% of annual work-related disability-adjusted life years (DALYs) lost. Musculoskeletal harm accounts for 27%, mental health harm 17%, cancers 16% and respiratory harm 14% (data.worksafe.govt.nz/) Different economic cost estimates range from $3.5 billion (Approx. 2% of GDP) to $20 billion, depending on how costs are measured (Worksafe, 2016; Independent taskforce on workplace health and safety, 2013). New Zealand's economy is reliant on industries with relatively high accident and injury rates; Agriculture, Manufacturing, construction, fishing and forestry make up more than half of accident claims each year as well as having the highest rates of claims, ranging from 24 to 32 claims per 1000 full-time workers (Independent Taskforce on Workplace Health and Safety, 2013). The paradoxical nature of relying upon hazardous work, which fuels economic growth but causes harm within communities creates a tension which the New Zealand government attempted to resolve by introducing sweeping changes to existing Health and Safety legislation in 2016.

New Zealand Health & Safety Legislation

In 2013 an Independent Taskforce on Workplace Health and Safety report commissioned by the government, made it clear that New Zealand's work health and safety system was failing. This led to the establishment of WorkSafe New Zealand and the Health and Safety at Work Act 2015 (HSWA). The act is largely based upon Australian legislation, with minor adjustments made to reflect New Zealand's needs. The "guiding principle of HSWA is that workers and other persons should be given the highest level of protection against harm to their health, safety, and welfare from work risks as is reasonably practicable (Worksafe, 2017)." How New Zealand's legal system will set precedent regarding the interpretation of the phrase "reasonably practicable" is unclear, but the intent of the law is not. The act initiates a duty of care upon business in regards to their workers safety, and empowers the court to fine businesses when an employee is exposed to the risk of injury, illness or death, without a reasoned excuse and the employer did not meet their responsibilities outlined in the HSWA. Section 30 of the HSWA makes it clear to meet these duties, risks that arise from work must be effectively managed, with risks to health and safety being created by people being exposed to hazards. The act defines a hazard as anything which can cause harm. The first step in resolving a hazard is its identification.

Provisions in the Act (Section 45) also make it clear that employees must take "reasonable care for their own health and safety" and "take reasonable care that what they do or do not do does not adversely affect the health and safety of other persons." How a court will interpret this language is unclear, but it clearly implies that a worker who identifies a hazard, but does nothing is in breach of their duties. What about a worker who "should" have identified a hazard, but failed too? This highlights the importance of screening tools at the beginning of the employment process which can screen out individuals with low hazard awareness or mark them as requiring extra assistance/training.

Workplace Accident Models

An understanding of the importance of hazard identification can be found through an examination of accident models. There exists a range of accident causation models which attempt to place accidents or injuries within a broader system to understand the complex interplay of factors involved in their causation. These factors come from a range of sources, from broad organizational level influences, such as companywide policy, to the behaviour of managers and the actions of workers (Shappell & Weigmann, 2000). The unsafe action of a worker on the ground, leading to an accident, can usually have its causality traced back up this hierarchy to organizational level influences (Reason, 1990). The Human Factors Analysis and Classification System (HFACS; Shappell & Weigmann, 2000) clarifies these steps into four key areas where failure must occur for an accident to happen. First are organizational level factors, these include such things as employee selection, cost cutting, chain of command, communication, time pressure and safety programs. These factors are the first step in accident causation and have a direct and indirect affect on the next step in the system, unsafe supervision. Unsafe supervision can manifest in a range of ways such as failure to provide guidance or failure to correct a known problem. Unsafe supervision provides the preconditions for unsafe acts, such as adverse states of an operator both psychological and physical and the substandard practices of operators. Finally, these factors lead to unsafe acts caused either by errors which fall under the categories of skill, knowledge or perceptual errors, or by intentional violations of the operator. While it's important to note this complex chain of causality which influences individual behaviour, it is worth noting that the final step in the system, and the cause of 80% of accidents are the unsafe acts of individuals (Shappel & Weigmann, 2000). This step provides an important opportunity for individuals to use their abilities in identifying hazards to mitigate risk. Unintentional failures on the part of the individual such as the failure to identify a risk due to perceptual errors or a lack of hazard

knowledge or can be the last link in a complex chain which causes an accident (Reason, 1990).

The Accident Sequence Model attempts to explain the process individuals go through from when they are exposed to a hazardous situation to a potential accident occurring (Ramsey, 1985). Following exposure to a hazard, individuals must use their sensory abilities to physically perceive the hazard. Next, utilising past knowledge, they must realise that what they have perceived is hazardous and therefore dangerous to them or others. They then must decide how they will interact with the hazard, potentially avoiding or nullifying it, this requires they have the physical ability to do so. If any of these four steps are breached, an accident is likely to occur. Key to this process is hazard awareness (Hunt, 2019; Ramsey, 1985).

Hazard Awareness

Hazard awareness is the first step in the safety management process (Perlman, Sacks & Barak, 2014), and is concerned with the first two steps in Ramsey's (1985) model; the sensory perception of a stimulus and the knowledge that is it a hazard. A failure to detect a hazard, in this first step, not only increases the chance of an catastrophic failure but also increases the risk of future accidents (Hunt, 2019; Carter & Smith, 2006). Ramsay defines a hazard as, "The inherent property of a system that could cause injury or damage" (1984, pp 133), this definition can be expanded to include anything, or any condition which has the potential to cause harm (Taylor, Easter & Hegeny, 2004). While accidents have different causes inadequate hazard recognition is undoubtedly of primary importance. A qualitative review of 100 accidents in the construction sector, involving; interviews with accident-involved personnel and their supervisor; an inspection of the accident location; and a review

of appropriate documentation, showed that 42% were linked to inadequate hazard recognition (Haslam et al, 2005). Further, a series of workshop based intervention studies conducted by Susanne Bahn (2013) with 77 workers in an underground mine showed that in a hazard identification task the team with least experience (almost 3 years collectively) were unable to identify more than four obvious (11%), two trivial (9%), five emerging (22%) and three hidden (13%) hazards in their work areas. It is perhaps unsurprising then, that research has shown that novice workers are most likely to be injured or killed at work (Burt, 2015).

Hazard awareness can be broken down into two key parts, the sensory perception of a hazard and the process of recognizing what you have perceived is hazardous. Kowalski-Trakofler and Barrett (2003) pose a five-step model of hazard recognition: Detection of sensory cues – Attentional Selection – Recognition of Hazard – Confirmation of Hazard – Appropriate Response. The sensory component involves the complex interplay of factors; sight, hearing, touch, taste, smell, proprioception, and other more subtle senses such as balance and temperature, which provide the individual with a flood of information which must be constantly processed. No action could exist without perception and perception ultimately relies on action. These senses allow an individual to do the most basic things such as orient themselves and move through space, and the most subtle and complex activities, such as brain surgery (Bernstein, 1966). Individuals vary in the strength of these perceptual abilities, from the ballerina whom has perfect control of her body's movement through space, to the man blind at birth, each have a greater or lesser ability to perceive hazards due to these perceptual strengths or deficits (von Hoftstein, 2003). These perceptual abilities have been shown to be important to safe action in numerous studies, including those of novice drivers (Deery, 1999), persons with simulated cataracts (Marrington, Shelby, Horswill & Wood, 2008) and individuals suffering mild traumatic brain injury (Preece, Horswill & Geffen, 2010).

After a potential hazard has been perceived the individual, through the recall of experience, training or knowledge, determines that the conditions which are present are hazardous. Thus hazard awareness is a learn ability (like driving a car). Largely the process of identifying something may be hazardous is a process of drawing on semantic memory. Semantic memory refers to a major division of long-term memory that includes knowledge of facts, ideas, and concepts (Martin & Simons, 2007). Domains of knowledge are thought to be interconnected via nodes of information, where in all knowledge about a given subject, are connected and interrelate to provide a complex integrated picture of the world. For example, the individual will store knowledge about many aspects of an activity, including aspects of the activity which could be hazardous. Such as the stopping distance of your vehicle, or the coffee cup in its holder. The number connections and the strength between them influences their quality and enhances the ability to generalize information to novel situations (Schneider & Bjorklund, 2003).

Following the perception, and the recognition, the individual begins predicting how these elements in a given environment may behave in the future relative to one's self and make a decision about how they are going to respond, often through confirmation or disconfirmation of the hazard, which leads to attempts to mitigate risk, or discontinuation of the unsafe behaviour (Kowalski-Trakofler & Barrett, 2003; Waller, 1977).

The risk of a failure of hazard recognition can be in two areas. Firstly, it increases the chance of people being involved in an accident, as they are not picking up potential risks. Secondly, the ability of businesses to manage further incidents at work is significantly reduced. If workers are not identifying hazards in their workplace, it is not possible for said hazards to be removed or mitigated, potentially leading to more accidents, which represents a failure of business to meet the obligations held within the Health and Safety at Work Act (Albert, Hallowell, Skaggs & Kleiner, 2017; HSWA, 2015; Namian, Albert, Zuluaga &

Jaselskis, 2016). In a civilian environment the risks are parallel to that of the workplace, with a failure to detect hazards resulting in individuals' exposing themselves to dangerous conditions to which they are unable to deal with effectively.

It is in part the purpose of this study to provide further evidence that hazard awareness is a learned ability. Research with adults has indicated that hazard perception and recognition can be improved upon. In a series of studies where miners were trained to identify hazards using degraded images of their work environment, 11 instructional slides (depicting a combined total of 35 hazards) were displayed to the class for five seconds per slide, after which a mining industry specialist reviewed the slides and discussed the multiple hazards depicted in each. The research indicated an improvement in the classroom and the training program was applied to 2,400 miners across a three-year period. The results indicated a significant reduction, up to 29.94%, in accident rates year on year (Kowalski-Trakofler & Barrett, 2003). A similarly large improvement in hazard recognition of 31% was found in a large multiphase, quasi-experimental study attempting to improve the hazard recognition abilities of construction workers using mnemonics, which attempted to encode information in a way which facilitated retrieval from the long term memory (Albert, Hallowell & Kleiner, 2013; Cook, 1989). The fact that hazard awareness can be improved suggests that it is a learned ability, the question of this research then, is how these adults came to their abilities in hazard awareness. It is the contention of this research, that hazard awareness begins to develop throughout childhood, in part by parental behaviour and through the range of experiences that the 'family' engages.

Development, Hazard Awareness, and the example of Pedestrian Behaviour

Safe behaviour requires the interplay of a range of complex skills acquired throughout childhood. As an illustrative example, safe pedestrian behaviour requires the use of; looking behaviours, selective attention and visual search, visual timing, perception of dangerous locations, and information processing (Thomson, Tolmie, Foot, & McLaren, 1996). These five key skills map closely to Kowalski-Trakofler and Barretts (2003) five-step model of hazard recognition: Detection of sensory cues – Attentional Selection – Recognition of Hazard – Confirmation of Hazard – Appropriate Response. Each step required in safe pedestrian behaviour provides an opportunity for a catastrophic error in hazard recognition. More than 50% of children aged between 4-14 have been shown not to look before crossing the road (Scottish Development Department, 1989). Looking alone is flawed, and open to what Reason (1990) described as 'cognitive errors'. Several studies on children and adults have shown how common it is for an individual to look but fail to 'see' on coming traffic (Grayson, 1975; TRRL, 1972). These are largely due to a failure of visual search and a lack of attention (Thompson et al., 1996). Laboratory studies of children indicate their scanning of objects or scenes show that these are inefficient and unstructured by comparison to adults or older children (Vurpillot, 1968). With more organized, goal directed and structured visual searches appearing between the ages of 6-9. Requiring children to carryout multiple tasks at once also clearly shows younger children performing relatively poorly in attending to multiple cues (DeMarie-Dreblow & Miller, 1988). Next, visual timing requires establishing a relationship between the time available between cars, and the time required to make the crossing. Observational studies indicate these abilities are well developed in adults and teenagers, but not so children (McLaren, 1993; Lee, Young and McLaughlin, 1984). Where distance and velocity must be integrated, children tend to focus on one variable at the expense of the other and the resulting judgement is thus erroneous (Piaget, 1969). In a direct failure of

hazard recognition, children often fail to perceive dangerous locations. In a series of studies examining children's ability to determine if a road crossing location was safe, children had very little ability to recognize danger. Children tended to focus on a single factor when making such judgements, for example a lack of vehicles on the road would commonly lead to a determination that the location was safe, even if a second factor such as something obscuring their view of the road was also present, such as a hill or corner (Ampofo-Boateng & Thomson, 1991). Clearly the issue of information processing is present in all these areas, but one area of concern is the problem of divided attention. Developmental studies show clear age trends regarding the ability to divide attention, with older children performing better than younger ones on a range of dual tasks (Guttentag, 1984). Often to compensate individuals determine one aspect to be primary and the other secondary, distributing cognitive resources accordingly. Children over time learn to use their limited abilities more efficiently, and with experience learn to automate certain task elements. With age children become more efficient at picking up relevant information, decision making, and organising appropriate behavioural responses. As this suggest the issue is primarily one of strategy rather than a structural issue, which suggests experience and parental assistance could have a facilitative effect on the development of such functions. But what type of experience? Research indicates behavioural approaches are most effective.

Behavioural approaches to developing Hazard Awareness

Clearly the skills and abilities which make up hazard awareness are primarily developed throughout childhood. Though as has been shown with adults, children can accelerate their learning and development of these abilities through appropriate training. Importantly for this research, the approach which has shown considerable promise in

improving children’s abilities has been through experiential behavioural training (Ampofo-Boateng, 1993). Where classroom knowledge based approaches have largely failed, considerable evidence exists to suggest that teaching children in a meaningful context, with behavioural approaches can accelerate learning, even beyond what could be expected within an early Piagetian stage like approach to development (Thomson et al., 1996).

In two experiments conducted with 6 and 7 year olds, the first using closed off streets was compared to schoolyard training, and the second experiment compared the street training to classroom instruction, showed that training in the real streets was superior (Sandels, 1975). In several studies using a simulated road environment to improve visual timing in 5 year olds, 6 half hour training sessions lead to a significant improvement. Children were asked to cross a simulated road and had their performance discussed after each turn. Evidence showed the children missed less opportunities through improved anticipation of gaps by making their assessments earlier. Across the training children's judgements became more consistent, showing that they had improved their criterion as to what was an acceptable gap (Demetre et al., 1992, 1993). A practical learning approach to improving young children’s ability to determine safe crossing locations, and to develop their concept of danger showed marked improvements in the judgements of 5 years olds. The proportion that children chose safe routes raised from 10% to 75% across 6 30 min training sessions. The children’s justifications for their choices following training showed far greater insight into their choices than before training, indicating the children didn’t merely learn how to complete the test in a blind way (Ampofo-Boateng, 1993).

The strength of practical training is that it develops multiple skills at once. For example, in the pretend road study, children do not just learn visual timing, they also learn other aspects of the traffic environment as well. They learn how to use basic skills in an appropriate strategic form. Practical training of this kind can also be expected to teach the

children attention and visual search, making them more attuned to relevant information. A child new to the road environment cannot be expected to know the hazards present any more than a novice downhill mountain biker can be expected to know which features of the terrain are dangerous. Allowing children to interact in a natural realistic environment allows them to slowly attune to the most pertinent features in a natural way. The problem with rule usage, such as “look both ways before you cross the road”, is that it is separated from the reality in which it occurs and encourages children to go through a ritual without a connection to its purpose. Children trained in making timing judgements look before crossing because they can't make timing judgements without doing so. A marked improvement on carrying out an abstract rule, that is marked by information gathering rather than moving one’s head. This approach also has benefits in younger children, as the approach is not limited by language development (Thomson et al., 1996).

The implications of this for the present research is clear, practical hands on experience with hazards and hazardous environments which place hazards and the correct behavioural approaches necessary for dealing with them in their relevant context should facilitate learning in a meaningful way. In the absence of formal training, children who have had greater exposure to hazards should have an increased awareness of them. What’s clear is that many of the skills and abilities necessary for dealing with hazards are largely developmental, what is also clear is that in children and adults these abilities can be improved and accelerated. Whilst it may take time for an individual to develop the cognitive abilities necessary to manage the many key tasks needed in a complex environment such as traffic, no individual wakes up regardless of age or developmental stage aware of all hazards in their environment with the tools to manage them. These experiences will in part be stored in the episodic memory.

Episodic Memory & Hazard Awareness

Integral to how growing up experiences develop the key recognition component of hazard awareness, will be the development of episodic memory, where knowledge of hazards will be connected to the recollection of specific events or key moments across the lifespan. For example, an individual who is reticent to run with scissors because they recall a time when they did, and pricked their classmate (Gathercole, 1998). It has been argued that the development of these pathways allows for "episodic foresight" where the individual can project themselves into the future based off past experiences (Martin-Ordas, Atance, Lowe, 2012).

A significant experience with a hazard, such as the time you fell out of the tree and broke your leg, is likely to be a memory laden with emotion. Memories of events which created physiological arousal have been shown to have greater durability and are less likely to be forgotten (Hirst et al., 2015). These memories are characterized by their rich detail. Studies looking at subjective recall of emotional memories have also indicated that the effect is even greater in negative coded memories (Cooper, 2019). This is important as the content of memories accessed at retrieval guides our behaviour and influences our decision making, with recall of negative events preventing us from repeating mistakes (Kesinger & Ford, 2020). Behaviour may be guided by an attempt to avoid anticipated emotional outcomes (Baumeister, Vohs, DeWall & Zhang, 2007). The experience of regret when recalling memories has also been shown to facilitate learning and behaviour change (O'Connor, McCormack & Feeney, 2014). The implications for the present research are clear, experiences with hazards in ways which have a negative emotional outcome will be recalled easily. These memories will be enduring, vivid, and readily shape behaviour. One way in which children engage with hazards and build a complex interconnected network of knowledge, memory and experience is through play.

Recreation & Risky Play

Play is an important part of growing up, and serves many functions, including the development of cognitive, physical, social, and emotional well-being of children and youth (Ginsburg 2007). In a review of research on risky outdoor play in children Brussoni et al, (2015) found significant associations between risky outdoor play and many positive health and relational variables including physical activity levels, aggression and social competence. It is proposed that it also contributes development of an understanding of risk and danger (Simpson, 1988). Risk taking in play helps children test their physical limits, develop their perceptual-motor capacity, and learn to avoid and adjust to dangerous environments and activities (Fromberg & Bergen, 1998). Play also helps children to learn how to problem-solve, make decisions, follow rules, exert self-control, regulate emotions, and develop and maintain peer relationships (Pellegrini, 2009). There is also evidence in animal studies that show the development of the frontal lobe due to play. In children this area of the brain is associated with executive function and the development of regulatory skills, which help control impulsive urges (Panskeep, 2004). While the amount children engage in risky outdoor play varies, research from an evolutionary perspective suggests that children's desire for risky play is universal (Bruner, Jolly & Sylva, 1976; Sandseter & Kennair, 2011). The perspective taken by Brussoni et al (2012) in their review of the literature on children's risky play, is that "keeping children safe involves letting them take and manage risks". Children appreciate being given the opportunity to assess and manage risk themselves (Christensen & Mikkelsen, 2008). With efficacy and self-concept influenced by taking risks and having minor injuries, frequent and serious injuries were viewed by children as a sign of incompetence and clumsiness and are generally view in derogatory ways (Green, 1997). There is evidence that children learn risk management strategies by engaging is risky play, observational studies have indicated the clear use of harm mitigation in risky play activities in

young children (Sandseter, 2009). Engaging in risky play is a keyway in which children learn their current capabilities, and adjust their activities accordingly, with evidence indicating children largely participate in activities within their range of ability (Little, Eager & Risk, 2010). Children also drew on their risk experiences as an opportunity to assess the capabilities of their peers, which facilitates support for each other's risk engagement and safety (Christensen & Mikkelsen, 2008). This risky play provides the opportunity for experiences this research hypotheses contribute to hazard awareness. For example, an arborist who spent their childhood climbing trees will have many more hours of high-quality experience to draw upon than one who did not, increasing their knowledge of hazards in that environment, but likely also their ability to use inductive and deductive reasoning.

Reasoning

Crucial to moving forward in life in an effective manner a child must develop abilities of inductive and deductive reasoning. It is not possible to directly teach a child about all possible hazards or to have direct experience with everything that is dangerous, if that was necessary the child would be in and out of hospital wards. It is necessary through the application of general rules, and from specific examples to extrapolate that a novel situation, object or environment may be hazardous (Goswami, 2011). A child may learn initially that falling from the couch hurts, then extrapolate that falling from anything would likely hurt, and the higher you are the more it hurts. Once this knowledge is connected to the foundational principle that force is determined by mass and acceleration, the child can deduce that any scenario where they or an object is moving contains the possibility for harm. The child can then anticipate the risk and avoid or manage that risk appropriately.

Children develop the ability to reason inductively at a very early age. With children as young as two able to make inductive inferences about the properties of a familiar objects. Children adjust their inductive reasoning based on how typical they believe something is in its overall category, with the extent to which something is typical, promoting the use of inductive reasoning (Gelman & Coley, 1990). Crucial to promotion of inductive reasoning in adults is the number of observations an induction is based upon, with some evidence indicating similar reasoning in children (Gutheil & Gelman, 1997). Preschool children have also been shown to be able to determine if a property of an object is idiosyncratic or generalizable, such as determining that a "jacket smelling yucky" is likely a property of that jacket but not true of all jackets, but that a rabbit eating alfalfa is likely true of all rabbits (Gelman, 1988). This development of inductive reasoning abilities, from typicality, number of observations and generalizability of properties, is all conducive to the hypothesis that exposure to hazards will promote a general hazard awareness ability, where children and adults can make inferences based on experience (Goswami, 2011). Hence our measure of hazard exposure takes items from across a range of common hazardous activities and objects. Its also possible that observing others interact with hazards could facilitate learning.

Observational Learning and Family Size

Bandura (1977) presented two types of observational learning: (1) imitation, which is matching the topography of a model's behaviour, and (2) vicarious learning, which is the increase or decrease of an observer's behaviour that is similar to that of a model, as a result of watching the model's behaviour be reinforced or punished. From a social learning perspective, it is unclear whether family size will influence the development of hazard awareness. Research from a study of longitudinal birth data and death records of over 3000

children indicated an odds ratio increase of 1.5 per child with highest risk in children with three or more older siblings. Smaller age gaps were also associated with higher risk. The findings are partially explained by a reduction in supervision due to competing demands placed on parents (Nathens**,** Neff**,** Goss**,** Maier & Rivara, 2000). Theoretically these findings could also be linked to imitation of hazardous activities the younger child is not developmentally prepared for, and thus their lesser physical and cognitive capabilities lead to errors which cause injury. Whether a child could learn to avoid hazards vicariously is connected to the question of whether that behaviour is reinforced or punished. As has been made clear in previous sections, risk taking behaviour is an intrinsic part of childhood, and taking risks as children helps to build a sense of identity (Sandseter & Kennair, 2011; Green, 1997). Thus a large part of the risk-taking behaviour a younger child observes would be reinforced and only those instances where an individual is harmed acting as vicarious punishment. The younger child is then again not developmentally prepared for that challenge and is more likely to have an injury if they imitate the behaviour. In contrast to this, a child may observe and learn more advanced harm mitigation strategies and a behavioural repertoire, such as observing an older child or adult stopping and looking both ways as they cross the road, or witness another child rewarded for appropriate behaviour by an authority figure (Bandura, A. Ross, & D. Ross, 1963; Masia & Chase, 1997). Potentially the outcome of vicarious experience of hazards as a learning opportunity or a risk factor for harm, is the role of the parent, whether they can provide adequate supervision and the extent to which they facilitate learning from the experiences of the older child in a developmentally appropriate way.

Socialization and the Role of Parents

Socialization refers to the way in which individuals are assisted in becoming members of one or more social groups. Socialization has a range of goals, including the acquisition of standards, roles, rules, and values across the personal, social, cognitive, and emotional domains (Grusec & Hastings, 2015). Though socialization continues across the lifespan and is accomplished by a variety of individuals and in a range of settings, including; parents, peers, teachers, and siblings, and by schools, the media, the Internet, the workplace, and general cultural institutions, the primary agent for socialization is the family unit (Maccoby, 1992). The process of socialization is bidirectional with children's early social behaviour influencing the approaches that parents use (Choe, Olson & Sameroff, 2013). As children age, their increased sophistication changes how they interpret the behaviour and messages of parents, influencing their internalization and acceptance of parental values (Thompson, 2006). These processes have broad consequences for children. They influence children's internalization of values, conscience development, self-conception, capacities for self-control and self-regulation, empathy development, emotion understanding, and the understanding of others (Laible & Murphy, 2014).

A key, if understudied, role of socialization, is teaching children how to participate in the world in a manner which is safe and considers risk. Early safe behaviour may be influenced by the following of simple rules such as "don't run with scissors", and imitation of parental behaviours such as wearing a bike helmet, with more complex behavioural repertoires and complex social interactional skills built over time. The parent in part plays the role of teacher and helps to facilitate the learning of skills and knowledge beyond the reach of the child on their own, with the milieu of life the parent provides their child brings opportunities to teach, instruct, model and reinforce (Vygotsky, 1978). Research on the intergenerational transfer of injury risk behaviours indicates that parents teaching predicts

how children act in the present, with modelling of safety behaviours influencing how children intend to act in the future as adults (Morrongiello, Corbett & Bellissimo, 2008). Optimal parenting can be measured in a variety of ways, one useful, popular, and empirically valid measure is parenting style (Maccoby, 1992). A key objective of this research is to investigate how parenting style influences a child's hazard awareness ability.

Parenting Style

Parenting styles, first proposed by D. Baumrind (1966), have been shown to be associated with a range of outcomes in children and the subsequent adult. Parenting styles can be separated into four distinct categories, separated upon two dimensions of, responsiveness and demandingness, each with separate associated outcomes (Macoby & Martin, 1983). The first, Authoritative parenting, high in both responsiveness and demandingness, is characterized by high levels of nurturance, involvement, sensitivity, reasoning, and encouragement of autonomy. Parents who direct the activities and decisions for their children through reasoning and discipline would be described as authoritative (Turner, Chandler & Hoffer, 2009). Second, is Permissive parenting, high in responsiveness and low in demandingness, characterised by the tendency to place few demands on the child, low use of punishment techniques, and being non-controlling in their behaviour. Permissive parents set up few rules and guidelines for their children's behaviour. Authoritarian parenting, high in demandingness and low in responsiveness, as the name suggests is characterised by highly controlling and coercive parenting, high use of restriction and rejection behaviours, and use of parental power to achieve goals. Were an authoritative parent may place high demands on a child, and explain patiently their reasoning for doing so, an authoritarian parent would be more likely to expect compliance because it's their right to

direct their child's behaviour (Turner, et al., 2009). Finally, neglectful/uninvolved parenting, low in both responsiveness and demandingness, characterized by lack of interest and care in the child's upbringing. This style contains significant range in its expression, from a parent whom pays no attention to a child, to one who doesn't provide their basic needs (Durbin, Darling, Steinberg & Brown, 1993).

Authoritative parenting, high in both responsiveness and demandingness is associated with many positive states and outcomes in children, adolescents and adults. A consistent connection has been shown between parenting style and academic performance for all age groups, increases in; self-efficacy, intrinsic motivation, achievement orientation, competence, and academic persistence (Baumrind, 1991; Strage & Brandt, 1999; Turner et al., 2009). Whilst authoritarian and permissive styles were negatively associated with grades, self-regulation, and instrumental competence (Baumrind, 1991). With children of uninvolved/ neglectful parents, being more likely to associate with children who do not endorse adult values (Durbin et al., 1993). Though the research on parenting styles is largely consistent, some discrepancies have been found in non-European samples (Park & Bauer, 2002). Research has shown enhanced development of deductive reasoning abilities in children of authoritative parents. In a study of 120 school age children given two deductive reasoning based problems composed 10 conditional propositions (If p, then q), a statistically significant difference between children of authoritative and permissive parents was found (8.9 and 5.9 respectively)reference. The researches theorized that authoritative parenting my provide a context or milieu where the child is successfully encouraged to explore and expand their developing capacity for logical thought (Chapel & Overton, 1998). The picture for the association between parenting styles and positive outcomes is a strong one, acting via the enhancement of child socialization (Morrongiello, Corbett, Lasenby, Johnston & McCourt, 2006; Spera, 2005).

These findings have found their way across to the safety literature, with research finding an association between permissive parenting and rates of medically attended injuries in children aged 24-42 months (Morrongiello et al., 2006), they showed that parenting style predicted the use of different safety related parenting strategies, with permissive parents relying more heavily on explanations and less on rules about safety. This lower use of rule-based strategies may lower the levels which children internalize self-regulatory behaviours, and make them more likely to interact with hazards, particularly with permissive parents being less likely to closely supervise their children (Mauro & Harris, 2000). The present study hopes to add to an understanding of how parenting styles facilitate safety in children, with the expectation that parenting styles that are demanding of children but also warm and supportive, will promote an advancement of the child's abilities in the area of hazard awareness in a way which is comparable to the advanced development of other key behavioural, regulatory and self-conceptual areas. To assess the extent to which parenting styles facilitates safety through increased hazard awareness, the students in the study will carry out an objective, gamified hazard awareness measure named the 4pHAT.

4pHAT

The development of the 4pHAT was conducted at the University of Canterbury, led by Associate Professor Christopher Burt. The 4pHAT was designed, as an objective test of an individual's hazard awareness ability. The 4pHAT utilises a gamified approach to assessing an individual's ability to detect hazards. Four 'spot the difference' puzzles presented side-by-side with ten differences between the left-hand image and right-hand image form the test. Designed to replicate other 'spot the difference' puzzles the differences included changes in the colour of specific items, the removal or addition of items and subtle manipulation in the

positioning of items. The 4pHAT consists of 4 image pairs depicting scenes from two different life domains; workshop safety and outdoor work safety. Each scene includes five safety related differences (e.g. worker wearing then not wearing a glove) and five neutral differences (e.g. a brush disappearing of a wall). Thus in total 40 differences are shown across the 4 puzzles, and 20 of these are safety/hazard specific.

The 4pHAT utilizes the principles of gamification. Gamification is the use of game design elements and principles, in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011). Gamified measures of this nature have been shown to have a range of benefits including; increased engagement, motivation, enjoyment, concentration and improved learning outcomes (Eickhoff, Harris, de Vries & Srinivasan, 2012; Buckley & Doyle, 2016). In the context of 4pHAT, an individual cannot make a false claim, by saing, they are safety conscious or always pay attention to detail, their score is purely derived from the number of hazards they identified in the given timeframe, thus removing any subjectivity, bias or manipulation from the subjects responding. While gamification has had limited use in recruitment and selection at this time, its demonstrated utility in other domains provides ample evidence for further exploration into other areas (Hamari, Koivisto & Sarsa,2014; Menezes & De Bortolli, 2016).

The Present Study

Hazard awareness is a complex ability developed throughout childhood by a range of mechanisms which require one to participate with hazards to learn from them and to be taught about them. As such, it is predicted that therange of hazard experiences a child is exposed to will build an interconnected picture of the hazards in that environment (the

world), and likely the ability to generalize across to novel situations. Furthermore, the quality of relationship between a parent and child will both facilitate the healthy development of the child and be associated with superior teaching about safety and risk and be evident in a greater ability to identify hazards. Thus, two hypotheses were tested:

Hypothesis 1 – A higher number of experiences with activities which could occasion learning about hazards will be associated with a higher score on the 4pHAT

Hypothesis 2 – A tendency to an authoritative parenting style will be associated with a higher score on the 4pHAT

Method

Design

The present study used a cross sectional, correlation design. Data on the dependent variable, hazard awareness, was collected from a sample of high school students through the use of an online hazard awareness test (4pHAT), and correlated with self-report data on Injury History, Parenting Style (PAQ-R) and Growing Up Activities (GUAC) collected from their parents.

Sampling and Participants

A sample of high school age students (mean = 14.9 years old, male – 11 female – 16 missing – 4), and one of their parents (mean = 49 years old, male – 9 female – 20 missing – 2), were recruited from three schools in Christchurch, New Zealand. At the participating schools several different recruitment advertisements were ran simultaneously. These included; an advertisement published in the school's online notices (Appendix i), flyers placed at strategic places around the schools (Appendix ii), and a short verbal notice delivered at the commencement of the school day (Appendix iii). Students who wished to participate were required to collect a study package containing information, instructions, and materials from their respective student services offices. The advertisements described the purpose of the study, and that students who returned their packages would receive a $10 voucher as a rewards.

Materials

Demographics questionnaire - quantifying – the age, gender, and number of children in the family of participants.

Self-Reported Child Injury History – Parents were asked to report (Yes or No) whether their child had a significant injury in several common environments (Home, School, Work, On the Road, Sport/Recreation, Other). A significant injury was defined as one requiring medical attention. Injuries in each domain were added together to achieve a total injury history score.

Parental Authority Questionnaire – The Revised (PAQ-R) was used to measure parenting style (Reitman, et al, 2002). The PAQ-R is a 30 item questionnaire, which consists of three 10 question subscales: authoritative ("Once family rules have been made, I discuss the reasons for the rules with my children"), authoritarian ("When I ask my children to do something, I expect it to be done immediately") and permissive ("In a well-run home children should have their way as often as parents do") parenting styles. Items are responded to by scoring on a 5-point Likert style scale ranging from 1- strongly disagree to 5 – strongly agree, with a neutral mid-point of 3 – neither agree nor disagree. The scale was scored by summating items on each subscale, with a possible score range of 10 – 50, with high scores indicating a higher preference for that style of parenting. Coefficient alphas for the three scales in a validation study ranged from .72 to .76 and test–retest reliability over a 1-month interval was .72 (Reitman, Rhode, Hupp, & Altobello, 2002). In this study the following alpha values were found for the three subscales: authoritative = 0.78, authoritarian = 0.72, permissive = 0.75.

Growing Up Activities Questionnaire (GUAC) – The GUAC is a 95-item questionnaire designed by the author to assess the extent to which the child (family) has been

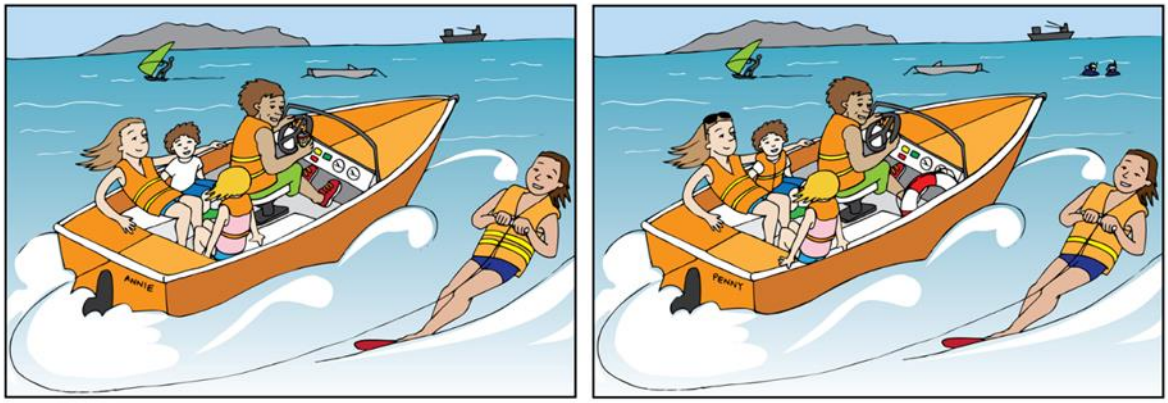
exposed to and engaged with a range of diverse activities while growing up. These experiences provide them with an opportunity to learn about safety hazards, both around the home (e.g. Has your child ever lived in a home with these features; Swimming pool, Garden shed, Stairs) and in recreational activities (Has your child ever participated in these activities; Swimming at the beach, Fishing, Skiing/Snowboarding). The GUAC was developed with and reviewed in conjunction with an expert in the field on safety science. Government literature and guidelines on common hazards provided a reference for the inclusion of items and sections. An attempt was made to provide a comprehensive list of activities in, around and away from the home which covers both rural and urban living.

GUAC scoring used an 'add point' process (Yes = 1 point, No = 0 points). The parent indicated whether a hazardous item or activity has been present in the child's life. A Yes to an item adds one point to the cumulative GAUC total score. Each subsection contains a brief description on how to determine whether a hazard is considered to have been present, for example - Home life (Has your child participated in these household activities either alone or with a family member). A full list of items can be found in Appendixes.

Hazard Awareness – (4pHAT) - The 4pHAT is a gamified, objective ability measure of an individual's awareness of safety hazards. Designed using the "spot the difference" method, the 4pHAT has 4 image pairs with 5 safety related differences and 5 neutral differences in each image pair. Due to issues regarding test security and this document being open source, the example provided in Figure 1 is illustrative only and not included as an item in the 4pHAT. The applicant's task is to find the 20 safety related components which differ between the image pairs (e.g. worker wearing then not wearing a glove) and the 20 neutral differences (e.g. a brush disappearing of a wall). The 4pHAT was administered online, through Talegent's web-based test administration site. Completing the test required access to a home computer or tablet, with mobile devices incompatible with the program. Upon

accessing the program participants are presented with instructions on how to complete the test (Appendix L). Participants were given 10 mouse clicks (or finger presses) on each image pair before they are moved to the next. Displayed on screen are; the number of clicks remaining (out of 10), number of items identified, and a ‘give up’ option. When a difference was correctly located, a green squared was displayed around the identified area, this acted as an indication for participants not needing to click in the given area for any more differences, as well as to track their progress. There was no time limit for the test. Images stayed onscreen until all the 10 differences were found, all ten clicks were used, or the participants clicked the “give up” button. Apart from reading the test instructions, there is no language requirement for completing the 4pHAT. All images were displayed in colour at a resolution of 95 dpi and to the dimension’s of 1680 pixels wide and 1050 pixels in height. A colour-blind option was available by clicking a button at the bottom of the screen. Scores on the HAT have been shown to be significantly correlated with lower injury rates, near misses, and positive attitudes towards safety (Burt, 2017).

Figure 1. Example image pair of the style used in the hazard awareness test



Procedure

The advertisements the participants were exposed too instructed them to take home their study packages and complete them together (parent and student). Upon opening the package participants received (in order) an information sheet detailing the purpose of the study, a brief message on the ethics approvals granted by the university, and a comprehensive consent form. Following this, the parent was presented with a physical copy of the demographic questionnaire, the PAQ-R, and the GUAC (in order) with brief instructions on how to complete them. Last, was an instruction sheet detailing how to access and login to Talgent's software, for the student to complete the 4pHAT. This required the child to type out and follow a simple URL in their browser and click the link on the middle of that page. The hosts software required several elements of personal information before one could login to the Hazard Awareness Test. Due to the internal architecture of hosts system, which used these pieces of personal information as custom identifiers, the section could not be removed. To circumvent the issue of collecting personal information which would compromise the anonymity of participants, each was assigned a unique 6 digit code which would replace their personal information on the login page. These codes were used to identify their test score and link it with their parent's surveys (also coded). Parents were then instructed to use the fresh envelope provided and return their package back to their school's student service office in return for a $10 voucher (full study package provided in Appendix A).

Results

Data Preparation

Data from the 4pHAT was automatically collected by Talegents software and stored in an excel spreadsheet and then transferred to SPSS. Participants responded to the PAQ-R and GUAC by hand, so these data were manually entered into SPSS.

Talegent collected scores from 48 participants on the 4pHAT, of these 7 did not correctly enter their participant code and had to be excluded. Further, 10 study packs containing the PAQ-R and GUAC measures were never returned, leaving a final N of 31.

A small number of study packages were returned with isolated values missing on survey items. S shown in Table 1, 3 missing values were found for PAQ-R items, and these were replaced with item mean values.

Table 1. Missing PAQ-R items and the substituted means.

	Missing Item	Number Missing	Item Mean
PAQ-R	Item 25	1	2.73
	Item 27	1	3.67
	Item 29	1	3.10

Table 2 shows other missing data, and notes that 2 Growing Up Activity Questionnaires and one Significant Injury Event Questionnaire were left blank.

Table 2. Missing demographics values and number of non-responses to significant injury event and growing up activities' questionnaires.

	Parent Age	Parent Gender	No. Of Children	Child Age	Child Gender	Significant Injury Event	GUAQ
N	30	29	27	28	28	30	29
Number Missing	1	2	4	3	3	1	2

Finally, the data were checked for outliers, defined as values plus or minus three standard deviations from the mean. No outliers were found in the data, and therefore all data was included in the analysis.

Variable Distribution and Range Restriction Issues

Correlational analysis assumes normality of data, for both dependant and independent variables. Range restriction has the effect of suppressing relationships in correlation-based analysis (Raju & Brand, 2003). Analysis was conducted examining the descriptive statistics, and the distribution of the data to identify any range restriction issues. Skewness and Kurtosis were analysed to assess the suitability of the data for correlational analyses (Hunter, Schmidt, & Le, 2006). For evidence of a normally distributed data set with a sample size of 50 or less, absolute Z values for both skewness and kurtosis should be less than 1.96 (Kim, 2013). These Z values are calculated by dividing the actual skewness value by the standard error. Results

pertaining to the mean, standard deviation, range, skewness and kurtosis of the 4pHAT are shown in Table 3.

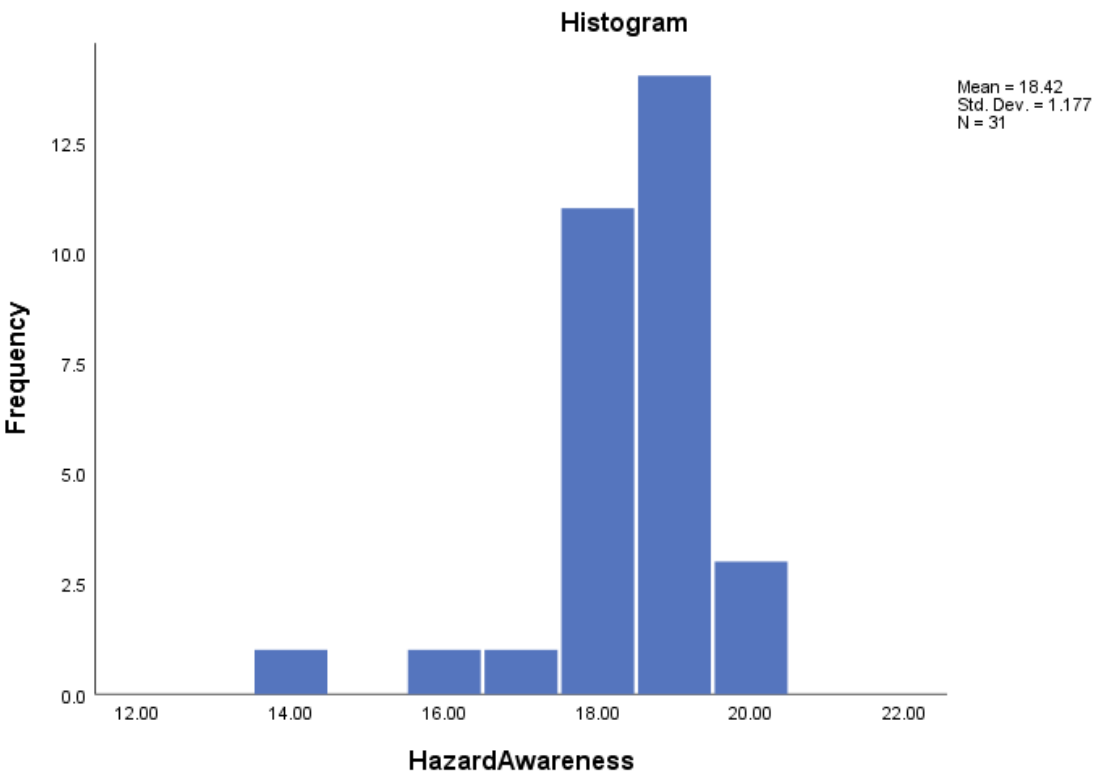
Table 3. Mean, range, skewness and kurtosis statistics of the 4pHAT

	n	Mean (SD)	Range	Skewness (SE)	Skewness Z-score	Kurtosis (SE)	Kurtosis Z-score
4pHAT	31	18.4 (1.18)	14-20	-1.96 (0.42)	-4.66	6.03 (0.82)	7.35

These results indicate that the 4pHAT data has skewness and kurtosis values that indicate non-normally distributed data (Kim, 2013). The large negative skewness value of -1.96 (SE = 0.42) indicates an asymmetry of the data with a long tail to the left of the distribution with the bulk of the data lying to the right-hand side of the mean. Kurtosis expresses the degree to which the density of the data differ from what is expected with a normal distribution (Hopkins & Weeks, 1990). The large kurtosis value of 6.03 (SE = .82), indicates a leptokurtic distribution with a large peak to the data.

Theoretically, a non-normally distributed data set is to be expected. The 4pHAT is an ability test measuring an individual's hazard awareness. It was assumed that all individuals in the study sample have developed some level of hazard awareness, as necessary for appropriate functioning in the world. Figure 1 displays the distribution of scores on the 4pHAT. The x-axis represents the score on the 4pHAT and the y-axis the frequency of that score.

Figure 2. Histogram of all scores on the 4pHAT.



As the 4pHAT was designed to be a measure of hazard awareness to be used during the recruitment and selection phases of employment, it is principally focused on identifying low scoring individuals. Previous research has shown (Burt, 2017), and the present study confirms the tool is successful at this goal, with two cases falling over 1 standard deviation below the mean. This indicates the measure has been successful at measuring individual differences.

Given the preceding results it important to note that the range-restricted data may cause suppression of correlations (Cascio & Aguinis, 2008), suggesting that correlations in the following analysis may be less than would be expected with a normally distributed data set.

Results pertaining to the mean, standard deviation, range, skewness and kurtosis of the Parental Authority Questionnaire – Revised, and the Growing Up Activities Questionnaire, with its subscale are shown below in Table 4. The PAQ-R is a 30-point scale, with three 10-point subscales. Respondents score an item with how much they agree with a statement reflecting one of three styles of parenting. The statistics in Tables 4 indicate the data conforms to the assumption of normality upon which Pearson product correlations are based. Mean scores on the authoritative and permissive subscales were comparable to those found in the initial validation study, falling within one standard deviation.

Table 4. Mean, range, skewness and kurtosis statistics of the PAQ-R

	n	Mean (SD)	Range	Skewness (SE)	Skewness Z-score	Kurtosis (SE)	Kurtosis Z-score
Authoritative	31	36.40 (3.69)	30-49	-0.20 (0.42)	-0.48	0.64 (0.82)	0.78
Authoritarian	31	27.20 (5.20)	17-43	0.76 (0.42)	1.81	1.49 (0.82)	1.82
Permissive	31	27 (5.50)	16-36	-0.39 (0.42)	-0.93	-0.57 (0.82)	-0.70

The mean score for the authoritarian subscale of is markedly lower than that found by Reitman et al (2002) in their validation work, falling three standard deviations below their mean score of 40.5, in a sample parents of 7-year olds. The mean score of authoritarianism in Table 4 indicates either an issue with the representativeness of the sample, or perhaps more likely an issue with the age difference of the present sample (mean 14.9) and that of the scale's validation sample. These findings are likely a reflection of changing parenting

practices as children age. The suitability of the PAQ-R in the present sample is further explored in a separate section below.

Table 5. Mean, range, skewness and kurtosis statistics of the Growing Up Activities Questionnaire (GUAQ) and its subscales.

	n	Mean (SD)	Range	Skewness (SE)	Skewness Z-score	Kurtosis (SE)	Kurtosis Z-score
GUAQ (total)	29	40.60 (11.90)	23-60	0.04 (0.43)	0.09	-1.44 (0.85)	-1.69
Workplace	29	6.10 (2.23)	2-9	-0.37 (0.43)	-0.86	-0.98 (0.85)	-1.14
Recreation	29	6.03 (1.94)	1-9	-0.88 (0.43)	-2.04	0.53 (0.85)	0.62
Sports	29	6.00 (3.34)	1-13	0.37 (0.43)	0.86	-0.76 (0.85)	-0.89
Transportation	29	5.55 (2.73)	1-11	0.45 (0.43)	1.05	-0.65 (0.85)	-0.76
Home Life	29	4.21 (1.52)	2-8	0.48 (0.43)	1.12	0.04 (0.85)	0.05
Animals	29	1.14 (1.13)	0-5	1.49 (0.43)	3.47	3.65 (0.85)	4.29
The Home	29	5.03 (1.76)	2-8	0.32 (0.43)	0.74	-0.95 (0.85)	-1.12
Tools, Equipment and Toxic Materials	29	12.3 (4.17)	4-19	-0.42 (0.44)	-0.95	-0.53 (0.86)	-0.62

The GUAQ measured hazard exposure with 95 items across 7 domains – Recreation, Sport, Transport, Home Life (e.g. helping with cooking), Animals, the Home (e.g. features such as stairs) and Tools/Equipment/Toxic materials. An 8th domain, workplace, was created by picking out items which most closely reflected hazards in a work environment. The GUAQ is used as both a composite measure, with all domains added to achieve a total hazard exposure score, and a domain specific measure to assess the contribution of each domain to hazard awareness. The mean, range, skewness and kurtosis statistics of the Growing Up Activities Questionnaire (GUAQ) and its subdomains, indicate that the GUAQ total and most of its subdomains performed well, with normally distributed data suitable for correlational analysis. The skewness Z-score for recreation indicates a mildly skewed distribution. The animals subdomain is highly skewed and kurtotic, towards the low end. Several of the items in that subscale referenced animals only found in rural settings, such as sheep, the distribution of these scores indicate a sample which did not successfully capture a rural lifestyle. Both subscales were kept for further analysis, though any relationships found can be expected to be suppressed (Cascio & Aguinis, 2008).

Scale properties of the PAQ-R

Due to the original sample which the PAQ-R was validated with was parents of 7-8 year olds, it is necessary to assess whether the three factor structure found in the original work held with the current sample (Reitman et al, 2002). Due to the older age of the children sampled and the possibility of differing parenting approaches, certain items could load on separate subdimensions than those expected, affecting any relationships found between composite scores and our dependant variable.

Table 6 Factor loadings for the three PAQ-R subscales

	Component		
	ATR	ATT	PER
Authoritarian Scale			
2	0.33	0.34	-
3	0.52	-	0.4
7	0.54	-0.45	-
9	0.50	-	-
12	0.65	-	-
16	0.76	-	-
18	0.69	-	-
25	0.32	0.57	-
26	0.63	-	-
29	0.54	-	-
Authoritative Scale			
4	-	0.75	-
5	-	0.87	-
8	0.60	-	-
11	0.33	0.46	-
15	-	0.82	-
20	-	0.48	-
22	-	0.31	-
23	0.60	0.32	-
27	-	0.37	-
30	-	0.40	-
Permissive Scale			
1	-	-	0.67
6	-	-	0.67
10	-	-	0.44
13	-0.42	-	0.68
14	-	-0.51	0.61
17	-0.36	-	0.66
19	-	-0.60	0.51
21	0.50	-	0.43
24	-	-	0.63
28	-0.37	-0.44	-

A principal components analysis with varimax rotation was performed to evaluate a three-factor structure. Items were retained if they had a loading of at least .30 (Robinson et al., 1995). In the present analyses, all items loaded highly on at least one subscale. Both eigenvalue and scree plot analysis appeared to converge on a three-factor solution. As shown in table 6 the PAQ-R demonstrated fairly stable factor structure across the three subscales. The Authoritarian and Authoritative subscales each had two items load more heavily on the other dimension and the Permissive subscale had one item load more heavily on another subscale and one item did not load at all. Inter-item correlations were assessed using Cronbach's alpha to determine if any items may be suitable for exclusion. An initial alpha score of 0.73 was achieved for the authoritative subscale, with removal of the problematic item 8 increasing the score to 0.75. Item 8 was then assessed qualitatively to determine why any issues might be occurring. Item 8 - *I direct the activities and decisions of my children by talking with them and using rewards and punishments*. The item appears to be problematic due to the age of the given sample and the discrepancy between the sample the scale was validated with. Directing 7-year olds activities in the way described appears qualitatively different than doing so with a 15-year-old, its perhaps clear why the item loaded on Authoritarian parenting. Due to this item 8. was excluded from further analysis. The inter-item correlations of the Authoritarian subscale (alpha = 0.77) revealed only a very modest increase if item 2. were removed, as such the scale was kept intact. Item – 28 in the permissive subscale loaded negatively for both authoritative and authoritarian parenting but did not load on its intended subscale. Removal of this item increased the inter-item correlation from 0.76 to 0.78. In the original validation work item-28 only loaded on permissiveness in a majority Black American sample, and not with majority White American sample, revealing the item could contain a cultural artefact which has not translated to a New

Zealand sample. Due to the non-factor loading, and the increase in alpha, and problems across samples, item 28 was excluded from further analysis.

The relationship between the Parental Authority (PAQ-R) and Hazard Awareness (4pHAT)

One of the main goals of the present study was to establish if there is a relationship between parenting style and hazard awareness, correlational analysis was deemed an appropriate tool to assess this relationship. All items in the PAQ-R are positively coded, with a 5 on each item reflecting a strong agreement and 1 reflecting strong disagreement. As such all items in each subscale are summed without the need for any reverse coding. High scores indicate greater endorsement of the given parenting style, or tendency towards it. Table 7 presents the relationship between authoritativeness, authoritarianism and permissiveness scores of parents and their child's hazard awareness as measured by the 4pHAT.

Table 7. Correlation between parental Authoritativeness, Authoritarianism and Permissiveness scores and 4pHAT scores.

	Authoritativeness	Authoritarianism	Permissiveness
4pHAT (n = 31)	0.28	0.23	-0.05

The results show small correlations between authoritativeness and authoritarianism with hazard awareness but neither of those relationships were statistically significant. Hypothesis 2 predicts that A tendency to an authoritative parenting style will be associated

with a higher score on the 4pHAT. While the results did not reach statistical significance they are consistent with the predicted relationship. However, clearly parenting style is accounting for some of the variance in hazard awareness. With a sample size 48 the correlation would have achieved statistical significance.

Intercorrelations between growing up activities' domains (GUAQ)

The GUAQ contains several different domains measuring exposure in different facets of life. Correlational analysis contained in Table 8 indicates that several of the domains contained within the growing up activities have medium to high correlations with each other.

Table 8. Intercorrelations of subdomains with the Growing up activities questionnaire

	Recreation	Sports	Transportation	HomeLife	Animals	TheHome
Recreation	—					
Sports	0.42*	—				
Transportation	0.59***	0.52 **	—			
HomeLife	0.48**	0.39 *	0.55**	—		
Animals	0.42*	0.13	0.20	0.15	—	
TheHome	0.48**	0.36	0.38*	0.42	0.41*	—
Tools Equip Toxic	0.41*	0.36	0.51**	0.61***	0.34	0.50**

Note: *$p < .05$ ** $p < .01$ *** $p < .001$

It appears that participating. in activities in one domain are not isolated to that given domain. For example, a child who participates in higher levels of sport also participates in higher levels of activities around the house (*r* .48). Fairly consistently across domains this relationship is present, even in domains which would appear uncorrelated such as sports participation and owning animals (*r* .42)

The relationship between the Growing Up Activities (GUAQ) and Hazard Awareness (4pHAT)

It was hypothesized that hazard awareness would be developed through hazard exposure. As such, the GUAQ covers a range of common activities which can contain hazards an individual will likely be exposed to in their lifetime. The extent to which this hazard exposure develops hazard awareness was assessed by correlating GUAQ scores, both total and domain specific, with our objective measure of hazard awareness, Table 9 contains these results. The GUAQ total score showed no relationship with hazard awareness. This finding was consistent across the majority of sub-domains. Sports and HomeLife had small correlations, neither of which were statistically significant.

Table 9. Correlation between the Growing Up Activities Questionnaire and its dimensions with Hazard Awareness (4pHAT)

	4pHAT
GUAC (total)	0.07
Workplace	0.08
Recreation	0.01
Sports	0.20
Transportation	0.00
Home Life	0.17
Animals	0.01
The Home	0.04
ToolsEquipToxic	-0.10

The relationship between the Permissiveness (PAQ-R) and Growing Up Activities (GUAQ)

During an exploration of the data it was found that increases in parental permissiveness had medium to high relationships with children's growing up activities. The results shown in Table 10 indicate that children of more permissive parents had engaged with significantly less activities in total and had significantly less hazard exposure in the workplace specific domain, the home and the tools/equipment/toxic materials domains. No relationship was found with the other dimensions of the PAQ-R.

Table 10. Correlation between parental permissiveness and growing up activities

	Permissiveness
GUAC (total)	-0.47 *
Workplace	-0.58 **
Recreation	-0.29
Sports	-0.35
Transportation	-0.19
Home Life	-0.23
Animals	-0.10
The Home	-0.44 *
ToolsEquipToxic	-0.39 *

Note: *$p < .05$ **$p < .01$

Significant Injury Events and their relationship with Growing up Experiences

A self-report measure of significant injury events experienced by the student in a range of environments was taken from parents. No significant relationships were found between these injury events and hazard awareness, neither was there a relationship depending on the use of parental authority. Table 11 shows the relationship between significant injury events and growing up experiences. The results indicate that children who have been exposed to higher amounts of transportation-based hazards and hazardous activities around the home have higher parent-reported significant injuries.

Table 11. Correlation between significant injury events and growing up activities

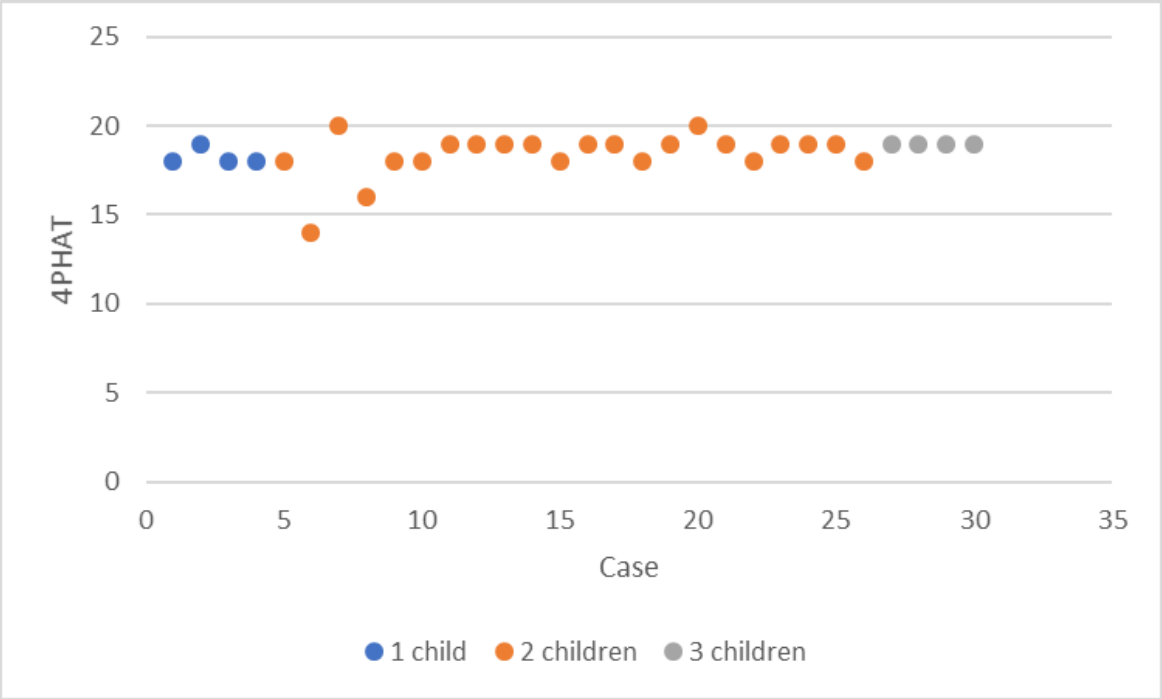
	Significant Injury Events
GUAC (total)	-0.47 *
Workplace	0.28
Recreation	0.28
Sports	0.09
Transportation	0.53 **
Home Life	0.57 **
Animals	-0.10
The Home	0.08
ToolsEquipToxic	0.20

Note: *p < .05 **p < .01

Other Results – Number of children

The given sample did not contain enough variance in the number of children in their families. Due to this correlational analysis was deemed inappropriate. Figure 2 contains a scatter plot of scores depending on the number of children in the family. A visual analyses clearly seems to confirm no relationship.

Figure 2. Plot of 4pHAT scores depending on the number of children in the family



Other Results – Gender differences

T- tests were carried out to assess whether there were any differences between male and female students scores on the 4pHAT and GUAQ. Differences between the two could indicate a meaningful difference in the way males and females are socialized towards safety (Morrongiello & Dawber, 1999). In line with previous studies using the 4pHAT no significant differences were found male (mean = 18.73) and female (mean = 18.24) t (26) = 1.04, p = .31. A fairly large mean difference was found between males (mean = 44) and females (mean = 37) on the GUAQ (total), unfortunately the finding didn't achieve statistical significance, likely due to the sample size *t* (24) = 1.77, p = .09.

Discussion

Study Aims

The aim of the present study was to further establish that hazard awareness is a learned ability. The study investigated the proposition that hazard awareness is principally learned through exposure to hazards throughout the lifespan (particularly during childhood and adolescence), and that parenting style, particularly an authoritative parenting style may positively impact learning about hazards. Findings could be used to help address the issue of civilian and workplace injuries/fatalities by better understanding the antecedents of safe behaviour. With detailed information on how hazard awareness is learnt research informed training tools and parenting strategies could be developed.

Summary of Findings – Hypotheses

The extent to which parenting practices contribute to a child's hazard awareness was assessed by proxy, using an authoritative parenting style as a model for effective parenting. The exact strategies parents use to socialize children to safety is an area which is understudied. It was expected that the superior outcomes seen across a range of areas with the children of authoritative parents would carry over to the realm of safety and hazard awareness. A small relationship was found between authoritativeness and hazard awareness, but due to the low sample size it didn't achieve statistical significance.

It was expected that growing up experiences measured through exposure to hazardous activities such as riding a bike, or having some hazardous feature in the family home, for example toxic materials or a staircase, would develop an individual's hazard awareness. The

present research found no significant relationship between the growing up experiences measured and the measure of hazard awareness. The scale used to measure hazard exposure also broke down into several subdomains (workplace, recreation, etc), these subdomains also showed no significant relationships with the measure of hazard awareness. The measure of hazard exposure used was a general measure, covering a general list of common life hazards. The measure of hazard awareness (4pHAT), is a workplace specific measure. The two had a very little crossover in the hazards they covered, which could be the cause of the lack of correlation. The lack of correlation between the two seems to imply a lack of generalization occurring between hazard experiences and novel situations.

Summary of Findings – Other Findings

Further investigated in the present study was the relationship between parental authority and growing up experiences. Higher levels of permissiveness were found to have a medium sized negative correlation with growing up experiences ($r = -0.46$). Children of permissive parents participated in significantly less activities around, in, and away from the home. Due to the nature of the analysis conducted implying causation is not possible, regardless of this the finding seems to implicate parental use of authority as a necessary element in children participating in activities, whether that is as a casual variable or as a moderator/mediator is unknown. This perhaps seems obvious regarding chore like activates around the home but is surprising in regards ‘fun’ activities such as sport and recreation. This finding contrasts with one showing children of permissive mothers had higher daily activity levels (Jago, Davison, Brockman, Page, Thompson & Fox, 2011). Suggesting a possible difference in unstructured versus structured activities of the kind measured by the GUAQ. Further iterations of the GUAQ may have to take into consideration such differences. There is also evidence which implies parents use of authority contains an element of feedback loop,

with child behaviour shaping parental authority use and vice versa (Kuppens & Ceulemans, 2018). The extent to which the relationship found in the present study is a feedback loop, where in the child's behaviour and preference for unstructured activities shapes the parent's behaviour in a way which encourages a permissive parenting style is unclear. To fully tease out the nature of these relationships would likely require a longitudinal design.

Lastly, it was theoretically unclear what implications family size would have on the development of hazard awareness. Conflicting research suggested that both observational learning would occur, with children developing their hazard awareness by seeing their siblings interact with hazards, and that due to lowered levels of parental supervision higher injury rates would occur. No significant differences were found between family size and hazard awareness or significant injury events experienced by the child.

A finding that further confirms that transportation-based hazards are one the most significant concerns to children was the high correlation with participation with transportation-based hazards and significant injury events. An array of research implicates roadways as high-risk areas for children, providing numerous highly dangerous moving parts, which thoroughly tax a child's cognitive functions when they attempt to interact with them.

Practical and Theoretical Implications

It was postulated that an important precursor to safe action was an individual's hazard awareness, an ability which allows people to draw upon their knowledge, experiences and skills to identify situations or objects which may cause them harm and so adjust their behaviour accordingly. How individuals come to these abilities is of interest to a diverse range of parties, including workplaces, parents and government/non-governmental agencies.

Workplaces could use the information to screen individuals who may be likely to cause harm to themselves and others and make informed decisions about their suitability as employees or their learning needs. Findings in this area could be used to help develop research informed tools which can advance individuals hazard awareness abilities in a manner which is consistent with how their abilities are formed throughout childhood and principals of learning embedded within them. Parents, Governmental and Non-Governmental agencies would be informed by research-based parenting practices or training tools which could help educate caregivers on how best to train their children to participate in the world in safe manner, encouraging children to safely engage with hazards as a way to learn from them. Unfortunately, due to the lack statistical significance these implications are moot and remain in the realm of hypothesis without evidential support.

Further, of interest theoretically, with possibly large practical implications, was the inference that if hazard awareness is an individual difference variable, one principally developed through our experiences growing up and the quality of our parents, what impact upon one's personal liability in a workplace accident would occur. Does a worker have personal liability for not identifying and neutralizing a hazard at work, if they can be demonstratably shown to have a low level of hazard awareness, which was underdeveloped due to a deprived childhood? It's a question worthy of pondering. Unfortunately, the lack of statistically significant findings allows no clarity of these pertinent issues.

Theoretically the lack of significant results could imply flaws in the development of the reasoning which informed the hypotheses of study, or the methods devised to measure them. These issues are discussed in detail in the limitations section.

Limitations

The results of the present study should be viewed with consideration of the potential limitations of the analysis.

Of primary concern in the lack of statistical significance in correlational analysis was the limited sample size. Initial power estimates predicted a necessary sample size of 75, 31 cases were achieved. Also due to this issue, regression analysis was deemed inappropriate as the low n= may cause unstable results which give inappropriate or inaccurate values (Kelley & Maxwell). Concerted efforts were put forth to achieve the appropriate sample size with three separate schools participating. Various issues explain the lack of uptake, one key issue was the timing of the advertisement coinciding with city wide lockdowns due to the global pandemic, understandably participating in research which had a reasonably high level of effort to participate was not front of mind. Secondly, and a potential issue which needs broader consideration amongst the scientific community is the issue of the oversaturation of analysis of children. One school principal noted that they receive a phone call every day regarding conducting a study at their school. One school refused due to this issue. Principals and children/parents they represent are rightfully concerned about constant interruptions to childhood through a persistent poking and prodding of scientist. This issue warrants reflection, especially if the continued goodwill of the community, of which scientists rely is continued.

The lack of randomization of the sample presents an issue to the validity and generalizability of findings. Participation in the study was fairly involved and I is reasonable to suspect that some quantifiable difference exists between those parents who chose to enrol themselves and their child in the study and the population at large. Potentially parents whom are already more concerned about safety related issues regarding their child, for example.

The testing environment the study was conducted provides a concern. Carried out entirely where the participants saw fit, with no oversite from a researcher. Exactly who carried out each part of the study is not certain, with how much assistance from a caregiver or sibling the participating student received unknown. The issue of distractions due to noise or other external variables causing low scores on the 4pHAT or inaccurate responses to surveys is also present.

Responses on the parental authority questionnaire are heavily subject to social desirability bias. People, broadly speaking, know the 'correct' response regarding how to raise one's child, many fewer than this carryout their parenting in this manner (Grimm, 2010). This could largely suppress the results of correlational analysis between authoritative parenting and the dependant variables.

The lack of significant results whilst plausibly due to the issues raised above, principally that of sample size, does cause one to reflect on theoretical concerns and the methods and materials chosen to measure them. Several issues are present and discussed below.

The Growing up experiences' questionnaire had no correlations with hazard awareness. This is perhaps unsurprising theoretically for two reasons; the simple presence of a hazard makes no statement about the quality of experience with that hazard, and the 4pHAT specifically measures the ability to detect hazards in only two environments (workshop and outdoor work). It was postulated that learning about hazards would principally happen when a child engaged with a hazard in a meaningful way and a range of exposure to hazards would build a complex network of understanding about what is and isn't hazardous and how to interact with them in a safe way. The GUAQ measures simple one-time exposure only. The number of exposures to the hazard, time of exposure, or quality of exposure to the hazard was

not measured. A child for example could score a point on the GUAQ for having been exposed to bleach simply by its presence in the house. No contact between the child and the substance could have occurred, along with the possibility no direct instruction from the parent could have occurred for a score on the GUAQ. This issue is present across the range of hazards measured. Secondly, the GUAQ measures a diverse range of hazards from across various life domains. The 4pHAT measures the ability to detect hazards in a narrow range of hazardous environments (workshop, outdoor work). As the ability to detect hazards is primarily one of recall of that hazard, the limited cross over between the hazards in the GUAQ and environments measured by the 4pHAT supports this notion. The non-existent relationship suggests little generalization is occurring between hazard exposure in one environment to another.

Authoritative parenting failed to reach a significant result. The PAQ-R was validated with a much younger sample size than the one in this study and this could present an issue. Evidence for this issue is found in the correlation between child age and permissive parenting and the lower mean score for authoritarian parenting when compared with the validation study. Naturally as children age the strategies parents use with their children change, and in this instance, parents were found to use less authority. This finding could mean inaccurate scores on the PAQ-R where the child experienced authoritative parenting throughout early childhood, and as they properly adjusted to life their parent adopted a more permissive style, a natural change (Rosen, Cheever & Carrier, 2008). Further, it is possible the children of authoritative parents were merely more compliant and attentive in taking the 4pHAT. As the study contained no external motivation to do well, such as gaining something desired like employment, its possible children of authoritative parents whom may have used effective parenting strategies to gain compliance from their child, participated with more vigour than children who may have, for example been coerced by an authoritarian parent. Further,

ignored in large part in the literature on parenting style is the issue of differing parenting styles between parents and how they interact to be additive or compensatory. Findings from Kuppens and Ceulemans (2018), highlight that all parenting practices aimed at controlling, managing or regulating child behaviour were not necessarily simultaneously used by parents, which is highly problematic if we wish to infer which parenting strategies shape childhood socialization.

Future Research

Exploration into this area of inquiry has two clear avenues. The theoretical grounding behind growing up experiences contributing to one's hazard awareness is clear. The issue likely results from the chosen method of measuring these experiences. Development of a separate measure, which considers the quality of experience with each hazard or the frequency of exposure, could lead to more fruitful results. The results of the factor analysis of the PAQ-R suggest work should be done to develop a measure of parenting style for children in their teenage years.

Conclusion

The present study attempted to clarify the association between one's childhood experiences and their subsequent ability to function in the world in a safe manner. Whilst some clues were laid out regarding the non-result of authoritative parenting, no major contribution has been made to our broader understanding. The present research principally provides a necessary step down an unfruitful branch of knowledge, which may direct further enquiry to an abundance of scientific discovery.

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Appendix

Appendix A: Study Preamble

Department: Psychology
Telephone: 0273118127
Email: cmr124@uclive.ac.nz
[16/07/2020]

Hello, my name is Cameron Rattray and I'm with the University of Canterbury psychology department. I'm currently conducting research related to children's safety, I hope you will take the time to participate in this study.

What is the study?

This study is looking at how parenting, and a child's experiences growing up influence the development of children's Hazard Awareness.

The leading cause of death for persons aged 1-24 are accidents, our goal is to try and understand how an important precursor to safe behaviour, Hazard Awareness, is developed.

If you choose to participate, you will be required to fill out two short, anonymous surveys related to your parenting style and your child's experiences growing up, followed by your child completing a 10-minute, age appropriate, test of their hazard awareness.

Complete everything in the study pack, and using the envelope provided, return it to Burnsides' Student Service Office by the end of Term 3 (25th of September) to receive your $10 voucher.

This study has gained ethics approval from both University of Canterbury Human Ethics Committee and the Maori Consultation Committee.

Scientists rely on the goodwill of the community to do their work, thank you for your consideration.

Appendix B: Consent Form

Department: Psychology
Telephone: 0273118127
Email: cmr124@uclive.ac.nz
[16/07/2020]

Hazard Awareness Information and Consent Sheet for Survey Participants

My name is Cameron Rattray and I am a Master's student at the University of Canterbury. I am conducting research on the influence of parenting style and growing up experiences on children's Hazard Awareness.

Involvement in this project involves a parent filing out a survey, and a child completing an online hazard awareness test independently. This should take approximately 20 minutes.

This survey pack includes materials for you the parent to complete by hand, as well as instructions on how your child is to complete the online hazard awareness test. If you as the parent consent to participating is this study, AND also consent to your child participating, AND they also consent, then please open the surveys and complete.

It is important that both you and your child's parts of the study are completed at the same time, and independently. That is please do not discuss the questions in the surveys or help your child while they are completing their test. Once completed please place the survey in the envelope provided and return them to where they were collected, to receive 1 $10 voucher.

If you do not wish to participate, please destroy the survey pack.

Please note:
Completing the surveys implies consent of all parties. DO NOT write your name on the surveys or on the return envelope.

You may receive a copy of the project results by contacting the researcher at cmr124@uclive.ac.nz. Note results are likely to be available early 2021.

Participation is voluntary, confidential, and anonymous. As such it will be impossible to withdraw your survey from the study once it has been returned.

The results of the project may be published, but you may be assured of the complete confidentiality of the data gathered in this investigation: your identity can not be made public. Nor will the name of any schools be mentioned. The data will be securely stored and destroyed after destroyed after ten years.

This project has been reviewed and approved by the University of Canterbury Human Ethics

Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

Appendix C: Demographics and PAQ-R surveys

Demographics

Parent

Age:_____

Gender: Male ☐

Female ☐

Gender Diverse ☐

Number of children:_____

Child

Age: _____

Gender: Male ☐

Female ☐

Gender Diverse ☐

Parental Authority Questioniare - Revised

PAQ-R Instructions: For each statement below circle the answer that best describes your behaviour and beliefs about parenting your child. There are no right or wrong answers. We are looking for your overall impression regarding each statement : (Circle)

SD = Strongly Disagree; D = Disagree; N = Neither Agree nor Disagree; A = Agree; SA = Strongly Agree.

1. In a well-run home children should have their way as often as parents do..... SD - D - N - A - SA
2. It is for my childrens' own good to require them to do what I think is right,

even if they don't agree.---------- SD - D - N - A - SA

3. When I ask my children to do something, I expect it to be done immediately, without questions.---------- SD - D - N - A - SA
4. Once family rules have been made, I discuss the reasons for the rules with my, my children.---------- SD - D - N - A - SA
5. I always encourage discussion when my children feel family rules and restrictions are unfair.---------- SD - D - N - A - SA
6. Children need to be free to make their own decisions about activities, even if this disagrees with what the parent might want to do. ---------- SD - D - N - A - SA
7. I do not allow my children to question the decisions that I make.---------- SD - D - N - A - SA
8. I direct the activities and decisions of my children by talking with them and using rewards and punishments.---------- SD - D - N - A - SA
9. Other parents should use more force to get their children to behave.---------- SD - D - N - A - SA
10. My children do not need to obey rules simply because people in authority have told them to.---------- SD - D - N - A - SA
11. My children know what I expect from them, but feel free to talk with me if they feel my expectations are unfair.---------- SD - D - N - A - SA
12. Smart parents should teach their children early exactly who is the boss in the family.---------- SD - D - N - A - SA
13. I usually don't set firm guidelines for my childrens behaviour.---------- SD - D - N - A - SA
14. Most of the time I do what my children want when making decisions. ---------- SD - D - N - A - SA
15. I tell my children what they should do, but I explain why I want them to do it.---------- SD - D - N - A - SA
16. I get very upset if my children try to disagree with me.---------- SD - D - N - A - SA
17. Most problems in society would be solved if parents would let their children choose their activities, make their own decisions, and follow their own desires when growing up.---------- SD - D - N - A - SA
18. I let my children know what behaviour is expected and if they don't follow the rules they get punished.---------- SD - D - N - A - SA

19. I allow my children to decide most things for themselves without a lot of help from me.---------- SD - D - N - A - SA
20. I listen to my children when making decisions, but I don't decide something simply because my children want it.---------- SD - D - N - A - SA
21. I do not think of myself as responsible for telling my children what to do.-------- SD - D - N - A – SA
22. I have clear standards of behaviour for my children, but I am willing to change these standards to meet the needs of the child.---------- SD - D - N - A - SA
23. I expect my children to follow my directions, but I am always willing to listen to their concerns and discuss the rules with them.---------- SD - D - N - A - SA
24. I allow my children to form their own opinions about family matters and let them make their own decisions about those matters.---------- SD - D - N - A - SA
25. Most problems in society could be solved if parents were stricter when their children disobey.---------- SD - D - N - A - SA
26. I often tell my children exactly what I want them to do and how I expect them to do it.---------- SD - D - N - A - SA
27. I set firm guidelines for my children but am understanding when they disagree with me.---------- SD - D - N - A - SA
28. I do not direct the behaviors, activities or desires of my children.---------- SD - D - N - A - SA
29. My children know what I expect of them and do what is asked simply out of respect for my authority.---------- SD - D - N - A - SA

30.If I make a decisions that hurts my children, I am willing to admit that I made a mistake. ---------- SD - D - N - A - SA

Growing Up Activities Questionnaire

Below are questions about aspects of your child's life. Please tick those that apply to your family and your child participating in this study with you.

Recreation (Has your child ever participated in these activities)

1. *Swimming at the beach* ☐
2. *Fishing* ☐
3. *Skiing/snowboarding* ☐
4. *Canoeing/kayaking* ☐
5. *Caving* ☐
6. *Climbing/(indoor or outdoor)* ☐
7. *Hiking* ☐
8. *Camping* ☐
9. *Hunting* ☐
10. *Other, please specify…….* ☐

Sports (Has your child participated in these sports)

11. Cricket ☐
12. Tennis ☐
13. Basketball ☐
14. Hockey ☐
15. Rugby (either code) ☐
16. Football ☐
17. Netball ☐
18. Gymnastics ☐
19. Combat sports ☐
20. Skateboarding ☐
21. Road cycling ☐
22. Mountain biking ☐
23. Go Karting ☐
24. Trial Biking ☐
25. Other, please specify……. . ☐

Transportation (Has your child ever used these modes of transport)

26. Bicycle ☐
27. Public Bus ☐
28. Train ☐
29. Walking (Unsupervised) ☐
30. Taxi/Uber ☐
31. Push scooter ☐
32. Electric scooter ☐

33. Gas powered scooter ☐
34. Motorbike ☐
35. Sailboat ☐
36. Motorboat ☐

37. Quad Bike ☐
38. Other Please specify…….. ☐

Home life (Has your child participated in these household activities either alone or with a family member)

39. Cooking ☐
40. Cleaning ☐
41. Gardening ☐
42. Wood chopping ☐
43. Car maintenance ☐
44. Home maintenance/improvements ☐
45. Carpentry ☐
46. Other, please specify…….. ☐

Animals (Has your family ever owned these animals)

47. Dog ☐
48. Cat ☐
49. Horse ☐
50. Cow ☐
51. Sheep ☐
52. Other, please specify…….. ☐

The Home (Has your child ever lived in a home with these features)

53. Swimming pool ☐
54. Garden shed ☐
55. Stairs ☐
56. Wood burner ☐
57. Gas fire ☐
58. Spa Bath ☐
59. Gas stovetop ☐
60. Electric stovetop ☐
61. Climbable trees ☐
62. River access ☐
63. Other, please specify…….. ☐

Tools, Equipment and Toxic Materials (Has your child ever lived in a home with access to these items)

64. Hand tools ☐
65. Power tools ☐
66. Chainsaw ☐
67. Lawnmower ☐
68. Tractor ☐
69. Harvester ☐
70. Fuel tank ☐
71. Confined spaces (e.g. Grain silo) ☐
72. Milking Shed ☐
73. Sowing machine ☐
74. Gas heater ☐
75. Barbeque ☐
76. Gun ☐
77. Emergency radio ☐
78. Emergency beacon ☐
79. Portable stove ☐
80. Fire extinguisher ☐
81. Solvents ☐
82. Glue/adhesive ☐
83. Oven cleaner ☐
84. Bleach ☐
85. Rodent/insect poisons ☐
86. Pesticides ☐
87. Tins of Paint ☐
88. Prescription medications ☐
89. Other, please specify…….. ☐

Significant events (Has your child had a significant injury or accident requiring medical attention in any of these places)

90. Home ☐
91. School ☐
92. Work ☐
93. On the road ☐
94. During sport/recreation ☐
95. Other, please specify…….. ☐

Thank you for taking the time to complete this survey.

Appendix E: Hazard Awareness test instructions

Hazard Awareness Test Instructions

Step 1: Getting there

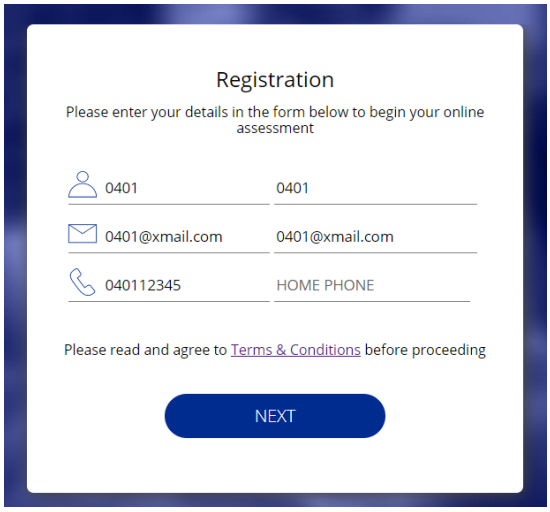
Using a computer (not a phone) go to this website - **sites.google.com/view/hazard-awareness**

Follow the Link on that page to the Hazard Awareness Test.

Step 2: Logging in

Your Participant code:

(Example only)



To protect your privacy, Do not enter your personal information! Rather fill in the fields using your participant code as follows.

First Name = Your Participant Code

Last Name = Your Participant Code

Email = Your ParticipantCode@xmail.com

Mobile = Your Participant Code + 12345

Home = Leave it empty

Continued on the next page……

Step 3: Questionnaire

Enter your Gender →→→→ ***Skip the other questions***

- Click the **Next** button at the bottom of the page.

Step 4: Take the test

This is the test!

Follow the instructions on screen for the Hazard Awareness Test.

Thank you very much for helping us out, we really appreciate it

Appendix F: Advertisement

CONTRIBUTE TO SCIENCE!

Is your child in **year 10 – year 11?**

We are looking for a **parent and child** to participate together in a study designed to assess the influence of parenting style and your child's experiences growing up, on their Hazard Awareness.

Participation is completely anonymous, and involves you filling out a short survey, followed by your child taking an age appropriate, online hazard awareness test. It will take approximately 20 minutes to complete.

Pick up and Return an information and materials package to the Student Services Office by the end of Term 3 (25th September) to receive a $10 voucher.

Scientists rely on the goodwill of the community to do their work, please ask your child to collect a study package from the Student Service Office, for you to open and complete together.

UC UNIVERSITY OF CANTERBURY

PSYCHOLOGY DEPARTMENT
Cameron Rattray
cmr124@uclive.ac.nz | 0273118127 |

Appendix G: Daily Notices Blurb

Notices Blurb

Make $10 for 20 mins work. The University of Canterbury is running a study on Hazard Awareness that involves a student and a parent. Pick up a study pack from the enrolment centre, take it home and give it to a parent. Return the completed pack to the enrolment centre and receive a $10 voucher. Thanks in advance.

Appendix H: Flyer

CONTRIBUTE TO SCIENCE!

Win a $100 voucher

We are looking for a **teenager and parent** to participate together in a study on Hazard Awareness.

Participation is completely anonymous, and involves a parent filling out a short survey, followed by you taking an online hazard awareness test. It will take approximately 20 minutes to complete both sections.

Go to -

Your Schools student services office

Scientists rely on the goodwill of the community to do their work.

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

PSYCHOLOGY DEPARTMENT
Cameron Rattray
cmr124@uclive.ac.nz | 0273118127 |

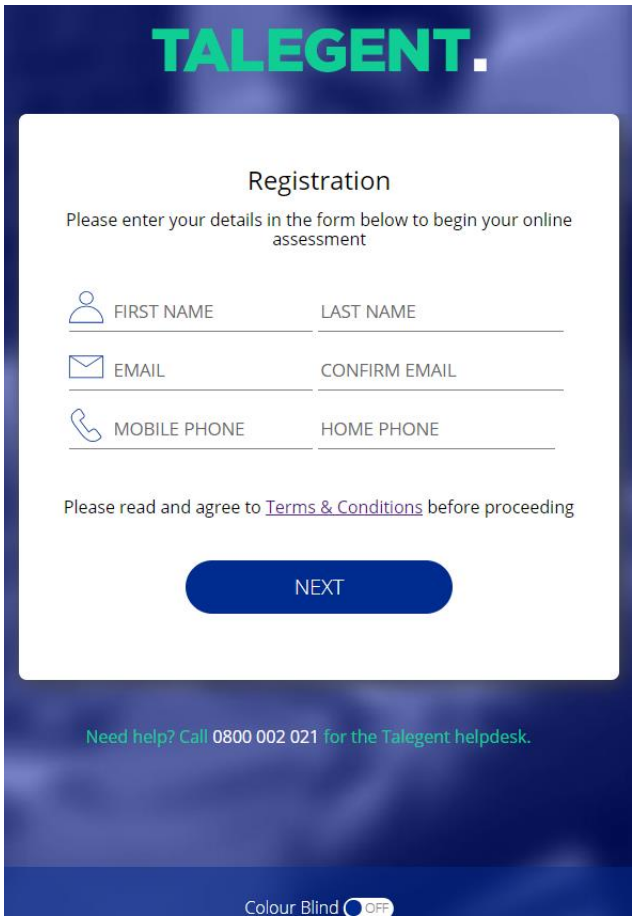
Appendix I: Hazard Awareness Link Screen

Hazard Awareness

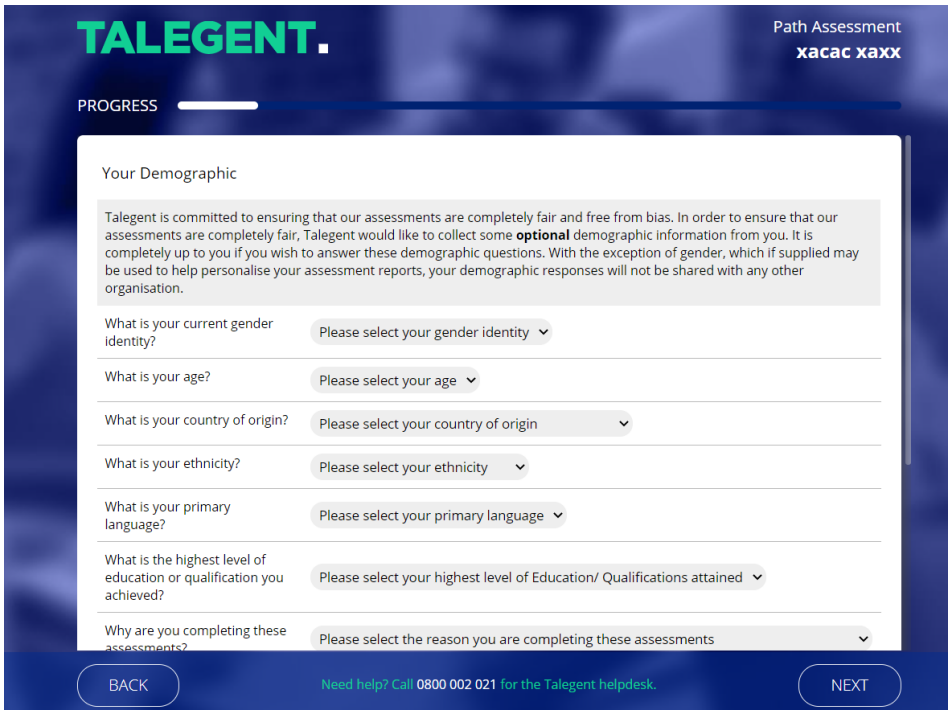
Click the link below to complete the Hazard Awareness Test

https://assess.talegent.com/?SID=~Vk3RJ3XfxXo58j81U35qEw2

Appendix J: Talegent Login Screen



Appendix K: Talegent Demographics Screen



Appendix L: Talegent Hazard Awareness test instructions