Experiencing risk: The effect of the experiential life-skills centre ‘Warning Zone’ on children’s risk perception

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This study examined the psychological effects of the Warning Zone experiential life-skills centre on risk perception. The aim of Warning Zone is to educate children about dangers and risks they may encounter in everyday life, with a view to preventing injury. To evaluate changes in risk perception, a quasi-experimental study was undertaken in which children’s risk perception was measured before, after, and one month after the Warning Zone experience. This research also examined children from different types of schools, in order to assess socioeconomic factors. Children’s risk perception increased significantly after Warning Zone, and this significant increase was retained one month later. Differential effects of Warning Zone were found between children from different school types, as were pre-existing differences in risk perception between these groups. Children from more deprived backgrounds had better understanding of risks prior to their visit to Warning Zone and a month later had better retained the message of Warning Zone about risks. We conclude that Warning Zone is effective at raising children’s perceptions of risk.

Keywords: risk perception; adolescents; perception of benefit; Warning Zone; experiential life-skills.

Introduction

Warning Zone is an experiential life-skills centre in the UK, which since 2006 has educated thousands of children each year about risk, with a view to preventing injury and potentially harmful behaviours. Warning Zone is visited by most year 6 school classes in the county and treats children as masters of their own destiny, informing them that choices they make are often important for their safety, and educating them on how dangerous situations can be avoided. Warning Zone offers education on fire, electricity, building sites, alcohol, personal safety, water, criminal damage, roads, railways and the internet. Each year in the UK several hundred children die in accidents, and hundreds of thousands of children need hospital treatment for injuries that frequently occur in the home (Mytton et al., 2013). As children grow up there is also the risk of becoming involved in antisocial behaviour, especially if they have poor decision making abilities and lower cognitive ability (Sorge, Skilling, & Toplak, 2015), and Warning Zone address antisocial behaviour too. The fundamental assumption of Warning Zone is that understanding of risks will cause children to make better, more informed choices, therefore reducing injury and crime rates and hopefully even mortality rates.

Decision-making, risk perception and Warning Zone

Understanding how humans make decisions is of interest in many fields and could be said to have its earliest roots not in psychology, but in economics. Expected utility theory was accepted by economists as the mathematical way in which we assign value to possible losses or gains of a decision (Neumann & Morgenstern, 1953). However, Simon asserted that our rationality is bounded, meaning we strive for a satisfactory, but not necessarily optimal, solution (Simon, 1956). In light of Simon's assertion, Mowrer (1960) suggested that while emotionality has been considered opposite to rationality, emotions have useful and adaptive roles in decision-making. Damasio (1994) proposed an account in which emotions 'colour' our thoughts and act as motivational or repellent forces on behaviour. Winkielman, Zajonc and Schwarz (1997) demonstrated the speed with which emotions can influence judgement by presenting smiling, neutral or unhappy faces for a fraction of a second; too short to recognise or recall. When asked to rate subsequent stimuli, participants' liking scores were significantly higher when stimuli were preceded by a smiling face. The way that we use emotions (affect) as integral to decision-making is known as the 'affect heuristic' and has been crucial in informing theories of risk perception (Slovic, 2000).

Every risky action we take begins with a decision; therefore accounts of decision-making have heavily influenced theories of risk perception (Slovic, 2010). The ability to assess risk is of fundamental importance for survival, allowing avoidance of threats which can maim or even kill (Byrnes, 1998). Peters, Burraston and Mertz (2004), argued that in order to assess the risk of an action we weigh up its associated risk against its possible benefits. They proposed that we assign value to these by 'feeling': emotions invoked by imagining the possible negative consequences are weighed up against possible positive emotions, to assess risk. Assigning value in this way is part of the affect heuristic and while clear knowledge about the risk of an activity is not necessary to perceive risk, it is safer to understand danger and accurately assign an emotive value to the possible negative outcome. Warning Zone offers children the ability to make better informed decisions. This research utilised the 'risk-versus-benefit' idea of risk perception to inform a method of measurement for how children perceive risk.

An early study of risk perception found that judgements of risk and benefit are negatively correlated (Fischhoff et al., 1978). This assumed inverse relationship is particularly interesting when considering that in reality this tends to be positively correlated (Pham, 1998). This finding supports the idea that risk judgements are based on an overall evaluation, guided by emotion (affect). Finucane, Alhakami, Slovic, and Johnson (2000), found that providing information designed to increase a participant's risk judgement, systematically caused them to decrease their benefit judgement. Finucane et al. also showed that under time pressure this effect increased, and as affect is the quickest method by which to reach a judgement (Winkielman et al., 1997), participants under time pressure were most likely relying heavily upon the affect heuristic, further supporting the notion that this assumed relationship is due to affect. The research by Finucane et al. indicates that Warning Zone should increase children's risk perception directly after the experience, as the perception of risk will increase and the perceived benefit will decrease. A review of risk communication literature found that messages that induce mild fear, and those which are part of an emotional framing, such as a story, increase risk perception by inducing affect (Visschers et al., 2012). Many lessons taught at Warning Zone involve invoking some level of detached fear, and could be considered inherently emotive as they frequently contain information about means by which one might be hurt or even killed. Thus it is hypothesised that the experience will increase risk perception due to the induction of affect and the influence this has on judgements of risk and benefit.

Warning Zone's teaching is intended to be easy to learn and remember. Studies on programmes similar to Warning Zone have found a significant rate of knowledge retention up to four months after the experience (Gielen, Dannenberg, Ashburn, & Kou, 1996). Warning Zone takes children through a number of rooms (zones) which are designed to look like places associated with risk in reality, for

example a kitchen, road, building site, alleyway, or railway. It is known that information is more likely to be recalled within a context similar to where it was encoded, as more cues are available to prompt recall (Kohler et al., 2000). Warning Zone teaches children about risk in an environment which mimics the context of realistic situations, with the intention of increasing the likelihood that lessons learned will be recalled at a crucial moment in the future. However, while this can theoretically be derived from the literature surrounding memory and recall, recall is not the focus of our research, which looks at risk perception only. To increase the reality of the experience, children experience each zone along with around five or six of their peers, which is important because the mere presence of other people can increase risk-taking behaviour (Chou & Nordgren, 2016). Morrongiello and Lasenby-Lessard (2007) created a model of psychological determinants of 6–12 year old children's physical risk taking decisions. Their review identified many individual characteristics of the child, family factors, and social-situational factors as determinants of risk taking/avoidance. They argue that because children are influenced by their peers to take part in risky activities, interventions that target groups of friends can be more effective. Warning Zone takes this approach and children visit in classes with their friends.

Emotional arousal also increases learning efficacy and the probability of storage and recall (Heuer & Reisberg, 1990). Warning Zone's lessons are emotionally salient as the environment mimics real threats, and often includes sudden sound effects, lighting changes and movements. While this study does not explicitly measure how well children remember material they were taught at Warning Zone, it follows that if children have retained this emotionally salient information, they will still have significant differences in risk perception after one month has passed.

There is a known association between social deprivation and injury in childhood (Edwards, Green & Roberts, 2006; Roberts, 1997). A longitudinal study on protecting adolescents from harm found that poverty and school type had an effect on many risk behaviours, including drug and alcohol abuse and criminal behaviour (Resnick et al., 1997). There is a lack of research into how prevention programmes such as Warning Zone act on different socioeconomic populations (Dowswell & Towner, 2002; Mulvaney et al., 2014). Socioeconomic status has close correlations to school location; urban schools are typically more disadvantaged and schools in the countryside and suburban areas are less so (Sirin, 2005). Independent schools require parents to provide fees and consequently these contain the most advantaged children whose parents have this disposable income (Lubienski & Lubienski, 2014). Furthermore, Lamb, Joshi, Carter, Cowburn, and Matthews (2006), examined knowledge retention in children who had attended a programme similar to Warning Zone (in Bristol, UK), and found the largest loss in knowledge over three months was children from lower achieving schools. Social deprivation is also a predictor of lower educational attainment (Paterson, 1991); therefore the finding by Lamb et al., (2006) may indirectly show that children from more deprived backgrounds are less able to recall this risk-related information, despite their increased risk of these hazards. Socioeconomic factors were examined more directly in our research, by assessing the risk perception responses of children from urban schools, schools in the countryside and independent schools with the hypothesis that there will be differences in their perception of risks.

Importance of this Research

Children attending Warning Zone (at 10–11 years old) are in a uniquely important position in terms of the impact this can have on the rest of their lives. The children are just entering adolescence and this is accompanied by increased autonomy from guardians (Spear & Kulbok, 2004), however adolescents' decision-making ability is not yet mature: Stanford et al. (1996) found that adolescents are more likely to be impulsive and bypass analytic decision-making processes in relation to risk, relying more heavily on affective judgements. It is important to target interventions at adolescents, as it has been shown that risk-taking is high in this age group because reward-seeking is high and self-control has not yet developed to restrain impulses (Steinberg, 2010). The developmental

neuroscience approach has supported a dual systems model (Steinberg, 2008), whereby risk-taking is high in middle adolescence because of increased dopaminergic activity in the socioemotional system due to puberty, combined with an as-yet immature cognitive control system. Adolescent brains are not yet fully formed (Boyer, 2006); developmental changes occur throughout adolescence in dopamine reward systems which can lead to reaching for sensations with higher reward and also risk association, such as drug and alcohol abuse (Spear, 2000). Yan and Brocksen (2013) argue that educational attainment can be improved by reducing substance use, such as alcohol and smoking, and that adolescents can be helped to avoid these risks if they are educated about them earlier. Our research is important as it seeks to examine the psychological effects of Warning Zone as children move into this distinctively vulnerable phase of their lives.

The literature on programmes similar to Warning Zone is sparse and only two published articles have been found, one in Bristol, UK, and one in Maryland, US, (Gielen et al., 1996; Lamb et al., 2006). This is important when considering that these prevention programmes have become popular in the UK, and many government funded bodies such as the fire and police services are involved in their implementation. Therefore psychological study of the effect of these programmes on attitudes and behaviour is not only useful, but necessary in justifying funding decisions, knowing how to target these programmes and in improving their content where necessary. Both of the above studies tested children's knowledge and retention of information learned, but not attitudes to risk, therefore our study is the first of its kind.

Research aims

The first aim of our research is to test the hypothesis that Warning Zone will increase children's risk perception of the dangers it teaches about, directly after children have had the experience. This is based on the emotion-affect model of risk perception in which we weigh up potential negative and positive emotions to make a decision (Peters et al., 2004). This is also supported by the theory that increasing perception of risk will decrease inferred benefits (Finucane et al., 2000). Theories of learning and memory predict that children will have good recall of information learned at Warning Zone, and children have been shown to have a good memory for information learned at similar venues, up to four months later (Gielen et al., 1996). While memories may persist, we want to check whether their altered risk perception also persists over time, thus the second aim of our study is to test whether children have significantly higher risk perception scores a month after they attend Warning Zone than before they visited. Lastly, socioeconomic background has been shown to relate to accidental injury and risky behaviour in adolescents (Resnick et al., 1997), so our study will test if there is a significant difference in Warning Zone's effect on risk perception, between urban schools, countryside schools and independent schools, to assess whether further targeting of risk education is needed for children from more deprived areas.

Pilot study

Aims

The aim of the pilot study was to enable construction of a risk perception questionnaire designed for the age group of the children (10-11 years), and to the Warning Zone experience. One aim was to discover perceived benefits of risky behaviours. This pilot was necessary as children are too young to answer 'How beneficial is this?', as without a specific benefit being mentioned they may be unable to envision how the action may benefit them. Supporting this, Borgers and Hox (2000) studied the response quality of children in survey research, finding that ambiguous questions

should be avoided in surveys for children. The children participating in this pilot study had not yet been to Warning Zone. Finucane et al., (2000) found that when we are taught about the risk of an action we often perceive that action's benefit as lowered. Completion of the pilot study prior to any visit to Warning Zone should provide an un-altered account of possible benefits. This also allowed for the discovery of concepts and questions that the children may have no understanding or knowledge of before Warning Zone. The main study questionnaire was to be completed on one occasion before the children had experienced Warning Zone, therefore unknown concepts could confound results and should be discarded from the questionnaire; this was the aim of the pilot study.

Methodology

Ethical approval was granted by the University Psychology Research Ethics Committee. Parents, children and head teachers gave informed consent for participation. Three groups of six children were asked about the benefits of topics included in the Warning Zone curriculum, before their school trip. Open-ended questions were provided on paper and children were split into smaller groups of three for ten minutes to discuss these and write any responses (see Table 1). They then fed back their responses and discussed them as a group. Data was gathered from recording vocal responses and from written responses on the sheets.

Table 1. Pilot Study Questions for Discussion in Focus Groups

Topics	Questions
Group 1	
Fire	Why might you leave the cooking unattended?
Electricity	Would you fly a kite in a field without checking if there are electric cables above you?
Alcohol	Why would a young person drink alcohol?
Water	Would you jump into water if you didn't know its depth? Why would somebody?
Online	Why would somebody your age send personal information through the internet?
Group 2	
Roads	Would you ever not use a seatbelt? Why do you think somebody might play near a road?
Railways	Why do you think somebody might mess around on a train platform?
Safety	Why do you think someone might be walking on their own at night?
Litter	Why might someone drop litter in the street?
Online	Why might you talk to someone you don't know on social media?

Note: Each question was written in large writing on a separate piece of paper to allow room for answers to be given.

Analysis

Thematic analysis of both written and vocal responses was carried out as defined and outlined by Braun and Clarke (2006). It is important to note that this technique is open to interpretation by the researcher, and is sensitive to the abilities of the focus-group leader.

Results and discussions

Analysis revealed that risks could largely be separated into three main benefit categories: ‘fun’, ‘being dared to by friends’ and ‘making things easier/laziness’ (outlined in Table 2). There were areas that did not fall into these categories, which we then excluded from the main study questionnaire. For example, when asked why they might leave the cooking unattended focus-groups generally discussed possible distractions from the activity. However, these distractions did not constitute a real benefit and would occur passively. Respondents also generally assumed that it would not be them cooking as most children their age do not do daily cooking. Sending personal information via the internet was also quite ambiguous to the children as it was intended to relate to personal information, such as addresses, being sent via websites which cannot be trusted. However, the children mostly assumed that this referred to the sending of information directly to strangers, with the intention of meeting them. Happily in the road safety questions the consensus across all groups of children was that they would always wear a seatbelt because it is against the law not to. Because of this no real benefit could be discovered and so this was not used in the main questionnaire. However, road safety relating to playing near a road was still covered.

The benefit categories ‘fun’, ‘ease’ and ‘being dared to’ were discovered and included all risks taken forward to the main study questionnaire. The pilot study provided these categories, and hypothetical situations outlined in ‘Explanatory Points’ in Table 2 were utilised to create specific questions in the main study questionnaire.

Table 2. Response Categories and Risks found in Focus Groups

Response	Risks	Explanatory Points
Fun	Playing near a road	Consensus that they may find it fun to play near a road especially if they had nowhere else to play.
	Playing near a railway	It would be fun to play near railway tracks if their friends were doing it too.
	Talking to strangers on social media	It might be fun if they were lonely.
Dared to by friends	Drinking alcohol	
	Jumping into water with unknown depth	
Easier/laziness	Walking alone at night	If they wanted to get home it might be quicker to walk alone in the dark than to wait for parents.
	Littering	It might be easier to just drop it than go to a bin.

Main study

Method

Participants

Participants were recruited from 7 primary schools known to be taking a school trip to Warning Zone. Participants were 183 children between ages 9 and 11 ($M = 10.29$ years, $SD = .63$ years; 45.9% female, 54.1% male). They were from 3 different types of schools; city, countryside, and independent schools. Average percentages of students eligible for free school meals in these school types in the year 2014 were; city = 42.10%, countryside = 13.88%, (Ofsted, 2016), independent = 0% (statistics not available but presumed to be zero due to the necessity for parents to pay substantial fees). Independent schools were defined as any fee-paying school, countryside schools were non-fee-paying schools not located within a city (schools in towns were classified as 'countryside'), and city schools were non-fee-paying schools within cities.

Design

This study is a quasi-experimental, mixed design in which children attending Warning Zone in the academic year 2015-16 performed the risk perception questionnaire before, straight after and one month after their visit to Warning Zone (within-subjects independent variable, Time). The between-subjects independent variable was School Type, representing a way to examine socioeconomic factors, with 3 levels; city, countryside, and independent schools. The dependent variables were perceived risk and benefit scores given by children in relation to risks on the questionnaire from the Warning Zone curriculum.

Materials

A 30-item questionnaire was designed based on the qualitative pilot study, measuring risks and benefits on a 5-point Likert scale (see on-line supplemental materials for full questionnaire). A 7-point scale was considered for increased concordance with participants' feelings; however Mellor and Moore (2014) state that children at ages 9-13 are typically given 5-point scales for better comprehension. Borgers, Hox and Sikkel (2003) reported low comprehension when children were required to give numbers signifying agreement; therefore we used a word-based format, e.g. 'Definitely not risky', 'Probably not risky', 'Unsure', 'Probably risky', 'Definitely risky'. Both risk and benefit questions were measured to examine risk perception in accordance with the theory of Peters et al., (2004). For example, 'How risky is it for you to play with matches?' was paired with 'How fun is it for you to play with matches?' Questions were based on the Warning Zone curriculum, and additional control questions were included (questions, 3, 6, 10, 16, 24, 28).

Procedure

Parents, children and head teachers gave informed consent for participation in this research. Children filled in the same paper-based questionnaire before and after the Warning Zone experience, on the day of their visit. They were re-tested with the same questionnaire one month later at their schools.

Data analysis

Data was entered into SPSS scoring each answer between 1 (low risk, low benefit) and 5 (high risk, high benefit) for each answer. The internal consistency of the questionnaire was examined and Cronbach's alphas for risk scores at times 1, 2, and 3, were 0.673, 0.898, and 0.904 respectively, and benefit scores were 0.793, 0.784 and 0.825. No items needed discarding. Separate variables were computed for mean risk scores and mean benefit scores given at times 1, 2 and 3 (pre, post and 1-month later). The same was done for control questions, computing 3 separate control variables. The file was split by the 'School Type' variable to allow analysis of these groups. Data was explored and significant values for Shapiro-Wilk's tests, skewness and kurtosis values and a visual inspection of histograms revealed that the data was not normally distributed, in nearly all cases. Therefore, assumptions for parametric tests were not met and non-parametric tests were used to analyse the data. Alpha was set at $p < .05$ unless otherwise stated.

Results

The descriptive statistics in Table 3 show that overall mean risk scores (given out of 5) were higher than overall mean benefit scores (risk $M = 4.53$, $SD = 0.39$; benefit $M = 1.80$, $SD = 0.57$). Thus showing that the activities listed were correctly seen as highly risky and that they did not have many benefits. These also show that children's mean risk scores increase between 'Time 1' (before the children attended Warning Zone) and 'Time 2' (directly after the tour of Warning Zone) and appear to decrease again at 'Time 3' (one month after the trip), although not reverting back to the level of scores given before Warning Zone at time 1. The benefit scores decrease at time 2 after Warning Zone, and then show an increase after a month, but again not reverting back to scores given before Warning Zone (Table 3). In each case, standard deviations for risk scores are smaller than those for benefit scores, so there is more deviation from the mean in benefit scores.

Table 3 also shows that time has a significant effect on overall risk and benefit scores given, as indicated by the highly significant values for Friedman's ANOVA. Post-hocs show that there are significant differences between all three times in the case of both the overall risk and overall benefit scores. However, as anticipated for the control questions neither risk nor benefit scores significantly changed between times 1, 2 and 3; risk scores $\chi^2(2) = 1.71$, $p > .05$, benefit scores $\chi^2(2) = 0.63$, $p > .05$.

Table 3 (subscript capitals in Median columns) shows that risk scores given by children from countryside schools are significantly lower than those given by children in city schools at all three times. However, the effect size for a difference at time 2 was small $r = -.18$. At times 1 and 3 city school children again give significantly higher risk scores than independent school children. Significant differences in risk scores between countryside and independent schools are only found at time 3, where children from countryside schools give significantly higher risk scores (see Figure 1). At all three times children from independent schools give the highest median and mean benefit scores, while city school children consistently give the lowest. Table 3 shows that at times 1 and 2, countryside schoolchildren give significantly higher benefit scores than those from city schools. At times 1 and 2 children from independent schools also give significantly lower benefit scores than city schools do. Countryside school children give significantly lower benefit scores than children in independent schools at time 1, but no significant differences were found between these two school types at times 2 and 3 after the visit to Warning Zone (see Table 3 with reference to capital letter subscripts reading down columns)

Table 3. The Effect of Time and School Type on Risk and Benefit Scores

	Time of Assessment									χ^2
	Time 1 (Pre)			Time 2 (Post)			Time 3 (1-month)			
	<i>M</i>	<i>(SD)</i>	<i>Mdn</i>	<i>M</i>	<i>(SD)</i>	<i>Mdn</i>	<i>M</i>	<i>(SD)</i>	<i>Mdn</i>	
Overall Risk	4.32 _a	0.44	4.42	4.72 _b	0.47	4.83	4.57 _c	0.51	4.88	113.40**
Countryside	4.32 _i	0.42	4.42 _A	4.73 _{ii}	0.34	4.82 _A	4.59 _{iii}	0.37	4.67 _A	68.48**
City	4.48 _i	0.43	4.58 _B	4.65 _{ii}	0.88	4.92 _B	4.66 _{ii}	0.77	4.92 _B	22.27**
Independent	4.15 _i	0.47	4.29 _A	4.73 _{ii}	0.30	4.78 _{A,B}	4.36 _{iii}	0.47	4.42 _C	28.89**
Overall Benefit	2.05 _a	0.67	1.92	1.59 _b	0.63	1.42	1.75 _c	0.68	1.58	71.10**
Countryside	2.00 _i	0.62	1.92 _A	1.62 _{ii}	0.64	1.42 _A	1.73 _{iii}	0.62	1.67 _A	31.50**
City	1.78 _i	0.61	1.58 _B	1.30 _{ii}	0.41	1.17 _B	1.59 _i	0.57	1.46 _A	21.90**
Independent	2.61 _i	0.71	2.54 _C	1.80 _{ii}	0.67	1.71 _A	2.04 _{iii}	0.91	1.92 _A	24.71**

Note: Subscripts that differ in ‘Overall Risk’ and ‘Overall Benefit’ rows are significantly different from each other in post-hoc Wilcoxon tests (Bonferroni corrected so $p < .0167$). Capital letter subscripts (shown next to *Mdn* scores) that differ from one another in the ‘Countryside’, ‘City’ and ‘Independent school’ columns are significantly different on Mann-Whitney U tests comparing differences for each school type at each time. Different Roman numeral subscripts in ‘Countryside’, ‘City’ and ‘Independent’ rows are significantly different from one another in Wilcoxon-Signed ranks tests comparing differences between scores at times 1, 2 and 3. In the χ^2 column, * indicates significant at $p < .05$, ** significant at $p < .001$.

Figure 1. Mean risk scores at times 1, 2 and 3 for children from countryside, city and independent schools. Error bars represent standard errors.

Figures 1 and 2 illustrate differential effects of school type on mean risk and benefit scores. Figure 1 shows that children from city schools are the only school type not to show a drop in risk scores between times 2 and 3. Figure 2 shows that children from city schools also give the lowest mean benefit scores at times 1, 2 and 3 with independent schools showing both the highest mean benefit scores and the lowest mean risk scores at all three times. A series of Wilcoxon-Signed ranks tests were undertaken to explore these differential effects of time and school type on scores and their significance, as shown in Table 3 (reference to Roman numeral subscripts).

Figure 2. Mean benefit scores at times 1, 2 and 3 for children from countryside, city and independent schools. Error bars represent standard errors.

Children from all school types showed significant changes in risk scores between times 1 and 2 (pre and post visit) and times 1 and 3 (pre visit and 1-month later). Countryside and independent

school children also showed a significant decrease in risk scores given between times 2 and 3. All three school types show a highly significant decrease in perceived benefit score between times 1 and 2. Table 3 also shows that children from all three school types show significant increases in perceived benefit scores from time 2 to time 3. Only children from city schools did not show a significant difference in benefit scores between times 1 and 3, while the other children showed a significant decrease in these between times 1 and 3 (see Figure 2 and Table 3 with reference to Roman numeral subscripts).

Discussion

This study set out to discover whether the experiential life-skills programme, Warning Zone, which informs children about risks, increases risk perception in children. Also, if any increase in risk perception is retained a month after the experience, and whether children from different socioeconomic backgrounds show differences in the way Warning Zone effects their risk perception. There was a significant increase in risk perception scores and decrease in perceived benefit scores given before Warning Zone and after, so the first hypothesis is supported. The increased risk perception was maintained one month after their trip, so the second hypothesis is supported. A further finding was that there were differential effects of Warning Zone on risk and benefit scores given by children from different school types, showing that Warning Zone does indeed influence children from different socio-economic backgrounds differently, therefore supporting the final hypothesis.

The finding that Warning Zone increases children's perceptions of risk is in line with a basic assumption that providing information about risk can increase risk perception. While this may appear trivial, it is crucial for the success of many public health and safety campaigns. Directly after Warning Zone there was a highly significant increase in children's risk perception, and non-significant increase for control questions, thus supporting the assertion that Warning Zone's teaching has caused this improvement. It is imperative to examine how aspects of the delivery of information have impacted on this, and thus how it can be achieved in other prevention schemes. The learning environment at Warning Zone may be influential in supporting children's learning, as the multi-media effect posits that words combined with pictures enhance learning in comparison to words alone, and hearing spoken word is more effective than reading text (Mayer, 2014; Schnotz, 2015). At Warning Zone children are surrounded by mock risky situations, providing visual stimulation, and are taught verbally. Warning Zone increases children's risk perception by providing information about risk and delivering this in a memorable, fun and effective way.

Warning Zone was found to increase average risk perception scores while decreasing average benefit ones. This is important when considering that, according to the emotion-affect model of risk perception, subjective values are assigned to both of these opposing aspects (Peters et al., 2004). Warning Zone focuses on informing children about risk and therefore the presumed inverse relationship of risk and benefit, discovered by Fischhoff et al., (1978), may cause the subsequent inference that benefit has been lowered. This has previously been shown by Finucane et al., (2000), and finding this effect here further supports the notion of Peters et al., (2004), that risk perception is based on an overall affective judgement. Thus Warning Zone's success in increasing children's risk perception towards dangerous situations could be an outcome of the induction of affect during the experience. Previous research has found too that affect-inducing risk communication is effective in increasing risk perception (Visschers et al., 2012). To examine these ideas further, future research should focus on understanding how affect (emotion) influences judgements of risk perception.

By targeting children just entering adolescence our hope is that Warning Zone will raise children's perception of risk and reduce the emotional impact of later situations by giving them some experience of danger and allowing them to think about it in a safe setting. Thus when they encounter real situations they may be more prepared and able to exert cognitive control over their impulses. The dual systems model (Steinberg, 2008) helps us to understand that adolescents cannot fully control

their impulsive behaviour that is triggered by emotional excitement, especially when with their peers. Thus parents and places like Warning Zone need to help young adolescents to prepare for dangers, anticipate the impact of peer pressure, and practice controlling their risk-taking impulses. Steinberg showed that when on their own, 14 year old children were no more risk taking than adults, but the presence of their peers activated the socio-emotional network and diminished cognitive control. Indeed, during the pilot study for this research it was discovered that children would consider 'looking cool' to be a benefit of some risky activities. The brain development of adolescents needs considering when interventions are designed, and perhaps more needs to be done to help adolescents realise that being with their peers increases their loss of control.

Our study has allowed assessment of the impact of Warning Zone on different socioeconomic populations which has previously been lacking (Dowswell & Towner, 2002; Mulvaney et al., 2014), and a differential effect was discovered here. Socioeconomic differences between different school types were assumed due to free school meal percentages, which were significantly higher for city schools. Before this is discussed, it is important to examine pre-existing significant differences between children from different school types. We found that children in a more deprived socioeconomic group (city school children) had higher risk perception before Warning Zone than less deprived children. This is likely to be due to increased exposure to these risks prior to the Warning Zone visit. Children from more socially deprived areas are more likely to live near roads and railways, more exposed to air and noise pollution and also more likely to live in areas with higher crime rates (Braubach & Fairburn, 2010). Socioeconomic deprivation is also related to an increased incidence of risky health behaviours such as smoking and binge drinking (Pampel, Krueger & Denney, 2010; World Health Organisation, 2010). Increased exposure to this throughout childhood is likely to have prompted parents and teachers to find motivation and opportunity to warn city children of dangers associated with these features of their environment. In fact, before visiting Warning Zone a negative relationship was shown between affluence and risk perception, further supporting this 'increased-exposure hypothesis'. Children arrived at Warning Zone with different ideas about risk, and their experiences there acted differently upon their risk perceptions dependent on their different socioeconomic backgrounds.

Warning Zone's differential effect on children from different school types can be most clearly seen in Figure 1: children from city schools are the only group not to show a drop in risk perception scores one month after visiting Warning Zone. This finding indicates a positive picture, that those in the most at-risk sector of society are showing an increase in risk perception by visiting Warning Zone, and retaining this increase most effectively. A number of possible explanations as to why this is the case exist. Previous unpublished research, found that children forget information after Warning Zone, and it is therefore reasonable to assert that the reduction in risk perception is due to forgetting of risk information (Pulford & Frosch, 2014). As previously discussed, children from more deprived backgrounds are more exposed to risks on which Warning Zone offers teaching. Therefore they may be less likely to forget the information learned, due to regular reminders in their daily lives which could reactivate their memories of the experience (Lieberman, 2011). Another possibility is that the lessons' familiarity and conceivable emotional relevance for more deprived children, has caused them to process the information more deeply at the time of learning. Deeper processing is known to improve retrieval as is the induction of affect during learning (Craik & Tulving, 1975; Gluck, Mercado & Myres, 2008). However, this drop in risk perception may not have been caused only by forgetting, and other factors affecting risk perception such as social amplification and dread may also need examination (Slovic & Peters, 2006). It was not possible in this research to ascertain exactly why children from more disadvantaged backgrounds retain their elevated risk perceptions better, but this is nevertheless a promising step towards an improved understanding of how best to target those most in need.

Limitations

Several areas have been identified which could be improved upon in work which builds on this research. Firstly, future work should seek to reproduce findings relating to school type with larger sample sizes in these categories. Also, it was not possible, within the organisational constraints of this research, to test all children precisely one month after their trip to Warning Zone. The third assessment was completed around 4-6 weeks after the trip, however, city school children completed their final assessment last and still showed the highest rate of retention of all the school types, so this cannot account for these findings.

Some questionnaire items were ambiguous and researchers looking to replicate or extend this work must be aware of this. It has been noted that questions assessing benefits which ask 'how brave would you look if...' may be misleading (items 29, 30, in the on-line supplemental materials). Some children gave high scores here: 'definitely brave', while indicating that they considered these very risky. This may be because the idea that something is highly risky is logically followed by an assumption that you would need bravery to take this risk. Results of these questions may be confounded by this logical deduction and questions sensitive to this should be avoided in future research. Furthermore, the risk question on 'clicking on an advert online' was often given 'unsure' and may not have been specific enough. Clicking on an online advert can be perfectly safe, while clicking on an unrecognised pop-up or an advertisement on an unknown website is far more likely to be a threat to the computer and to security. This question should have been specific to unrecognised websites.

Future Directions

As discussed, there needs to be further investigation into gaining an understanding of how affect plays a role in increasing risk perception. Placing participants under time pressure increases the likelihood of their making judgements based on affect, and analysis of this could allow further insights into the influence of affect on risk perception. Manipulations of affect induced during the experience could also be utilised to assess this influence. Programmes like Warning Zone could employ this information to ensure their messages effectively utilise affectual means of communicating risk-related information. It would also be of value to discover if children have increased risk perception for dangers outside of the Warning Zone curriculum, allowing examination of whether Warning Zone causes a larger psychological change in attitudes to risk. Future research is also needed into whether the risk perception changes observed at Warning Zone actually decrease injury and crime rates in young people, and for this a large-scale investigation of statistics such as hospital admissions and arrests in comparable areas with and without a prevention scheme like Warning Zone needs to be undertaken.

The finding that children from more affluent backgrounds show a larger drop in risk perception scores after time has passed needs to be examined further and an ethical discussion of the larger implications of this must be carried out. More assessments of children over a longer follow-up period could give a clearer idea of the extent and course of their lessening risk perceptions. Reminder lessons delivered at school in the weeks following the trip may help consolidate information, and Warning Zone may be able to provide additional reminder materials. Extending Warning Zone to also educate parents could help to reinforce the messages at home, akin to the parenting programmes that exist for younger children's parents (Mytton et al., 2013). Taking ethical considerations into account, more affluent children are not in need of further funds for targeting as they, despite a lack of risk perception before Warning Zone and a lower retention rate, are still at less risk than socially deprived children. Programmes such as Warning Zone which do not distinguish between these groups are progressive in their making no assumptions about 'who needs to know', as this research has shown that all children benefit from this experience.

A newer threat which has been the subject of much attention over the last ten years is that of the internet. This is an area of much government interest and there have been large-scale efforts to improve online safety. Harmful online communities exist that advocate self-harm, and represent a danger to adolescents (Keipi et al., 2015). Importantly, children from all backgrounds are similarly exposed to this danger: 97% of UK households with children have internet access (Office for National Statistics, 2015). This means that the internet should not show the same risk perception variations for different socioeconomic backgrounds prior to Warning Zone, if the increased-exposure hypothesis holds true. Warning Zone has recently opened an online safety area guided not by technology, but by games and this is the only one of its kind in the UK. Future research could focus on this area to give a better idea of how effectively internet safety is being tackled, and as a means of further examining the increased-exposure hypothesis.

Conclusion

This research has shown that the experiential life-skills programme Warning Zone does have an effect on children's perceptions of risk. It increases their risk perception and this increase is maintained over a period of one month after their trip. The study has also discovered differences in the way that children from different socioeconomic backgrounds perceive risks, and uncovered pre-existing dissimilarities in their knowledge of risky situations and activities. Overall this research has given new evidence of the psychological effect of these experiential programmes, and provided a starting point on which to build future research.

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