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Research Article

Decoding School Safety: Exploring the Effectiveness of Safety Signs Based on the Perceptions of the Primary School Children in Zhengzhou, China

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ABSTRACT

In 2010, unintentional injuries represented 12% of the 5.1 million injury-related fatalities worldwide among individuals aged 1 to 19 years. Although this significant health issue exists, childhood injuries still remain relatively neglected in global health efforts nowadays. This study employed a non-probability sampling method to empirically investigate the presence and effectiveness of school safety signs among children in a primary school in Zhengzhou, China. The aim is to provide new insights into safety research within the context of school health, contributing both theoretically and practically. It uses a quantitative method, including the distribution of questionnaires, the use of KMO sample measurement to check the validity of the questionnaire, the construction of thematic models and research hypotheses, and one-way ANOVA to test the hypotheses. The preliminary findings have stated that the effectiveness of safety signs is influenced by both the characteristics of their visual elements and the personal traits of the information receivers. The proposed design recommendations for school safety signs will benefit school children and safety sign designers.

Keywords: school safety signs; danger perception; pupils; warning effectiveness.

1. Introduction

The World Report on Child Injury Prevention, has reported that approximately 830,000 children die each year due to unintended or accidental injuries, mainly falls, drowning, scalds, and road traffic injuries. Public safety is the primary task of preventing child injuries in the 21st century, and schools are where children are most likely to be injured (Peden et al., 2008). Globally, the increase in the risk and impact of injuries has had a significant impact on the well-being of school-aged children and adolescents. Their high level of vulnerability is due to their physical fragility, mental and emotional capacities, and dependence on adult care (Pelling &Uitto, 2001). As a result, they bear a disproportionate burden of injuries. Approximately half of those affected by injuries are children and adolescents, and the number of children and adolescents affected is projected to increase significantly over the next decade (Kousky, 2016). Of these, the incidence of childhood injuries is increasing and poses a major challenge to public health worldwide. As children grow into adulthood, the proportion of total deaths caused by childhood injuries increases annually. Accidents and injuries are the leading causes of morbidity and mortality in school-aged children (Towner et al., 1994; Gallagher et al., 1984). Therefore, there is a great need to focus on the incidence of injuries in children and to improve their safety. Injuries have become the leading cause of death among 1-14-year-olds in China, and as an important public health problem that endangers personal safety and health, it will become the focus of disease control in China in the 21st century, along with infectious and chronic diseases (Yin, 2000).

2. Problem Statement

School safety is a problem in various parts of China. According to Hu et al. (2012), the main causes of nonfatal injuries are falls, animal bites, traffic accidents, falling objects, and burns. The main location of the injuries was schools.

School safety signs are especially vital to ensure that pupils, teachers, and other staff members are not at risk of injury. They are performed by combining various shapes, colors, symbols, and pictograms, and each sign element guides and informs users to take or avoid certain actions (A Guide to School Safety Signs, 2021). A study by the National Safety Council of China showed that proper school safety signs can reduce accidents by up to 80% (Sherbina, 2023). Therefore, the effectiveness of school safety signs for school-age children deserves to be studied and emphasized. It can be seen, theoretically, that this study not only fills the gap in research on school safety signs, but practically, the output suggestions also help the industry in terms of targeting school-age children and design.

3. Research Questions & Research Objectives

Based on the school safety signs in China's problem statement to examine the issues, the research questions and research objectives for this study are as follows:

RQ1. How do the visual characteristics of school safety signs affect school-age children's perceptions?
RQ2. How do the personal characteristics of school-aged children influence their willingness to comply with school safety signs?
RQ3. What do school-aged children think about school safety signs?
RQ4. How can the effectiveness of school safety signs be improved, as perceived by school-aged children?
RO1. To analyze how the visual features of campus safety signs affect the perception of school-age children.
RO2. Investigate the influence of school-aged children's traits on their willingness to obey school safety signs.
RO3. To summarize the thoughts of school-age children on the design of school safety signs.
RO4. To develop a recommendation concerning the views of school-age children to enhance the efficacy of school safety signs.

4. Theoretical framework & conceptual framework

Rogers et al. (2000) provide an objective summary of warning sign research and explore the effectiveness of signs from two perspectives: individual and sign variables. They also noted that macro-environmental issues such as the safety atmosphere could influence the efficacy of safety signs. Later, Laughery (2006) introduced a model comprising three structural variables: logo characteristics, individual traits, and situational factors. The purpose of the safety signs is to effectively communicate potential hazards to users to prevent accidents. Information transmission involves attention, recognition, and understanding (Qiang, 2016). When examining the perception of safety signs on campuses, individuals' subjective and objective understanding may be influenced by their cognitive state. Therefore, it is reasonable to analyze the factors that affect the comprehension of safety signs on campuses from a cognitive-psychology perspective. Based on the cognitive psychological process and C-HIP model, this study constructs a conceptual framework model depicting the factors that influence the perception of campus safety signs. The model considers the characteristics of the signs as well as individual user characteristics. Figure 3.1 illustrates this model and its advantages over a previous model of safety sign effectiveness (Wogalter et al. (1999; Rogers et al., 2000). From a psychological perspective, the perception process of safety signs by users is more closely divided, making it better suited for analyzing the individual characteristics of children aged 7-12 in a practical context.

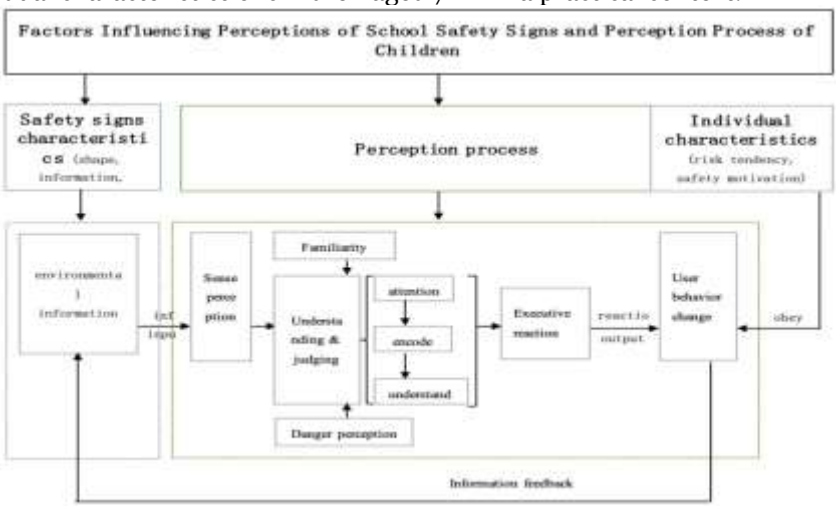

Figure 4.1: Theoretical framework

This study will comprise two sections of conceptual framework:
Section 1 investigates the impact of safety sign characteristics on their effectiveness in terms of danger perception (refer to Figure 4.2).
Section 2 examines the effect of individual characteristics on safety sign effectiveness in promoting compliance behavior (see Figure 4.3).

Among them, section 1 primarily assesses the levels of risk conveyed by various colors (red, yellow, green), information words (prohibited, caution), shapes (bordered circle with diagonal line, square, triangle), and combinations of color, shape, and information words. Additionally, it examines the disparities in the levels of risk conveyed by these variables. The hypothesis I is as follows:
【H1】 Different visual characteristics of school safety signs elicit varying risk perceptions.

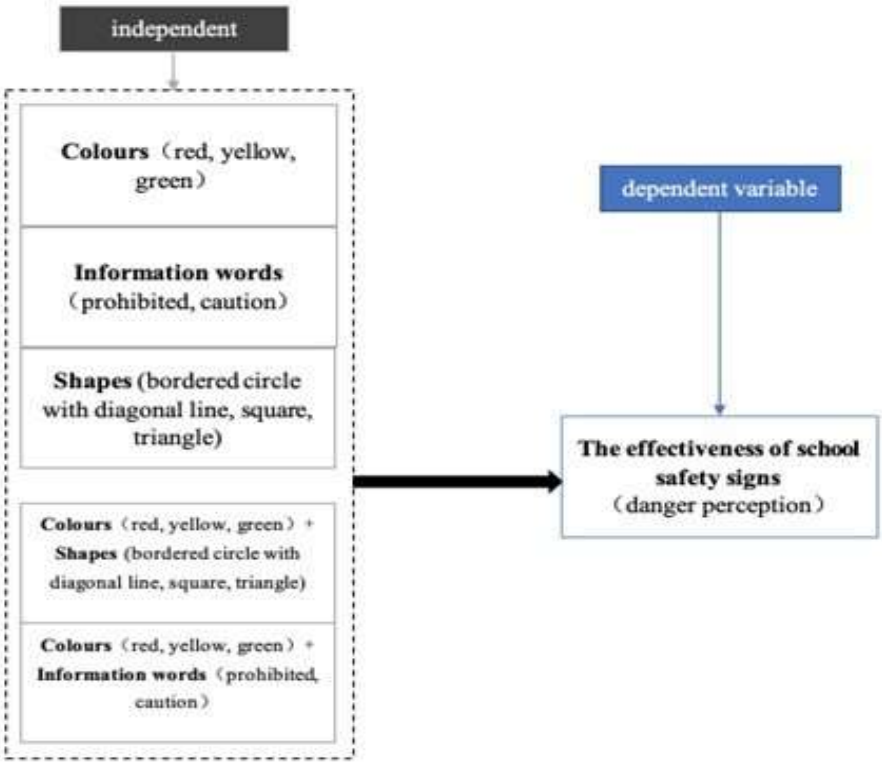

Figure 4.2 Conceptual framework-section1. Investigates the impact of safety sign characteristics on their effectiveness in danger perception

Section 2 evaluates the impact of non-design elements on the effectiveness of safety signs. This includes individual factors, particularly the risk inclination and safety motivation. The hypothesis II as shown below:
【H2】 Different individual characteristics on safety sign elicit varying compliance behaviors of school children.

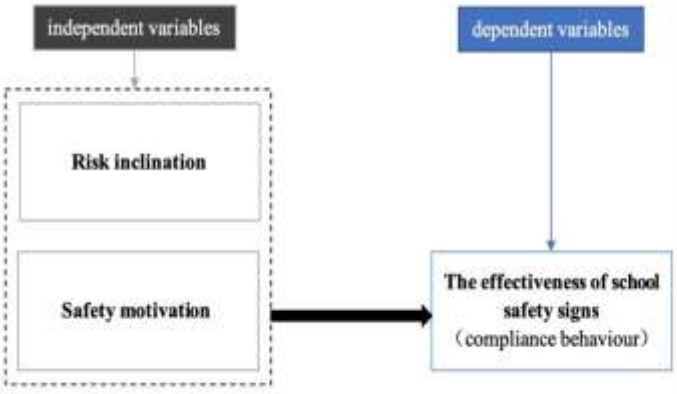

Figure 4.3 Conceptual framework section 2. Examines the effect of individual characteristics on safety sign effectiveness in promoting compliance behaviour

5. Research Methodology & Data Analysis

The research adopts a cross-sectional design, and quantitative data will be collected through questionnaires, all of which are tested using a Likert 5-point scale. it will be analyzed using statistics for the validation of the results, firstly, the validity of the model construction was tested by exploratory factor analysis, that is to investigate whether factors might exist (Brace, Kemp & Snelgar, 2006). The Kaiser (Meyer) Olykin measure of sampling adequacy and Bartlett's test of sphericity were used to judge whether factor analysis could be performed.

5.1 Questionnaire design

Part 1: Factors Affecting the Perceptions of Children Aged 7-12 by Measuring the Visual Characteristics of School Safety Signs

This study aimed to examine the visual characteristics of campus safety signs and explore the factors influencing their perception among school-age children. To this end, a questionnaire was distributed to a sample of primary school students in China. The questionnaire consisted of items designed to capture children's perceptions of safety signs about their visual characteristics, such as color, shape, and size. The survey also included questions regarding individual characteristics to allow for further analysis of potential differences in risk propensity and safety motivation. To ensure the clarity of the questionnaire, technical terms will be explained and the language will be kept simple and precise. The findings of this study provide valuable insights into children's perceptions of school safety signs and how visual characteristics influence these perceptions. This research will inform the design and placement of safety signs in primary schools, and promote children's safety and well-being. When examining the impact of the visual traits of safety signs on the perception of school-aged children regarding campus safety, no significant dissimilarities exist regarding the extent of danger, intensity of potential peril, likelihood of danger, degree of attention-grabbing, and level of attentiveness of these diverse assessment techniques (Wogalter and Silver, 1990). Yu et al. (2004) employed a survey consisting of 39 questions, utilizing a Likert 5-level scale, to investigate the relationship between information words and colors and their interaction with shapes, and responses be rated from to 1-5, with five levels ranging from "no risk 1" to "very likely severe risk 5." Table 5.1 shows a visual illustration.

IV（amount）	Questions	References
Colours（3）	1. To what extent do you perceive a threat when encountering the colour 'red'?	Wogalter&Silver,1990; Yu et al., 2004
	2. To what extent do you perceive a threat when encountering the colour 'yellow'?	
	3. To what extent do you perceive a threat when encountering the colour 'green'?	
Information words（2）	4. To what extent do you perceive a threat when encountering the word 'prohibition'?	
	5. To what extent do you perceive a threat when encountering the word 'caution'?	
Shapes（3）	7. To what extent do you perceive a threat when encountering the shape 'circle frame with a slash'?	
	8. To what extent do you perceive a threat when encountering the shape 'triangle'?	
	9. To what extent do you perceive a threat when encountering the shape 'square'?	
combinations of colours (red, yellow, green) and information words (prohibition, caution) (6）	10-31. To what extent do you perceive a threat when encountering the 'picture'?	
combinations of colours (red, yellow, green)and shapes (circle frame with a slash, triangle, square)（6）		
combinations of information words (prohibition, caution) and shapes (circle frame with a slash, triangle, square)（6）		

Table 5.1 Factors influencing the perceptions of children aged 7-12 by measuring the visual characteristics of school safety signs

Part 2. Factors influencing the compliance of children aged 7-12 with school safety signs

This study examined how the personal characteristics of school-age children affect their compliance with campus safety signs.

To this end, the study utilized Goldberg et al.'s (2006) scale to measure risk propensity, Neal et al.'s (2000) and Helmkamp et al.'s (2004) scales to measure safety motivation, and Likert's 5-point scale to test compliance of children. The questionnaire was scored on a scale of 1-5 using 5 response levels, ranging from "completely disagree 1" to "fully agree 5," as presented in Table 5.2.

IV	No.	Questions	References
Risk propensity	1	I like doing exciting things.	Goldberg et al., 2006
	2	I never do dangerous activities (such as climbing trees).	
	3	I like challenging things.	
	4	I want to try everything.	
	5	I do things without thinking about the consequences.	
	6	I like adventure.	
Safety motivation	7	I think the safe environment in schools is an important issue.	Neal et al., 2000; Helmkamp et al., 2004
	8	I think it is very important to keep safe at all times.	
	9	I think it is important to improve personal safety awareness.	
	10	I think it is important to reduce the frequency of school safety accidents.	

Table 5.2 Factors influencing the compliance of children aged 7-12 with school safety signs

Part3. Measure children's understanding of school safety signs

When investigating the thoughts of school-aged children on designing campus safety signs, a Likert 5 scale was employed to assess their understanding. The questionnaire was rated from 1 ("completely incomprehensible" to 5 for "fully understood"), with five response levels ranging from 1 to 5. A total of 27 sign types were evaluated, including prohibition, warning, and prompt signs, as shown in Table 5.3. Instructional signs have been removed because they are all related to chemicals, which are not commonly found in primary school campuses in China. This is outside the scope of primary school areas.

IV (amount)	Signs location	Registered school safety sign images
Prohibition signs (14)	B. Inside the school building, on the walls, in the laboratory, in the chemical storage room -Fire hydrants; electric gates; chemical hazard labelling	 a. No touching (1-2-3-4-5) b. No closing (1-2-3-4-5) c. No gloves (1-2-3-4-5) d. No turning (1-2-3-4-5)
	C. Inside the school building and on signage o the outdoor lawn	 a. No fireworks (1-2-3-4-5) b. No smoking (1-2-3-4-5)
	D. Outdoor hand-washing sinks, watering hose on lawn, cafeteria sinks	 a. Non-drinking water (1-2-3-4-5)
	E. Outdoor fences, railings, dormitory gates, large trees and other high places	 a. No climbing (1-2-3-4-5) b. No crossing (1-2-3-4-5)
	F. Inside the school building, especially on the rooftop of the upper floors and next to the windows in the classrooms	 a. No throwing (1-2-3-4-5)

	G. Walls inside school buildings, campus construction roads -Hazardous materials storage room, besides lifts, leadership room, conference office	 a. No passengers (1-2-3-4-5) b. No stay (1-2-3-4-5) c. No entry (1-2-3-4-5) d. No passage (1-2-3-4-5)
Warning Signs (10)	A. Walls inside school buildings, outdoors -Slippery floor at the entrance to the washroom	 a. Be safe (1-2-3-4-5)
	B. Inside the school building, on the walls, in the laboratory, in the chemical storage room -Electrical gates; labelling of chemical hazards	 a. Beware of electric shock (1-2-3-4-5) b. Beware of fire (1-2-3-4-5)
	C. Inside the school building on the walls, laboratories, chemical storage rooms -Chemical Hazardous Materials Labelling	 a. Beware of the explosion (1-2-3-4-5) b. Beware of burning hand(1-2-3-4-5)
	D. Inside school buildings, especially on upper rooftops, next to classroom windows, in stairwells, on slippery floors; outdoor rainwater puddles, uneven pavement, and construction repairs	 a. Beware of tripping (1-2-3-4-5) b. Beware of falling (1-2-3-4-5) c. Beware of slipping (1-2-3-4-5) d. Beware of potholes (1-2-3-4-5)
	E. Outside the school building, especially near the maintenance work inside the campus. underneath buildings with physical objects, such as plaques	 a. Beware of falling objects(1-2-3-4-5)
Prompt signs (3)	A. On the walls inside the school building -Stairwells, corridor stairways	 a. Safety stairs (1-2-3-4-5) b. Emergency exit (1-2-3-4-5)
	B. On the wall inside the school building, next to the	 a. Garbage can (1-2-3-4-5)

Table 5.3 Measure children's understanding of school safety signs

5.2 Study population

Depending on the number of questions in the questionnaire, the sample size should be three to five or five to ten times the number of questions in the questionnaire with the largest number of subscales (Wu and Tu, 2011; Tinsley & Tinsley, 1987; Comrey, 1988). In this study, three themes were set up with a total of 63 questions and a valid sample size of at least five times the number of questions (Gorsuch, 1983). Therefore, 300 volunteers were selected. Stratified sampling was initially employed to divide students in grades 1-6 into three groups based on their grade level: Group 1 (grades 12), Group 2 (grades 3-4), and Group 3 (grades 5-6). Due to the large number of students in the school, quota sampling was then used to select 100 students from each group. These students voluntarily participated in the activity and received a gift as a token of appreciation. Additionally, to ensure an equal gender ratio and to avoid gender-based errors, an equal number of males and females were selected from each group, resulting in 50 boys and 50 girls in each group. The selection criteria for participants are shown in Table 5.4.

Standard	Inclusion	Exclusion
Population	Include children who studies in the primary school.	Exclude children who does not study in the primary school, as well as working staff of the primary school.
Age	Aged 7-12.	Under 7 or above 12
Gender	Male & Female.	————

Table 5.4 The selection criteria for participants

5.3 Research tools

The materials and tools used correspond to the different stages of research. In the first stage, three questionnaires were administered to children. In the second stage, a self design manual was sent to the children to draw them on. On each page, the children have a reference for the sign (meaning of the sign), and they are required to design and draw the sign according to their understanding at a location of 7 × 7 cm. The children were required to draw the generally incomprehensible campus safety signs provided by the researchers in the manual, which were selected from the results of Questionnaire 3. Color pens (red, yellow, and green) and black watercolor pens are provided to children to understand how they choose colors when designing safety signs.

6. Discussion

The findings of this study have significant implications for school health research, particularly in the area of injury prevention through effective communication tools like safety signs. The study highlights that the effectiveness of school safety signs is influenced by both visual design elements and personal traits of information receivers. These insights underline the importance of tailoring safety interventions to the cognitive and perceptual capacities of children aged 7–12, a group identified as particularly vulnerable to school-related injuries (World Health Organization, 2008).

I. Visual Design and Comprehension

The role of visual elements such as color, shape, and symbols in conveying safety messages effectively cannot be overstated. Research indicates that children have varying levels of visual literacy, which can impact their ability to interpret safety signs
(Peden et al., 2008). For instance, bold colors and universally recognized symbols (e.g., red for danger or green for safety) improve the likelihood of message comprehension among younger audiences. This aligns with existing literature suggesting that age-appropriate design can significantly reduce misunderstandings and improve adherence to safety instructions (Schwebel et al., 2012).

II. Personal Traits and Perception

The study also highlight the personal traits of children, such as their cognitive development, familiarity with safety concepts, and previous exposure to safety education, emphasizes the need for a child-centered approach in school safety programs. Children with higher exposure to safety education demonstrated better understanding and recall of safety signs, a finding consistent with earlier research that highlights the role of repeated exposure and education in improving safety behaviors (Kennedy & Chen, 2009).

III. Contributions to School Health Research

This research supports a shift towards evidence-based policies in school health management. The inclusion of scientifically validated safety signage in school environments aligns with global frameworks, such as the Sustainable Development Goals (SDG 3: Good Health and Well-being), which emphasize the reduction of injuries through preventative measures (United Nations, 2015). Moreover, by focusing on the interaction between visual elements and user characteristics, it bridges the gap between design theory and practical application in school health contexts. There are significant implications for the further study- the proposed recommendations for school safety signs have practical applications beyond schools, potentially influencing public safety policies in child-centered environments such as playgrounds and recreational facilities.

7. Conclusion

To summarize, this study seeks to comprehend the variables impacting 7-12-year-old children's perception of school signs, assess the efficacy of such signs and children's understanding of them, and make suggestions on the design of school safety signs suitable for school-age children to reduce the incidence of school accidents. Through questionnaires and field surveys, the sample size of children in Wenhua Road primary school in Zhengzhou City, Henan Province, China was comparatively small and lacked representation, potentially indicating regional bias. These limitations should be considered when interpreting the results of this study. The

proposed random sampling technique enhanced the representativeness of the sample and increased its coverage area, thereby improving the overall applicability of the study. This study employed a self-reported questionnaire for measurement, allowing each respondent to provide subjective evaluations, which may introduce some measurement bias regarding the effectiveness of safety signs. If the behavior of the surveyed sample is observed onsite for an extended period, it can enhance the reliability of the research findings. The expected knowledge contributions of this study include focusing on primary school children, examining the visual semiotics of image symbols and extracting shared features, and broadening research on the efficacy of campus safety signs. Based on empirical research and theoretical assumptions regarding the effectiveness of current safety signs, this study investigates school safety sign characteristics and individual characteristics at two levels. Two thematic models were developed in this study. One considers sign characteristics, aiming to explore children's risk perception of signs. The aim of analyzing personal characteristics is to investigate the extent to which children are willing to adhere to safety signs. This study provides compelling proof of the efficacy of school safety signs, thereby providing a logical and theoretical foundation for the creation of these signs. Additionally, it addresses the gap in the research on school safety signs for children aged 7-12 years old.

Human Subjects Approval Statement

This study has gotten human subjects approval letter from JKEUPM. (reference number is JKEUPM-2024-875)

Conflict of Interest Disclosure Statement There is no conflict of interest disclosure.

References

1. Adams, A., & Edworthy, J. (1995). Quantifying and Predicting the Effects of Basic Text Display Variables on the Perceived Urgency of Warning Labels: Tradeoffs Involving Font Size, Border Weight, and Color. Ergonomics, 38, 2221–2237.
2. BSI (British Standards Institution), (2002). Graphical Symbols and Signs. Safety Signs, Including Fire Safety Signs. Specification for geometric shapes, colours and layout (B 5499e1:2002).
3. Belechri, M., Petridou, E., Kedikoglou , S., & Trichopoulos , D. (2001). Sports Injuries among Children in Six European Union Countries. European Journal of Epidemiology, 17, 1005–1012.
4. Barker, P., Fraser, J.(2000). Sign Design Guide: A Guide to Inclusive Signage. JMU and the Sign Design Society, London.
5. Boyce, S. H., & Quigley, M. A. (2003). An Audit of Sports Injuries in Children Attending an Accident & Emergency Department. Sage Journal, 48(3). https://doi.org/https://doi.org/10.1177/003693300304800308
6. Cochran, D. J., Riley, M. W., & Douglass, E. I. (1981). An Investigation of Shapes for Warning Labels. Proceedings of the Human Factors Society 25th Annual Meeting, 395–399.
7. Collins, B. L. (1983). Evaluations of Mine-Safety Symbols. Proceedings of the Human Factors Society 27th Annual Meeting, 947–949.
8. Conner, M., & Norman, P. (1996). Predicting Health Behavior: Research and Practice with Social Cognition Models. Philadelphia: Open University Press.
9. Dale, M., Smith, M. E. m., Weil, J. W., & Trichopoulos , H. M. (1969). Are Schools Safe?: Analysis of 409 Student Accidents in Elementary Schools. Sage Journal, 8(5).
10. Dingus, T. A., Hathaway, J. A., & Hunn, B. P. (1991). A Most Critical Warning Variable:Two Demonstrations of the Powerful Effects of Cost on Warning Compliance. Proceedings of the Human Factors Society 35th Annual Meeting, 1034–1038.
11. Dumlap, G. L., Granda, R. E., & Kustas, M. S. (1986). Observer Perceptions of Implied Hazard: Safety Signal Word and Color Words. IBM Technical Report. Duan, X. S. (2017). Research on the United Nations Convention on the Rights of the Child. People's Publishing.
12. Ellis, B. (1992). The Effects of Uncertainty and Source Credibility on Attitudes about Organizational Change. Management Communication Quarterly, 6(1), 34–57.
13. Hu, M., Hu, G. Q., Sun, Z. Q., & He, X. (2012). Epidemiological Survey of the Prevalence of Non-Fatal Injury among Children Aged 5–14 Years in China. Biomedical and Environmental Sciences, 25(4), 407–412.
14. Helmkamp, J. C., Bell, J. L., & Lundstrom, W. J. (2004). Assessing Safety Awareness and Knowledge and Behavioral Change among West Virginia Loggers. Injury Prevention, 10, 233–238.
15. International Labour Office. (2000). Year Book of Labour Statistics, Geneva.
16. Kwok, Y. C. (2002). Participatory Research for the Designing of Children and Youth Integrated Services Centres. Hong Kong: The Hong Kong Polytechnic University.
17. Kraus, R., Heiss, C., Alt, V., & Schnettler , R. (2006). School Accidents - An Epidemiological Assessment of Injury Types and Treatment Effort. Zentralbl Chir, 131(5), 411–416.
18. Kalsher, M. J., Wogalter, M. S., & Racicot, B. M. (1996). Pharmaceutical Container Labels and Warnings: Preference and Perceived Readability of Alternative Designs and Pictorials. International Journal of Industrial Ergonomics, 83–90.

19. Kin Wai Michael Siu, Mei Seung Lam & Yi Lin Wong (2015) Designing signs forchildren: a study of children's drawings for safety signs, Communication Design, 3(2),106-123, DOI: 10.1080/20557132.2015.1122960
20. Kalsher, M. J., Wogalter, M. S., & Pucci, S. (1994). Enhancing the Perceived Readability of Pharmaceutical Container Labels and Warnings: The Use of Alternative Designs and Pictorials. Proceedings of Human Factors Society 38th Annual Meeting, 384–388.
21. Kennedy, C., & Chen, J. L. (2009). Changes in childhood risk taking and safety behavior after a peer group media intervention. *Nursing research*, *58*(4), 264–273. https://doi.org/10.1097/NNR.0b013e3181ac12dd
22. Luximon, A., Chung, L. W., & Goonetilleke, R. S. (1998). Safety Signal Words and Color Codes: The Perception of Implied Hazard by Chinese People. Proceedings of the 5th Pan-Pacific Conference on Occupational Ergonomics.
23. Leonard, S. D. (1999). Does Color of Warnings Affect Risk Perception? International Journal of Industrial Ergonomics, 23(5–6), 499–504.
24. Monk, A., & Waterson, P. (2014). The Development of Guidelines for the Design and Evaluation of Warning Signs for Young Children. Applied Ergonomics, 45(5), 1353–1361.
25. Neal, A., Griffin, M. A., & Hart, P. M. (2000). The Impact of Organizational Climate on Safety Climate and Individual Behavior. Safety Science, 34, 99–109.
26. Nations, U. (2015). Transforming our world: The 2030 agenda for sustainable development. New York: United Nations, Department of Economic and Social Affairs, 1, 41.
27. Ortiz, J., Resnick, M. L., & Kenskool, K. (2000). The Effects of Familiarity and Risk Perception on Workplace Warning Compliance. Proceedings of the IEA 2000/HFES2000 Congress, 4, 826–829.
28. Peden, M., Oyegbite, K., Ozanne-Smith, J., Hyder, A. A., Branche, C., Rahman, A. F., Rivara, F., & Bartolomeos, K. (2008). *World report on child injury prevention*. World Health Organization.
29. Rice Berg, V.J., Lueder, R.(2008). Designing products for children. In: Lueder, R., BergRice, V.J. (Eds.), Ergonomics for Children: Designing Products and Places for Toddlers to Teens. Taylor and Francis, London.
30. Schwebel, D. C., Davis, A. L., & O'Neal, E. E. (2012). Child pedestrian injury: A review of behavioral risks and preventive strategies. *American journal of lifestyle medicine*, *6*(4), 292-302.
31. Sosnowska, S., & Kostka, T. (2003). Epidemiology of School Accidents during a Six School-Year Period in One Region in Poland. European Journal of Epidemiology, 18, 977–982.
32. Sutton, S. R. (1987). Social-Psychological Approaches to Understanding Addictive Behaviour: Attitude-Behaviour and Decision-Making Models. British Journal of Addiction, 82, 355–370.
33. Siu, K. W. M., Wong, Y. L., Lam, M. S., & Ng, A. W. Y. (2014). Children's misinterpretation of today's designs: a case study of how children interpret registered safety signs. The International Journal of Creativity and Problem Solving, 24(2), https://link.gale.com/apps/doc/A443011726/HRCA?u=anon~903bf973&sid=googleScholar&xid=f198f53c
34. Wogalter, M. S., Magurno, A. B., & Scott, K. L. (1996). Facilitating Information Acquisition for over the Counter Drugs Using Supplemental Labels. Proceedings of the Human Factors and Ergonomics Society 40th Annual Meeting, 732–736.
35. Waterson, P.E., Pilcher, C., Evans, S., Moore, J.(2012). Developing safety signs for children on board trains. Applied Ergonomics 43, 254-265.
36. Wogalter, M. S., & Cox, E. P. (1998). Guest Editorial Psychology, Marketing and Warnings Research: Bridging the Gap between Consumer Theory and Warning Practice. Psychology & Marketing, 15(7), 615–619.
37. Wogalter, M. S., Barlow, T., & Murphy, S. A. (1995). Compliance to Owner's Manual Warnings: Influence of Familiarity and the Placement of a Supplemental Directive. Ergonomics, 38, 1081–1091.
38. Wolff, J. S., & Wogalter, M. S. (1998). Comprehension of Pictorial Symbols: Effects of Context and Test Method. Human Factors, 40, 173–186.
39. Weinstein, N., & Nicolich, M. (1993). Correct and Incorrect Interpretations of Correlations between Risk Perceptions and Risk Behaviours. Health Psychology, 12, 324–333.
40. Xue, Q. Z., Huang, P. Y., & Lu, Z. (2003). Behavioral Economics - Theory and Application. Shanghai Fudan University Press.
41. Young, S. L., & Wogalter, M. S. (1998). Relative Importance of Different Verbal Components in Conveying Hazard-Level Information in Warnings. Proceedings of the Human Factors and Ergonomics Society 42nd Annual Meeting, 1063–1067.