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Examining the Effects of Instructional Risk Communication Associated With the Child Restraint System (CRS): Based on the IDEA Framework

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Abstract

Developing a comprehensive framework for instructional risk communication is crucial for effectively addressing the public's risk perception and behavioural intention in road safety risks. Drawing upon the IDEA model as the theoretical framework, this study investigated the effectiveness of social media messaging by traffic police in China to advocate and popularise the use of child restraint system (CRS). Findings from an online quasi-experiment indicated that compared to the explanation-based (status quo) message, instructional risk messages designed according to the receiver-centred IDEA model were significantly more effective in raising parents' risk perception, perceived importance of CRS, and perceived self-efficacy. Importantly, these messages appear to have some impact in encouraging parents to consider engaging in appropriate child passenger protection behaviours in a road safety risk situation. Additionally, that there is no statistically significant interaction effect between message type and various socio-demographic traits, suggests that additional expense and time of crafting customised messages may not be necessary. Theoretical and practical implications for road safety risk researchers and communicators are also discussed.

Key findings

- This study was an online quasi-experiment to examine the effectiveness of the IDEA framework.
- The IDEA model is more effective than explanation-based messages in raising risk perception and behavioural intention.
- Tailoring an instructional road safety risk message may not be warranted.

Introduction

Road traffic injuries are a leading cause of mortality and disability for children globally (WHO, 2023). As an effective measure to ensure child passengers' road safety, the child restraint system (CRS), also known as "child safety seats", can reduce the risk of crash fatalities in traffic incidents by 71 percent (WHO, 2023) and the risk of severe injuries in children aged 4 to 7 by 59 percent (WHO, 2015).

In China, although the adoption of CRS remains low compared to developed countries, the sales have signifi-

cantly increased nationwide and recently expanded from developed to underdeveloped areas (Wang, 2022). This trend has been further boosted by the newly amended Law on the Protection of Minors, the National Program for Child Development (2021-2030), the Healthy China Initiative (2019-2030), and local laws and regulations stipulated for the mandatory use of CRS, resulting in a substantial improvement in the protection of child passengers' road safety. For example, the newly revised Jiangsu Provincial Road Traffic Safety Regulations mandate that when transporting private motor vehicles, CRS compliant with national standards must be used for children under 4 years,

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while for children aged 4 to 12 years with a height below 1.4 metres, the use of child safety seats adhering to national standards or alternative restraint systems, such as booster seats, is advocated (The Standing Committee of Jiangsu Provincial People's Congress, 2023).

Nonetheless, the installation rate does not necessarily equate to the usage rate, as indicated in a recent survey by Safe Kids China (2022). While the average installation rate of CRS in Beijing, Shanghai, and Shenzhen reached 79 percent, only half (53%) of interviewed parents reported using child safety seats regularly. One possible explanation for this “good in theory, poor in practice” outcome is a lack of knowledge and awareness of road safety risks among families with children (Chen et al., 2014). Therefore, in addition to advancing legislation and bolstering law enforcement, the traffic management authorities need to educate the public. One tool is existing communication channels, especially social media platforms, to formulate and implement instructional risk communication strategies (Guttman, 2014). This is crucial for fundamentally altering parents' perceptions of and attitudes toward road safety risks and consequently increasing the usage rate of CRS.

Risk communication is essentially “an interactive process of exchanging information and opinions among individuals, groups, and institutions” (National Research Council, 1989, p. 21). In this process, risk communicators serving as organisational spokespersons need to convey information pertinent to the risk event or context to the public, in a way that is timely and also considers the opinions and feelings of various stakeholder groups. With regards to road safety risks, traffic management authorities have long advocated *technical rationality* emphasising instructions represented by expert views and discourses to ensure that the general public's access to accurate information and reliable guidance can inform their decisions (Guttman, 2015). Accordingly, prior empirical studies on road safety risk communication have primarily focused on the impact of different persuasive appeals or message frames (e.g., gain vs. loss, positive vs. negative, absolute vs. relative, self-oriented vs. family-oriented) on individuals' risk perception and behavioural intention in specific cases such as seat belt use (Sutton & Eiser, 1990), highway speeding (Chaurand et al., 2015), distracted driving (Ward et al., 2021), and drink driving (Teng et al., 2019). In CRS-related practices, parent-targeted interventions guided by behavioural change models (e.g., Precaution Adoption Process Model, Elaboration Likelihood Model, Consumer Information Process Model, Strike Out Model) as well as educational activities in communities, child education centres, and hospitals have also demonstrated effectiveness for supporting and promoting parents to implement appropriate preventive measures to reduce child injuries (Lei et al., 2018; Owens, 2021; Yan et al., 2020).

In line with technical rationality, instructional risk messages typically focus on the explanation strategy, stressing the causes and effects of high-risk events as well as specific response measures taken by government authorities for the public (D. D. Sellnow & Sellnow, 2014). The relevant information is often sourced from reputable institutions or

specialists in the field. When the message contains any scientific evidence or technical terminology, communicators should also translate it into plain language for public understanding (D. D. Sellnow, Iverson, et al., 2017). This one-way persuasive strategy, however, has been questioned as presenting the communicator-centred risk “monologue” (Frisby et al., 2014; Heath, 1995; T. L. Sellnow et al., 2012), failing to incorporate the non-scientific public's demands and opinions into the risk communication process. Heath (1995) criticised this linear, hypodermic mode of communication, whereby “technical information could be injected into nontechnical audiences” (p. 269), to be at odds with the essence of risk communication and thus undermining the effectiveness of persuasive appeals. The diminished effectiveness also reflects the absence of a systematic framework for identifying the information that the general public truly needs as opposed to what technical experts think they need. Moreover, due to variations in empirical settings, experimental designs, and measurements, empirical findings of previous studies on message framing and persuasive appeal campaigns also reveal substantial variances or even contradictions (Levin et al., 1998; Yu & Shen, 2013). Therefore, it becomes imperative for both researchers and practitioners to address the question of how to effectively intervene in the public's risk perception, risk-taking/avoiding attitude, and behavioural intention in road safety risks through a comprehensive and systematic process.

Drawing on the IDEA framework developed by Sellnow and his colleagues in recent years, we conducted an online quasi-experiment to examine the CRS-related instructional risk message effectiveness of the receiver-centred IDEA framework compared to the communicator-centred explanation strategy. The overall goal of this research is three-fold. First, by comparing the effects of two distinct communication strategies on individuals' risk perception and decision-making, we intended to provide empirical evidence for road safety risk communicators' message design and behavioural intervention in similar risk scenarios. Second, we aimed to examine the potential impact of individuals' socio-demographic traits on their interpretation of instructional messages, highlighting the need to consider the information desires and risk perceptions from diverse cultural groups. Third, we confirmed the applicability of the IDEA framework for the first time to the road safety context, offering a solid empirical basis for further comparative studies across different road safety risk types and real-world settings.

Conceptualisation

Shifting from monologue to dialogue: The IDEA framework

In recent years, the field of risk and crisis communication has seen a paradigm shift from monologue to dialogue (Heath & O'Hair, 2020). This shift advocates a receiver-centred approach considering the public's cognitive, affective, and behavioural learning outcomes as the guiding principle for crafting instructional risk messages. In response to this paradigm shift, Sellnow and his colleagues proposed

the IDEA model to provide risk communicators (e.g., government spokespersons, journalists, social media content managers) with a pragmatic and easy-to-follow guideline for developing effective instructional risk communication (e.g., Johansson et al., 2021; D. D. Sellnow et al., 2019; D. D. Sellnow, Lane, et al., 2017; D. D. Sellnow & Sellnow, 2014; T. L. Sellnow et al., 2012; Sellnow-Richmond et al., 2018). In addition to the element of explanation (i.e., providing an explicit but succinct explanation of risk characteristics), the IDEA model also comprises three other critical elements: internalisation (i.e., assisting people in internalising the potential impact of risk events), distribution (e.g., utilising appropriate communication channels to disseminate risk messages), and action (i.e., suggesting specific self-protective action steps).

More specifically, the element of internalisation seeks to enhance people's perceived personal relevance to a particular risk event (Burke et al., 2010). To achieve this, communicators need to overcome people's apathy towards risks and also seize their attention from competing information sources conveyed through other media channels (Ulmer et al., 2017). Prior studies demonstrate that various strategies can be used to facilitate the public's internalisation of risk messages, such as expressing compassion and empathy (Coombs, 1999), highlighting the geographic proximity (Spence et al., 2005) and timeliness (T. L. Sellnow et al., 2012), and emphasising the potential impact of (non)compliance with pertinent advice or instructions (Lachlan & Spence, 2009). For instance, Sellnow, Lane et al. (2017) discovered that during a food safety crisis in the north-eastern U.S., respondents were more likely to internalise the official guidance when the message specified that the contaminated food came from a store or restaurant nearby (geographic proximity), provided a timeframe for medical treatment after consumption (timeliness), or indicated the batch number of products that caused the death of local residents (potential impact).

The distribution element aims to convey risk messages through multiple communication channels (e.g., newspapers, radio, TV, social media, mobile applications) to reach the target population. When facing diverse and competitive views delivered by various stakeholder groups in a given risk event, people often actively interact with a number of information sources to seek the common ground among distinct perspectives, thereby achieving the "message convergence" (Anthony & Sellnow, 2016). Hence, in addition to ensuring information accuracy and fine-tuned targeting, communicators should also strive to coordinate the consistency of instructional risk messages distributed across different media channels.

In terms of the action element, the IDEA model proposes that risk messages are expected to inform the public of specific actions they should take or avoid for self-protection (D. D. Sellnow, Iverson, et al., 2017). However, previous literature reveals that instructions offered by government agencies or news media mostly overlook or downplay this crucial element (Frisby et al., 2014; Sellnow-Richmond et al., 2018). For example, Frisby et al. (2014) conducted a content analysis of 566 television news reports during the 2010

U.S. egg recall crisis and found that only 2 percent of the reports provided practical guidelines or self-protective action steps for people to follow. Similarly, Sellnow-Richmond et al. (2018) analysed the official press releases issued after the first Ebola case in Dallas, Texas and found that only 6 percent contained specific measures for citizens to protect the safety of themselves and their family members.

Since the IDEA model was proposed, Sellnow and his colleagues have demonstrated its effectiveness in increasing people's risk perception and intention to take appropriate self-protective measures in various risk types, such as food contamination (Frisby et al., 2014; D. D. Sellnow et al., 2019; D. D. Sellnow, Lane, et al., 2017), global pandemics (Bang, 2021; Sellnow-Richmond et al., 2018), and natural disasters (Herovic et al., 2020; D. D. Sellnow, Iverson, et al., 2017). This study extended the applicability of the framework to the context of road safety risks. Specifically, the aim of the present study was to investigate the instructional risk communication strategies adopted by Chinese traffic police agencies on social media in advocating and popularising the use of CRS. It should be noted that the element of distribution is not examined here because it was restricted to communication channels afforded by social media platforms for the current concern. We therefore predict that:

H1a-d: The instructional risk message that addresses all elements of the IDEA model will have an increased impact on individuals' (a) risk perception (i.e., perceived severity and perceived susceptibility) of child passengers' road safety, (b) perceived importance of CRS, (c) perceived self-efficacy, and (d) self-reported behavioural intention, as compared to the explanation-based (status quo) message.

Multicultural groups in risk communication

In developing instructional risk communication strategies, organisational communicators often tend to homogenise the general public's risk perception and decision-making in uncertain situations. However, research has highlighted socio-demographic variations of risk perception that different cultural groups may have varying understandings and constructions of a certain risk event. For example, men tend to hold more favourable opinions and greater tolerance of environmental and technological risks than women (Davidson & Freudenburg, 1996), while women are more proactive in seeking risk information and taking practical measures than men (T. L. Sellnow et al., 2012). Individuals with higher levels of education and household income typically perceive technological risks as less severe (O'Connor et al., 1999). Moreover, empirical efforts on global warming have also confirmed the so-called "white male effect", suggesting that women or ethnic minorities are significantly more likely to perceive climate change as an imminent threat than white males (Bord et al., 2000).

It is worth noting that group-level variances may signal the gap in social resources (e.g., wealth, power, education, personal connections) that group members can access, which influence their capacity to cope with risks and escape potential threats. Multicultural groups are embedded in different risk environments in the short term resulting in

diverse information needs and desires in risky situations. Therefore, formulating instructional risk messages must consider the potential impact of multicultural group differences on how messages are perceived and interpreted. This study examined the interaction effects of instructional risk messages and group types (i.e., gender, age of child, household income) on individuals' risk perception and decision-making in the context of road safety risks. The following research question was posited:

RQ1: In what ways does message type (condition) interact with individuals' socio-demographic traits (i.e., gender, age of child, household income) to influence their risk perception, perceived importance of CRS, perceived self-efficacy, and behavioural intention?

Method

To examine H1a-d and RQ1, we conducted a between-subjects online survey experiment with post test-only design. This study was approved by and conducted in accordance with the guidelines of the Survey and Behavioural Research Ethics Committee (SBREC) at the Chinese University of Hong Kong. Sampling procedures, stimulus design, and measurements are described below.

Sampling procedures

Before the survey, we conducted an a-priori analysis using G*Power 3.1 (Faul et al., 2007) to estimate the sample size. The minimum sample size was 172 to reach power 0.90 for the independent samples *t*-test and 128 to reach power 0.90 for the multivariate analysis of variance (MANOVA). The sampling target for the current concern were parents with children aged below 7 years old.

We recruited 402 participants meeting the above sampling requirement via Credamo, an online survey panel that authenticates respondents through a real-name database covering more than 300 cities across China. Eligible participants were required to indicate informed consent and briefed on the research purpose at the outset. They were then randomly assigned to either a treatment (IDEA framework message) group or a comparison (explanation-based message) group. Participants in each group provided responses after being presented a stimulus message consisting of a fictional post on social media platform, Weibo, published by a traffic police agency. There was no missing data because the questionnaire was administered to require a response to each item. Each participant was debriefed on the fictional origin of stimulus exposure and paid 7RMB (approximately A\$1.48) upon finishing the survey. The average response time was 5.8 minutes and participants observed to spend evidently less (3 min) or more (10 min) time were excluded, resulting in a total of 336 valid responses with a response rate of 83.6 percent.

Participants were assigned to the treatment group ($n = 163$, 48.5%) or the comparison group ($n = 173$, 51.5%). More participants were female ($n = 205$, 61.0%). The majority of respondents were aged between 25 and 34 years ($n = 284$, 84.5%). The majority of respondents had a bachelor's

degree or above ($n = 274$, 81.5%). Participants' monthly household income was across all brackets from less than 15,000RMB ($n = 97$, 25.9%), between 15,000 and 20,000RMB ($n = 88$, 26.2%), between 20,000 and 30,000RMB ($n = 103$, 30.6%), and above 30,000RMB ($n = 58$, 17.3%). The randomisation was considered satisfactory in the light of gender: $t(334) = 0.35$, $p = 0.73$; age: $t(334) = -0.01$, $p = 0.99$; education level: $t(334) = -0.05$, $p = 0.96$; and monthly household income: $t(334) = 1.22$, $p = 0.22$.

Message stimuli

Before designing the message stimuli, we conducted extensive research into pertinent sections in Chinese laws and policies (e.g., Law on the Protection of Minors, Healthy China Initiative 2019-2030, National Program for Child Development 2021-2030) as well as the most recent opinions and suggestions from experts across a range of sectors (e.g., law, medicine, transportation management, disease prevention and control). This enabled us to acquire a comprehensive and up-to-date understanding of what instructional risk messages were conveyed and discussed at the time. This step ensured all details of message stimuli were derived from authentic and reliable sources, thus improving the ecological validity of stimuli.

Next, two distinct CRS-related social media posts published on the official Sina Weibo accounts of traffic police agencies were designed for the treatment group and the comparison group, respectively. As can be observed in [Figure 1](#) and [Table 1](#), the post developed for the comparison group highlights the explanation-based strategy focusing primarily on the source credibility, accurate information, scientific evidence, and lucid interpretation. In addition to these elements included in the comparison condition, the message stimulus given to the treatment condition also comprises elements addressed in the IDEA framework other than explanation and distribution, i.e., internalisation and action steps to be taken for child safety protection. The internalisation element was designed to reinforce the audience's attention and facilitate message retention by expressing empathy, emphasising personal relevance, and exemplifying the potential impact of adhering to or disregarding pertinent instructions. Moreover, the action element was developed to provide specific and actionable guidelines for parents to properly install and use the CRS.

Graphic templates for the post content created by the (virtual) organisational account "Traffic Police Online" (交警在线) were employed to enhance participants' perceived authenticity of the stimulus exposure. Both stimulus messages were purposefully kept the same length to rule out any external effects caused by heuristic cues other than the substance of stimuli.

Measures

After reading through the message stimuli, each participant rated their risk perception, perceived importance, self-efficacy, and behavioural intention on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).



Figure 1. Graphic representations of message stimuli

Table 1. English translation of messages

Comparison group	Treatment group
[#ChildSafetySeatUsage#] When many parents drive with their children, they allow the child to sit alone in a seat or hold the child while driving. However, in the event of a traffic crash, this can easily lead to a secondary collision inside the vehicle or the child being ejected from the vehicle. According to the statistics from the Ministry of Transport, more than 20,000 children in China are injured or killed in road traffic crashes each year. Failure to use child safety seats during travel is a significant contributing factor. Data show that in the event of a traffic crash, the use of child safety seats can reduce the risk of fatal injuries for infants under 1 year old by 71%, and for children aged 1-4, the risk is reduced by 54%. The mortality rate for infants and toddlers without child safety seats installed is 8 times higher than those with seats, and the injury rate is 3 times higher. Child safety seats protect children by restraining them in the seat during collisions or emergency braking, preventing them from being ejected. The seats also absorb energy and restrict the movement of the child's body, reducing the impact force and minimizing injuries. The World Health Organization recommends the use of safety seats for children under 4 years old to reduce injuries in emergencies or crashes, while children aged 4-12 or under 1.4 meters tall should use booster seats with seat belts.	[Attention, Parents! #ChildSafetySeatUsage#] Don't let the familiar comfort of parents' arms become a risk during your baby's travels! Don't let a pleasant trip become a regrettable incident for a lifetime! Recently, in Zhangjiagang City, Jiangsu Province, a white car collided with the front of a heavy semi-trailer while driving. A 6-month-old baby being held by his/her mother was thrown out of the car window and suffered severe injuries, ultimately leading to death due to the immense impact force. According to the statistics from the Ministry of Transport, more than 20,000 children in China are injured or killed in road traffic crashes each year, and not using safety seats during travel is a significant contributing factor. Data show that in the event of a crash, the use of child safety seats can reduce the child's crash injury and mortality rate by over 70%, whereas holding a baby or using adult seat belts can cause physical harm. Additionally, it is crucial to correctly install child safety seats following the user manual. The safety seat should be secured in the rear seat, preferably in the middle, to avoid frontal and side impacts and airbag deployment. After securing the safety seat, check for any left and right movement. To ensure the stability of the safety seat, press it against the seat and fasten it with the rear seat belt. Share this post and call for action: "Make half a square meter in the back seat, use a safety seat to protect your child's travels."

Risk perception

Drawing upon prior studies on risk communication (Roh & Lee, 2018), we measured risk perception by assessing participants' perceived severity and perceived susceptibility regarding children's safety during automobile journeys. For perceived severity, participants indicated their agreement with the following statements: (1) "Not using the CRS poses a fatal threat to children"; (2) "There is a significant safety risk for parents to carry their children or let them sit alone

in the passenger seat"; and (3) "There is a high risk of injury or even death for children who do not use the CRS in a traffic incident". Three responses were averaged to form the scale of perceived severity ($M = 5.74$, $SD = 1.08$, Cronbach's $\alpha = 0.83$). While for perceived susceptibility, participants rated their level of agreement with the following statements: (1) "My child(ren) is physically fragile with a high probability of being injured in a traffic incident"; (2) "The CRS-associated safety hazards pose a great threat to my child(ren)'s life"; and (3) "The probability of a car form-

ing an injury to my child(ren) during emergency braking or in an incident is extremely high". The scale of perceived susceptibility was calculated by averaging three responses ($M = 5.39$, $SD = 1.12$, Cronbach's $\alpha = 0.78$).

Perceived importance

The perceived importance regarding CRS was assessed by asking the participants to rate the extent to which they agreed that: (1) "The CRS is one of the best devices to protect children's safety in cars"; (2) "It is necessary to install and use CRS in a proper manner"; and (3) "As parents, we must let the child(ren) sit in the rear CRS and raise their awareness of road safety". Responses were then averaged to generate the scale of perceived importance ($M = 5.00$, $SD = 0.60$, Cronbach's $\alpha = 0.74$).

Perceived self-efficacy

The perceived self-efficacy was measured by asking the participants to state their level of agreement with the following items: (1) "I am able to equip my child(ren) with a CRS suitable for her/his age and weight"; (2) "I can learn how to properly use the CRS and do a good job of chaperoning"; and (3) "I am able to give my child(ren) a safe traveling environment keeping her/him away from traffic incidents". The scale of perceived self-efficacy was created by averaging the above items ($M = 5.80$, $SD = 0.71$, Cronbach's $\alpha = 0.72$).

Behavioural intention

The behavioural intention was further dichotomised into use intention and word-of-mouth (WOM) intention as two dimensions frequently adopted in previous studies (Coombs & Holladay, 2008). The use intention was measured by asking the participants whether they would: (1) install the CRS correctly in accordance with product instructions; (2) properly use the CRS; and (3) teach other adult family members to install and use the CRS correctly ($M = 5.94$, $SD = 0.61$, Cronbach's $\alpha = 0.65$). For WOM intention, participants were asked whether they would: (1) retweet this Weibo post; (2) share the post content with other parents; and (3) encourage and guide other parents to install and use the CRS correctly ($M = 5.51$, $SD = 0.91$, Cronbach's $\alpha = 0.79$).

Manipulation checks

Following the above dependent measures, we included several manipulation check items at the end of the questionnaire. The first manipulation check evaluated participants' perceived internalisation by asking the extent to which they agreed that the Weibo post: (1) reinforces my concern about CRS-related issues; and (2) makes me realise that CRS is closely related to my life. Both items were averaged to form a scale, with higher scores indicating a stronger level of perceived internalisation ($M = 5.69$, $SD = 0.75$). The second manipulation check assessed participants' perceived explanation by asking their level of agreement with state-

ments that the post: (1) provides accurate and scientific information on the use of CRS; and (2) provides a succinct and easy-to-understand explanation about CRS. Similarly, items were then averaged to form a scale ($M = 5.99$, $SD = 0.66$). The third manipulation check measured participants' perceived action of the stimulus message. They were asked to report their level of agreement with statements that the post: (1) conveys specific action steps I should take; and (2) makes me aware of the effective action steps I should take ($M = 5.80$, $SD = 0.88$).

Results

With regard to manipulation checks, results of the independent samples *t*-test revealed that as opposed to the comparison group (explanation-based message), the treatment group receiving the IDEA framework message reported significantly higher levels of perceived internalisation [$t(334) = 18.09$, $p < .001$] and perceived action [$t(310.92) = 3.37$, $p < 0.01$]. But the two groups exhibited no significant difference in perceived explanation [$t(334) = 0.26$, $p = 0.80$]. By and large, these results corroborated the effectiveness of our manipulations, thus allowing for further analyses.

H1a-d predicted that as compared to the explanation-based message (comparison condition), the instructional risk message incorporating all IDEA model elements (treatment condition) will have an increased impact on participants' risk perception (i.e., perceived severity and perceived susceptibility), perceived importance of CRS, perceived self-efficacy, and self-reported behavioural intention (i.e., use intention and WOM intention). These hypotheses were tested using a series of independent samples *t*-tests. As presented in Table 2, participants who viewed the treatment message ($M = 6.08$, $SD = 1.05$) reported significantly higher perceived severity than those who viewed the comparison message ($M = 5.38$, $SD = .99$), $t(334) = 6.30$, $p < .001$. Also, the IDEA model treatment condition ($M = 5.75$, $SD = 1.02$) yielded higher perceived susceptibility of child passengers' road safety than the status quo comparison condition ($M = 5.29$, $SD = 1.10$), $t(334) = 3.96$, $p < .001$. H1a was thus fully supported.

In terms of the perceived importance of CRS, the independent samples *t*-test revealed a significant model [$t(334) = 6.11$, $p < .001$] that participants exposed to the IDEA model treatment message ($M = 5.33$, $SD = .52$) reported a greater perceived importance of CRS than those exposed to the comparison condition ($M = 4.99$, $SD = .48$). Hence, H1b was supported. Similarly, H1c was supported that the treatment group ($M = 6.27$, $SD = .50$) reported significantly higher perceived self-efficacy, i.e., beliefs in one's capacity to appropriately install and use CRS to cope with children's road safety risks, as compared to the comparison group ($M = 5.62$, $SD = .53$), $t(334) = 11.61$, $p < .001$.

H1d predicted that the treatment condition would exhibit greater behavioural intention to take appropriate actions for child safety protection. Results revealed significant differences for both the use intention and the WOM intention in the expected directions. Participants exposed to the IDEA message ($M = 6.25$, $SD = .54$) were more likely to

Table 2. Results of independent samples *t*-test

	Levene's		Comparison group		Treatment group		MD	Independent samples <i>t</i> -test			
	<i>F</i>	<i>p</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		<i>CI, LL</i>	<i>CI, UL</i>	<i>t</i>	<i>p</i>
Perceived severity	.043	.836	5.38	.99	6.08	1.05	.70	.483	.922	6.301	< .001
Perceived susceptibility	.886	.347	5.29	1.10	5.75	1.02	.46	.231	.687	3.963	< .001
Perceived importance	.930	.336	4.99	.48	5.33	.52	.34	.228	.444	6.113	< .001
Self-efficacy	.025	.874	5.62	.53	6.27	.50	.65	.538	.758	11.613	< .001
Use intention	.306	.580	5.93	.49	6.25	.54	.32	.209	.431	5.661	< .001
WOM intention	9.582	.002	5.05	.58	5.93	.95	.89	.717	1.053	10.377	< .001

Note. MD = mean difference; CI = confidence interval; LL = lower limit CI; UL = upper limit CI.

consider properly installing and using the CRS than those viewing the status quo comparison message ($M = 5.93$, $SD = .49$), $t(334) = 5.66$, $p < .001$. Also, participants in the treatment group ($M = 5.93$, $SD = .95$) were significantly more likely to actively promote the use of CRS than those in the comparison group ($M = 5.05$, $SD = .58$), $t(334) = 10.38$, $p < .001$. Thus, H1d was fully supported.

With respect to RQ1 a full-factorial $2 \times 2 \times 7 \times 2$ (message type $\times$ gender $\times$ age of child $\times$ household income) MANOVA was conducted to examine the main and interaction effects among message type, gender, age of child, and household income on the four dependent measures. It is noted that participants provided the age of their youngest child (i.e., 1 to 7 years old) since they may have multiple children. For easier interpretation, the monthly household income was further dichotomised into "20,000RMB and below" ($n = 175$, 52.1%) and "above 20,000RMB" ($n = 161$, 47.9%). As exhibited in Table 3, the MANOVA results revealed two significant main effects: one for message type with higher means for the treatment IDEA message than the comparison message [$\Lambda = 0.693$, $F(6, 278) = 20.53$, $p < .001$, partial $\eta^2 = 0.307$, power = 1.000], and one for household income with greater means for participants with a higher monthly household income [$\Lambda = 0.938$, $F(6, 278) = 3.06$, $p < .01$, partial $\eta^2 = 0.062$, power = 0.910]. Consistent with prior studies on testing the effectiveness of the IDEA model, the main effect of gender showed no significance [$\Lambda = 0.985$, $F(6, 278) = 0.686$, $p = .661$, partial $\eta^2 = 0.015$, power = 0.271].

In addition, the MANOVA results indicated a significant two-way interaction effect for age of child and household income [$\Lambda = 0.838$, $F(36, 1223.54) = 1.560$, $p < .05$, partial $\eta^2 = 0.032$, power = 0.957]. However, results associated with the other five two-way interactions, four three-way interactions and one four-way interaction revealed no statistical significance. In sum, the findings corroborated that instructional risk messages should be developed using the IDEA model to include elements of internalisation, explanation, and action, but did not need to be customised for individuals' socio-demographic characteristics such as gender, age

of child, and household income, since they did not interact with message type.

Discussion

Results of an online quasi-experiment show that instructional risk messages designed in line with the IDEA model were significantly more effective than explanation-based (status quo) messages in enhancing individuals' risk perception, perceived importance of CRS, and perceived self-efficacy. More importantly, these messages encouraged participants to consider engaging in appropriate child passenger protection behaviours in a road safety risk situation. This finding extends the applicability of the IDEA framework to the road safety context, reiterating the ultimate goal of best practices literature (D. D. Sellnow, Lane, et al., 2017) for the effective instructional risk communication that would empower people to make informed decisions to protect themselves and their family members.

The main effect of household income reveals that higher-income parents reported significantly higher mean scores than their lower-income counterparts. This contradicts prior empirical findings that people with higher levels of household income usually perceive risks as less severe (O'Connor et al., 1999). However, no interaction effects were observed between message type and socio-demographic characteristics that participants consistently reported higher means when exposed to the IDEA message than when exposed to the status quo comparison message.

It is noted in previous literature that variables such as gender, household income, and residence location are likely to influence how people receive and interpret risk messages (D. D. Sellnow & Sellnow, 2014; Spence et al., 2005). Consequently, professional communicators are often advised to be alert to the varying information needs and practical appeals from different cultural groups when developing instructional risk communication strategies such as the IDEA model. Results from this analysis, however, imply that the extra efforts made to create tailored messages may not al-

Table 3. Full-factorial (2 message type × 2 gender × 7 age of child × 2 household income) MANOVA results

Effect	Wilk's Λ	F	df	p	Effect size partial η^2	Observed power
Condition	0.693	20.528	(6, 278)	0.000***	0.307	1.000
Gender	0.985	0.686	(6, 278)	0.661	0.015	0.271
Age of child	0.840	1.381	(36, 1223.54)	0.068	0.029	0.930
Household income	0.938	3.063	(6, 278)	0.006**	0.062	0.910
Condition × Gender	0.967	1.565	(6, 278)	0.157	0.033	0.600
Condition × Age of child	0.853	1.253	(36, 1223.54)	0.147	0.026	0.895
Condition × Household income	0.959	1.969	(6, 278)	0.070	0.041	0.719
Gender × Age of child	0.872	1.080	(36, 1223.54)	0.344	0.023	0.827
Gender × Household income	0.971	1.381	(6, 278)	0.222	0.029	0.537
Age of child × Household income	0.838	1.560	(36, 1223.54)	0.028*	0.032	0.957
Condition × Gender × Age of child	0.852	1.259	(30, 1114)	0.142	0.026	0.897
Condition × Gender × Household income	0.976	1.160	(6, 278)	0.328	0.024	0.456
Condition × Age of child × Household income	0.919	0.794	(30, 1114)	0.778	0.017	0.641
Gender × Age of child × Household income	0.885	0.955	(36, 1223.54)	0.546	0.020	0.759
Condition × Gender × Age of child × Household income	0.900	0.990	(30, 1114)	0.482	0.021	0.770

Note. Degrees of freedom (df) are expressed in parentheses as (hypothesis df, error df).

* $p < .05$, ** $p < .01$, *** $p < .001$.

ways be necessary. Despite the regular practice of customising messages in most persuasive appeal campaigns to reach disparate publics, findings obtained from the present study are consistent with a growing body of research contending that tailoring a risk message, which could be expensive and time-consuming, may not be warranted as long as the elements of internalisation, explanation, and action are properly addressed (e.g., Johansson et al., 2021; D. D. Sellnow et al., 2019).

Strengths and limitations

There are several important strengths to this study. The use of the IDEA framework provides insights into the effectiveness of road safety risk communication and this is the first application of this framework in the road safety context. A key finding is that communicators do not need to customise the messaging to be effective among different groups in the community. This will save considerable time and resources as risk messaging that includes elements of internalization, explanation, and action are likely to be effective.

Several limitations need to be pointed out. First, the sampling representativeness afforded by the online survey panel restricts our findings to be generalised to a wider population of Chinese parents with children. Regarding the educational background, for example, 81.5 percent of participants reported holding a bachelor's degree or higher, far exceeding the national average of 15.5 percent (National

Bureau of Statistics, 2021). This significant gap calls for a more systematic sampling frame in future studies. Second, the quasi-experimental design did not specifically address the causal relationships among risk perception, perceived importance, self-efficacy, and behavioural intention, but instead, examined them separately from each other. Subsequent efforts are expected to clarify the mediating effects among these dependent measures and further elucidate the psychological mechanisms through which the IDEA framework facilitates the effectiveness of road safety risk communication. Furthermore, in analysing the differentiated means of risk construction and information needs from multicultural groups, several potential group differences (e.g., urban development level, road safety attitudes, media usage preferences) other than the socio-demographic traits examined in this study can be considered.

Conclusion and future research

This study also provides several practical implications for road safety risk communicators and managers. Policymakers and practitioners serving the communication role within a traffic management agency are expected to follow the dialogic shift emerging in the field of risk communication. Specifically, the receiver-centred IDEA framework is highly recommended for message design and behavioural intervention, with the aim of addressing the public's infor-

mation demands as well as influencing their cognitive, affective, and behavioural learning outcomes in an appropriate direction. Subsequent analyses can also be conducted to further validate the effectiveness of the IDEA model across different road safety risk scenarios (e.g., seat belt use, highway speeding, drink/distracted driving) and in real-world settings, thereby offering a more robust empirical foundation for traffic safety managers to make informed decisions.

Future studies should broaden the understanding of multicultural groups and further identify the interaction effects between instructional risk message type and group characteristics. This is crucial for traffic management authorities to refine instructional messages designed upon the IDEA framework to fit the information needs of their target populations.

Author contributions

Xiao Wang contributed to conceptualisation, methodology, formal analysis, investigation, writing-original draft, visualisation, supervision, and funding acquisition. Yuxin Yi contributed to methodology, validation, investigation, data curation, and writing-review and editing. Both authors have read and agreed to the published version of the manuscript.

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Human Research Ethics Review

This study was approved by and conducted in accordance with the guidelines of the Survey and Behavioural Research Ethics Committee (SBREC) at the Chinese University of Hong Kong (No. SBRE-19-090).

Data availability statement

The data that support the findings of this study are available from the corresponding author, Xiao Wang, upon reasonable request.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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