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Modifying risk perception through emotion: an experimental study using a fear appeal video intervention in a driving context

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Objectives: Fear appeal messages are widely used in road safety campaigns to discourage risky driving behaviors; however, their effectiveness remains a subject of debate. This study experimentally examined how exposure to fear-inducing, emotionally negative content affects drivers' risk perception.
Methods: A total of 51 drivers were assigned to an experimental group (n = 24; 17 women; mean age = 21.13 years) or a control group (n = 27; 23 women; mean age = 21.04 years). The experimental group viewed videos depicting risky driving behaviors and traffic accidents, whereas the control group viewed videos that were emotionally neutral. Perceived risk was assessed both pre- and post-intervention using a behavioral risk perception task that featured naturalistic driving scenarios.
Results: Participants in the experimental group showed a significant increase in perceived risk following the intervention, but no significant change was observed in the control group. Signal Detection Theory analyses suggested that these changes resulted from a modification in the decision threshold.
Conclusion: The results of this study provide empirical evidence that fear-based content can modify drivers' risk perception and may inform the design of more effective road safety campaigns.

KEYWORDS
driving, experimental design, fear appeal, risk perception, road safety

Introduction

Reducing road traffic mortality remains a major challenge for public health initiatives. According to the World Health Organization (WHO), approximately 1.19 million people die each year worldwide as a result of traffic accidents [1]. A key strategy implemented in road safety interventions involves the use of mass media campaigns that feature emotionally negative scenes of traffic crashes [2–5]. Such fear appeal messages seek to persuade individuals to change their behavior or attitudes by arousing fear through depictions of the dangers associated with engaging in specific behaviors—such as speeding or drink-driving—or with failing to adopt actions recommended in the message [6–8].

Despite their widespread use in road safety prevention campaigns, evidence on the effectiveness of fear appeals remains mixed, with no clear consensus on their utilization [3, 4, 9–14]. The literature suggests that the impact of such content on reducing risky behaviors and accident rates appears to depend on several critical variables that must be carefully considered when designing campaigns [3, 11, 15]. Negative emotional content is important

for capturing attention, but it must be paired with effective, feasible coping strategies to avoid the risk—that is, the campaign must promote a sense of perceived efficacy [3, 16–18]. The threat must also be perceived as personally relevant, with drivers feeling vulnerable to the specific risky behavior targeted by the campaign [3]. Finally, the level of fear arousal elicited is key: if too low, the message may be disregarded, whereas if too high, it could trigger defensive responses such as avoidance or denial of the threat [2, 5, 19].

Another factor contributing to the heterogeneity of findings on the effectiveness of fear appeal campaigns in reducing risky driving behaviors concerns methodological issues in the research designs [11, 12, 14, 20]. Experimental evaluations of their effectiveness remain scarce in the literature. In a systematic review of crash-prevention communication campaigns published between 1990 and 2020 that was not limited to fear appeals, Faus et al. [12] identified only three experimental studies. While reliance on non-experimental or observational approaches is understandable given the challenges of evaluating mass media campaigns in the general population, the scarcity of experimental evidence makes it difficult to establish the causal effects of road safety campaigns on drivers' behavior. Against this background, we sought to investigate experimentally how fear appeal campaigns might influence risky driving behavior by examining a key precursor of such behavior: risk perception.

Perceived risk plays a central role in risk-taking behavior, with lower levels increasing the likelihood of engaging in risky actions [21–24]. It is also true that this relationship is moderated by personal and contextual factors, such as perceived benefits of the action, risk propensity, impulsivity, sensitivity to reward, feelings of invulnerability, social environment, peer influence, and emotional states [25–35]. Nonetheless, risk-avoidant behavior cannot occur unless the situation is first perceived as risky. Therefore, modifying risk perception is a necessary initial step toward behavior change.

The primary aim of this experimental study was to evaluate the effect of emotionally negative content, similar to that used in fear-based road safety campaigns, on risk perception in driving scenarios. To this end, we exposed a group of drivers to videos depicting risky driving behaviors and traffic accidents. Levels of risk perception were assessed before and after the videos, and responses were compared with those of a control group that viewed emotionally neutral videos. Unlike previous studies that primarily relied on self-report scales and questionnaires [3, 14], the present study measured perceived risk using a behavioral task featuring images of naturalistic road scenarios, whose validity has been established in prior research [29, 36–38]. In this task, participants were asked to indicate whether each road situation was risky or not (dichotomous response) and to rate the level of perceived risk on a Likert scale (rating response). Combining dichotomous responses, which require rapid decisions (as in real driving), with graded ratings that capture subtle variations in perceived risk provides a more comprehensive measure of how emotional interventions may modulate risk perception.

The use of dichotomous responses allowed us to address a second objective. Within a Signal Detection Theory (SDT) framework, these responses enabled us to examine potential mechanisms underlying any observed effect on risk perception, specifically whether the effect reflected a shift in the decision criterion, a change in sensitivity in discriminating risky situations, or both.

Methods

Participants

Participants were eligible if they held a valid driving license and were between 18 and 30 years of age, to ensure a relatively age-homogeneous sample. No additional eligibility criteria were applied regarding minimum driving experience, driving frequency, or regular access to a vehicle. Nonetheless, the length of time they had held their driving license and their annual car mileage were recorded to characterize the sample (see below).

A total of 52 licensed drivers participated in the study and were randomly assigned to either the experimental or control group. One participant was identified as an outlier and excluded due to extreme scores on emotional valence and arousal ratings (exceeding 2.5 SDs above the mean), leaving a final sample of 51 participants. The experimental group comprised 24 participants (17 women, 70.83%; 7 men, 29.17%), with a mean age of 21.13 years (SD = 3.21; range = 18–29). They had held a driving license for an average of 27.25 months (SD = 34.31; range = 0–132) and reported an estimated average annual driving distance of 3,000–6,000 km (M = 3.75; range = 1–8; see Procedure section). The control group consisted of 27 participants (23 women, 85.19%; 4 men, 14.81%), with a mean age of 21.04 years (SD = 3.13; range = 18–28). The average length of time they had held a driving license was 27.48 months (SD = 35.15; range = 0–120), and their estimated average annual driving distance was also 3,000–6,000 km (M = 4.22; range = 2–10; see Procedure section).

Participants were recruited through advertisements posted at the University of Málaga, resulting in a sample that was predominantly composed of university students. Students received extra course credit for their participation, while non-students received a small monetary compensation. Before the study began, all participants were informed about the confidentiality and anonymity of the data and provided written informed consent. The project associated with this study received approval from the Research Ethics Committee of the University of Málaga (approval number: 14–2019-H).

Instruments

Risk perception task

Perceived risk was assessed using a behavioral task previously validated as a measure of risk perception [29, 36–38]. In this task, participants had to estimate the perceived risk across a series of naturalistic driving situations presented from the driver's perspective. Each trial began with a fixation point displayed for 750 ms, followed by an image of a driving scenario. Participants then had up to 2,000 ms to decide whether the situation was risky or not, pressing either the left or right mouse button (button-response assignments were counterbalanced across participants). Immediately afterward, they rated the level of perceived risk on a 7-point Likert scale (0 = no risk, 6 = very high risk), which remained on screen until a value was selected with the mouse. Once a response

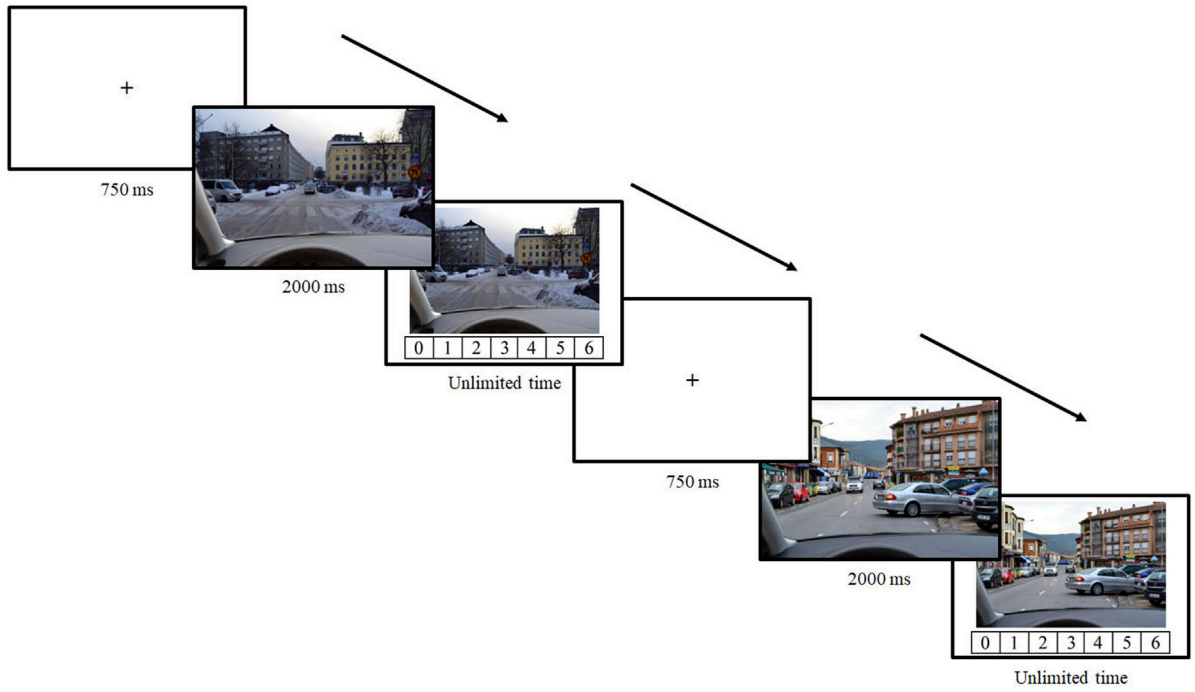


FIGURE 1
Schematic representation of the trial sequence (Spain, 2026).

was entered, the next trial began with the same sequence. The whole task consisted of 72 trials (72 distinct driving images), presented in randomized order for each participant. An example of the task procedure is illustrated in Figure 1.

The 72 driving images were selected from an extensive and detailed database of traffic scenes captured on roads in South and North Europe (see Megías et al. [29], for details). This database meets a set of criteria evaluated by 40 certified driving school instructors, ensuring low variability across individuals in interpreting traffic scenarios, such as vehicle speed perception or the behavioral responses required to avoid potential hazards. In addition to the instructors' evaluations, the perceived risk level of each image was rated by 40 licensed drivers on a 8-point Likert scale (0 = no risk, 7 = high risk). This database has proven to be an effective tool for investigating driving behavior [37, 39–41] as well as the specific neural and electrophysiological mechanisms associated with it [29, 36, 38, 42].

The set of images selected for this study comprised 24 very low- or no-risk images (average risk score = 1.87; hereafter referred to as low-risk), 24 medium-risk images (average risk score = 3.45), and 24 high-risk images (average risk score = 5.08). The categorization was further confirmed by the ratings provided by participants during the pre-intervention phase, with mean scores of 0.64 (SD = 0.55) for low-risk images, 2.27 (SD = 0.70) for medium-risk images, and 3.84 (SD = 0.81) for high-risk images. Examples of driving images from each risk category are provided in the Supplementary Material (Supplementary Figure S1).

The behavioral task and image presentation were developed and administered using E-Prime software [43].

Videos

Two categories of videos were used. The experimental group viewed videos with negative emotional content depicting risky behaviors that resulted in traffic accidents, while the control group viewed neutral videos unrelated to driving.

The negative videos were obtained from official road safety campaigns produced by the Spanish Directorate-General for Traffic [44] and from additional sources providing similar content. A larger pool of video clips depicting traffic accidents was compiled from these sources, and the clips included in the study were selected based on a prior evaluation with undergraduate students. This evaluation assessed valence, arousal, and the discrete emotion elicited by each clip to ensure the selected clips were predominantly associated with fear.

Participants in the experimental group viewed two different video sequences, each consisting of six short clips depicting traffic accidents. The first sequence lasted 50 s and the second lasted 68 s. The emotionally neutral videos depicted urban architectural scale models filmed from various perspectives and angles. Two sequences were also shown to the control group, lasting 50 and 54 s, respectively.

Each video was rated for valence and arousal by the participants after completion of the experimental task (see the Procedure section for details of the scales). As expected, the traffic accident videos elicited a negative valence (M = 4.25, SD = 0.63) and moderately high arousal levels (M = 2.35, SD = 1.20). In contrast, the emotionally neutral videos elicited valence scores close to neutral (M = 2.97, SD = 0.57) and low arousal levels (M = 4.11, SD = 0.91), confirming their suitability for the study.

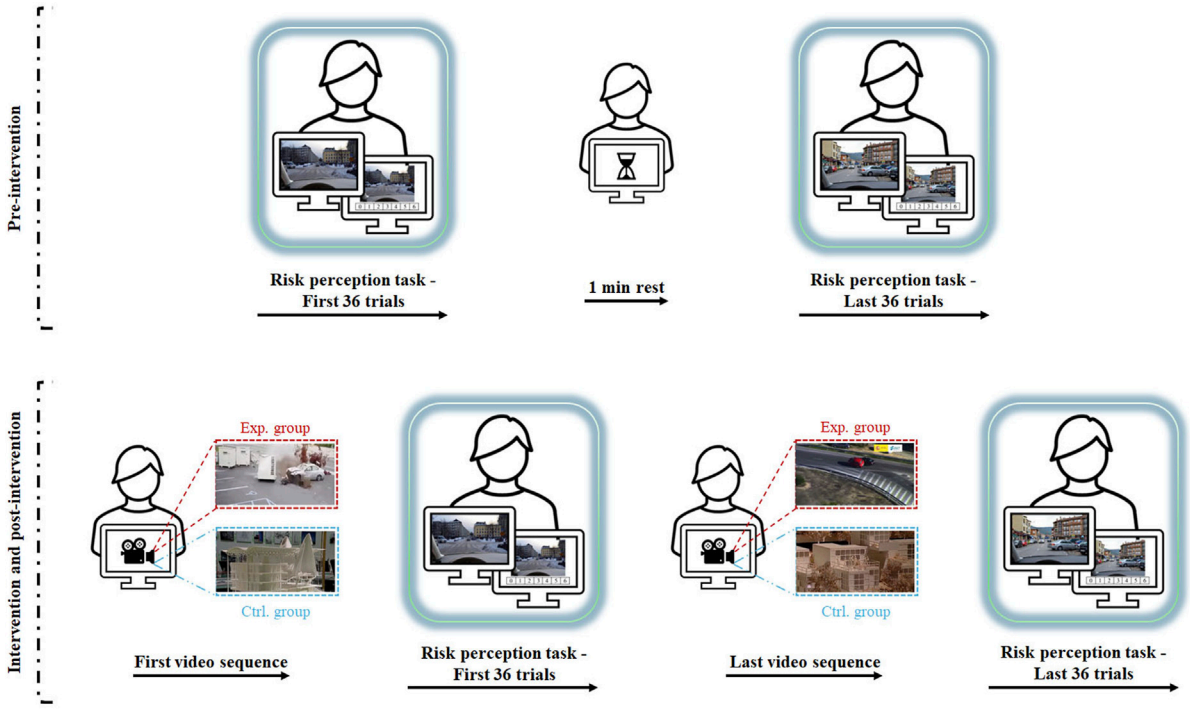


FIGURE 2
Schematic representation of the experimental task procedure. During the pre-intervention phase, participants completed the risk perception task, with a 1-min rest period at the midpoint. This was followed by the intervention, which consisted of presenting a video sequence containing either neutral or negative emotional content, depending on the group (experimental or control). In the post-intervention phase, participants repeated the risk perception task. During this phase, after 36 trials, a video sequence was presented again to reinforce the manipulation (Spain, 2026).

Procedure

Participants were randomly assigned to either the control or experimental group. All participants completed the risk perception task, which involved assessing the level of risk in a series of 72 driving scenarios (see the Instruments section for detailed information about the task and the driving images). The task was presented twice: once before the video presentation (pre-intervention), and once afterward (post-intervention). Participants in the experimental group viewed videos with negative emotional content related to traffic accidents, whereas those in the control group viewed videos with emotionally neutral content. During both the pre- and post-intervention phases, the risk perception task was interrupted at the midpoint (trial 36). In the post-intervention phase, after trial 36, participants viewed either traffic accident or neutral videos again (depending on the group) to reinforce the experimental manipulation. To maintain consistency between phases, a rest screen of equivalent duration to the videos was displayed at the midpoint of the pre-intervention phase. A visual summary of the experimental procedure is shown in Figure 2.

After completing the experimental task, participants were asked to rate the emotional valence and arousal elicited by each video sequence on a 5-point Likert scale (1 = positive valence, 5 = negative valence; 1 = high arousal, 5 = low arousal). These ratings served as a manipulation check for the emotional induction. Finally, all participants provided sociodemographic information, including age, gender, duration of driving license (in months), and annual car mileage. Annual mileage was reported using a 12-category scale: 1 = "Nothing," 2 = "Less than 1,000 km," 3 = "1,000–3,000 km," 4 = "3,000–6,000 km," 5 = "6,000–9,000 km," 6 = "9,000–12,000 km," 7 = "12,000–15,000 km," 8 = "15,000–18,000 km," 9 = "18,000–21,000 km," 10 = "21,000–30,000 km," 11 = "30,000–40,000 km," and 12 = "More than 40,000 km" [45].

Data analysis

Descriptive statistics (including means and standard deviations) were first computed to summarize the study variables. To address the research aim, two mixed factorial ANOVAs were conducted: one for the dichotomous responses (risk vs. no risk) and another for the rating responses (perceived risk on a 7-point ordinal scale). In both analyses, Group (experimental vs. control) was treated as a between-subjects factor, and Time (pre-intervention vs. post-intervention) and Risk level (low, medium, and high) as within-subjects factors. Additionally, Signal Detection Theory analyses for the dichotomous responses were performed to compute the criterion (c) and sensitivity index (d') [46]. For these analyses, the low/no-risk situations were treated as 'no risk' (signal absent) and the high-risk situations as 'risk present' (signal present). Although this may entail certain limitations, the medium-risk situations were excluded because their ambiguity prevents them from being clearly classified as signal present or absent, as required by Signal Detection Theory. Separate mixed factorial ANOVAs were conducted on the criterion (c) and the sensitivity index (d′), with Group (experimental vs. control) as a between-subjects factor and

TABLE 1 Mean values and standard deviations (in parentheses) for dichotomous and rating responses across groups, intervention phases, and risk levels (Spain, 2026).

	Dichotomous responses						Rating responses					
	Low risk		Medium risk		High risk		Low risk		Medium risk		High risk	
Group	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Experimental group	0.09 (0.09)	0.16 (0.23)	0.57 (0.15)	0.68 (0.18)	0.89 (0.08)	0.94 (0.09)	0.80 (0.59)	1 (0.61)	2.43 (0.66)	2.74 (0.73)	3.82 (0.83)	4.04 (0.92)
Control group	0.05 (0.05)	0.04 (0.06)	0.51 (0.13)	0.57 (0.19)	0.89 (0.09)	0.90 (0.09)	0.50 (0.48)	0.42 (0.50)	2.13 (0.72)	2.19 (0.84)	3.87 (0.80)	3.91 (0.88)

Time (pre-vs. post-intervention) as a within-subjects factor. Before conducting the ANOVAs, preliminary independent-samples t-tests were performed to examine potential gender differences. No significant differences were found for any of the dependent variables (all $p > 0.05$). Based on these results, gender was not included as a covariate in the analyses.

All analyses were conducted using SPSS (Version 22; IBM Corp.) and JASP (Version 0.19.3; JASP Team). The significance level was set at $p < 0.05$. Pairwise comparisons were Bonferroni-corrected.

Results

Descriptive statistics for both the dichotomous and rating responses are presented in Table 1.

Dichotomous responses

The mixed factorial ANOVA revealed significant main effects of Group ($F(1, 49) = 6.13$, $p = 0.02$, $\eta^2_p = 0.11$), Time ($F(1, 49) = 14.20$, $p < 0.001$, $\eta^2_p = 0.23$), and Risk ($F(2, 98) = 969.26$, $p < 0.001$, $\eta^2_p = 0.95$). Significant interactions were also found for Time × Group ($F(1, 49) = 4.87$, $p = 0.03$, $\eta^2_p = 0.09$) and Time × Risk ($F(2, 98) = 4.89$, $p = 0.01$, $\eta^2_p = 0.09$). No other main effects or interactions were significant. Focusing on the Time × Group interaction (see Figure 3), follow-up planned comparisons with Bonferroni correction revealed that the experimental group rated significantly more situations as risky than the control group at post-intervention ($M = 0.59$ vs. $M = 0.50$; $t(49) = 2.67$, $p = 0.01$, $d = 0.66$), whereas no significant differences were observed between groups at pre-intervention ($p > 0.05$). Within-group comparisons indicated that the experimental group was significantly more likely to classify situations as risky at post-intervention than at pre-intervention ($M = 0.59$ vs. $M = 0.52$; $t(49) = 4.11$, $p < 0.001$, $d = 0.56$). No significant change was observed across intervention phases in the control group ($p > 0.05$).

The follow-up analysis of the Time × Risk interaction revealed that all three risk categories behaved as expected, with significant differences between each risk level in both the pre-intervention and post-intervention phases (all $p < 0.05$; see Table 1 for means). Risk levels increased systematically across conditions, with the low-risk condition showing the lowest levels, the medium-risk condition intermediate levels, and the high-risk condition the highest levels.

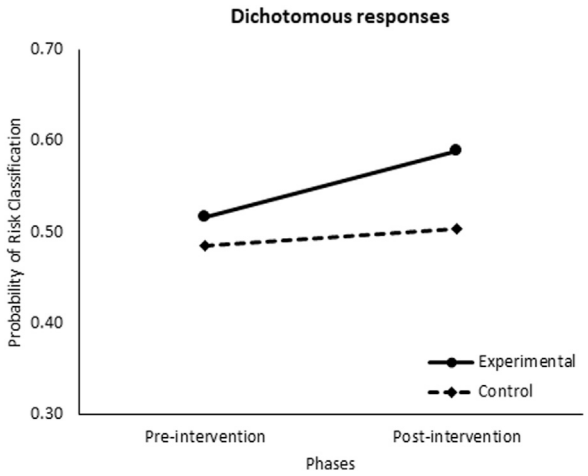


FIGURE 3
Mean dichotomous responses across pre- and post-intervention phases for the experimental and control groups. Values represent the average probability of classifying situations as risky (range = 0–1), with higher values indicating a greater probability (Spain, 2026).

For the medium-risk level, values were significantly higher in the post-intervention phase compared to the pre-intervention phase ($p < 0.05$).

With respect to the Signal Detection Theory analyses, the ANOVA conducted for criterion (*c*) revealed a significant main effect of Group ($F(1, 49) = 6.80$, $p = 0.01$, $\eta^2_p = 0.12$), Time ($F(1, 49) = 10.72$, $p < 0.05$, $\eta^2_p = 0.18$), and the Time × Group interaction ($F(1, 49) = 8.46$, $p = 0.01$, $\eta^2_p = 0.15$). Follow-up analyses of the Time × Group interaction (see Figure 4, Panel A) showed that, in the post-intervention phase, the experimental group had lower criterion scores than the control group ($M = -0.17$ vs. $M = 0.19$; $t(49) = -3.21$, $p < 0.01$, $d = 1.05$). However, no significant group differences were observed in the pre-intervention phase ($p > 0.05$). Likewise, the experimental group showed a significant decrease in criterion scores from pre-to post-intervention ($M = 0.15$ vs. $M = -0.17$; $t(49) = 4.25$, $p < 0.001$, $d = 0.93$), but no significant change between phases was observed in the control group ($p > 0.05$). These results suggest that the fear-based video intervention produced a response bias toward more cautious responses. The ANOVA conducted on the sensitivity index (d') revealed no significant effects (all $p > 0.05$; Figure 4, panel B).

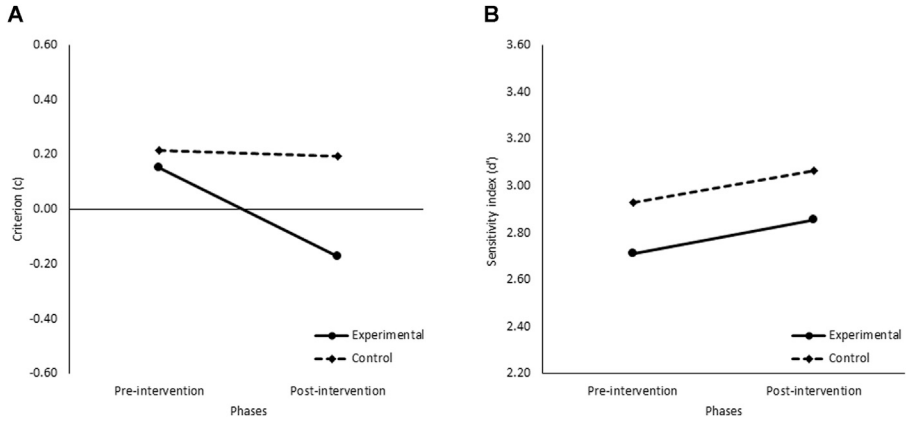


FIGURE 4
Means for the signal detection theory indices. **(A)** presents criterion (c) and **(B)** presents sensitivity index (d') across pre- and post-intervention phases for the experimental and control groups (Spain, 2026).

Rating responses

The mixed factorial ANOVA revealed significant main effects of Time ($F(1, 49) = 10.22$, $p < 0.01$, $\eta^2_p = 0.17$) and Risk, $F(2, 98) = 651.62$, $p < 0.001$, $\eta^2_p = 0.93$), as well as a significant Time × Group interaction ($F(1, 49) = 9.00$, $p < 0.01$, $\eta^2_p = 0.16$). No other effects were significant. Follow-up analyses of the Time × Group interaction using Bonferroni correction (see Figure 5) indicated that the experimental group rated situations as significantly more risky than the control group at post-intervention ($M = 2.59$ vs. $M = 2.17$; $t(49) = 2.31$, $p = 0.02$, $d = 0.57$), whereas no significant differences were found at pre-intervention ($p > 0.05$). The experimental group significantly increased their ratings from pre- to post-intervention ($M = 2.35$ vs. $M = 2.59$; $t(49) = 4.26$, $p < 0.001$, $d = 0.33$), whereas no significant change was observed in the control group ($p > 0.05$).

Regarding the main effect of Risk, as expected, significant differences were observed among the three risk levels, with ratings increasing progressively from low-to medium-to high-risk conditions (all $p < 0.05$, see Table 1 for means).

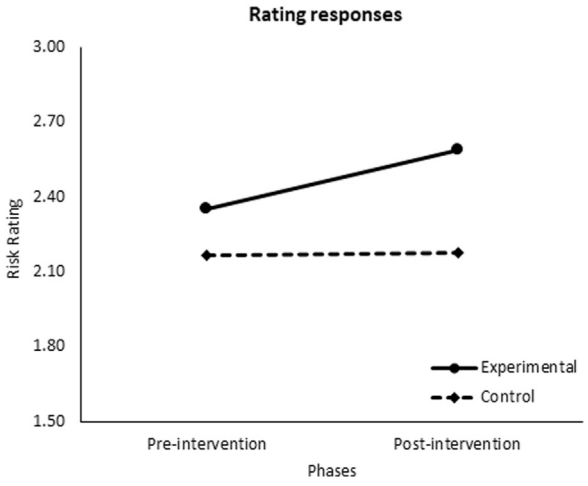


FIGURE 5
Mean risk rating responses across pre- and post-intervention phases for the experimental and control groups. Original risk perception ratings ranged from 0 to 6, with higher values indicating greater perceived risk (Spain, 2026).

Discussion

The aim of this research was to experimentally examine whether exposure to emotionally negative content — specifically, videos depicting risky driving behaviors and traffic accidents — enhances drivers' perception of risk in traffic scenarios. Although road safety prevention campaigns often rely on these fear-based approaches, their effectiveness remains a subject of debate [3, 4, 10, 14], and relatively few studies have rigorously evaluated their impact using experimental designs [9, 11, 12]. Using a behavioral task featuring naturalistic driving scenarios captured in real-world contexts, we assessed changes in perceived risk before and after a fear appeal intervention and compared these outcomes with those of a control group exposed to emotionally neutral content.

Our results showed that participants in the experimental group exhibited a significant increase in perceived risk following the intervention, whereas the control group showed no significant changes between the pre- and post-intervention phases. This effect emerged both when risk perception was assessed as a dichotomous response (deciding whether the situation was risky or not) and when measured by a rating response (perceived risk on a 7-point rating scale). Thus, changes in perceived risk levels were substantial enough to influence participants' probability of categorizing situations as risky. Furthermore, Signal Detection Theory analyses indicated that these changes were driven by a more cautious response tendency (criterion), with no accompanying changes in sensitivity (d′). This suggests that the intervention primarily shifted decision thresholds toward greater

risk perception, rather than enhancing participants' ability to discriminate risk cues.

Overall, these findings provide empirical evidence that fear-based content can modify drivers' risk perception in a laboratory setting. A key strength of the present study lies in its experimental design, which adds methodological rigor in a field where such approaches remain scarce. Moreover, perceived risk was evaluated through a behavioral task featuring naturalistic driving scenarios that, although presented as static images, may provide a more contextually relevant assessment than traditional self-report questionnaires, potentially enhancing ecological validity and reducing some forms of self-report bias.

The outcomes observed in this study align with the body of literature on driving that suggests the use of fear-based appeals can increase risk awareness and promote safer driving behaviors [10, 16, 17, 47]. This is consistent with fear appeal theories in public health research, which posit that the fear elicited by the presentation of a threat, when it is significant and personally relevant, motivates individuals to modify their behavior and follow recommendations perceived as feasible to deter the threat [7, 8]. Nevertheless, whereas most existing research has primarily examined behavioral responses, our study focused exclusively on risk perception. Risk perception is a central determinant in the decision to take risks [22, 24], and isolating this factor thus allows us to better understand the process through which fear-based messages influence behavior in risk-related contexts. Consequently, modifying the levels of perceived risk may represent a promising strategy for achieving the desired behavioral changes.

When extending these findings on risk perception to actual driving behavior, it is important to recognize that although perceived risk is strongly associated with decision-making, the final behavior also depends on additional factors such as risk propensity, impulsivity, feelings of invulnerability, emotions, and social influence [26, 30–32, 34, 48]. The role of these factors may help explain some of the mixed findings reported in the literature regarding the effectiveness of fear appeals in reducing risky behaviors.

Another factor contributing to the lack of consensus in the literature is the considerable variability in the design and content of fear appeal campaigns, which should also be considered when interpreting the implications of our findings. As noted above, a substantial amount of research supports the notion that fear appeals are an effective tool in reducing risky behaviors, but only when specific conditions are met [3, 11, 14]. Key considerations include the relevance of the message to the target audience—who must perceive it as personally significant and feel vulnerable to the risk—and the inclusion of coping strategies that enable drivers to respond effectively to the threat (perceived efficacy). If drivers do not perceive the message as personally relevant or fail to feel vulnerable to the depicted risks, they may disregard or deny its content. Conversely, if the message captures attention but drivers believe they lack the effective coping responses to protect themselves from the threat, this may result in defensive and maladaptive behaviors. In this regard, Lewis et al. [3] and Delhomme et al. [11] emphasize the importance of pre-testing the relevance of message components for the target audience to ensure that they elicit high levels of perceived vulnerability and efficacy. Ideally, such evaluations should be conducted using experimental designs before large-scale implementation.

From a practical perspective, a better understanding of how fear appeals shape risk perception can inform strategies to change risk-taking behavior. Specifically, the present findings suggest that emotionally negative road safety messages can influence drivers' tendency to classify traffic situations as risky, primarily by shifting their decision criterion rather than by improving their ability to discriminate between risky and non-risky situations. This distinction may be relevant for the design and evaluation of road safety campaigns, because it indicates that the effectiveness of emotionally negative content depends, in part, on its capacity to promote more cautious risk judgments. However, such messages should be carefully pretested with the target audience and combined with clear and feasible coping recommendations.

Beyond its contributions, the present research has certain limitations. First, the sample consisted primarily of young university students and was predominantly female, which may limit the generalizability of the findings. Although young drivers are of particular interest due to their overrepresentation in traffic accident statistics, more demographically diverse samples could provide greater insight. Regarding gender, the analyses showed no significant gender differences for any of the dependent variables; however, previous research has reported gender-related differences in responses to road safety messages and behaviors related to risky driving [15, 49]. Given these previous findings and the relatively small number of male participants, the possibility that gender may play a role in this context cannot be ruled out. Moreover, it would be interesting to consider individual differences within the sample (e.g., risk propensity, impulsivity, sensitivity to reward, and emotional regulation abilities), as they may moderate risk-taking tendencies and responsiveness to fear-based interventions [27, 29–33]. Second, although the traffic-accident videos had been selected based on a previous validation showing that they predominantly elicited fear, the manipulation check in the present sample focused only on valence and arousal. The observed values on these dimensions are consistent with fear; however, in the absence of a direct measure of this discrete emotion, the conclusion that the videos elicited fear should be drawn with caution. Third, while the study demonstrated changes in risk perception, it did not assess whether these changes persist over time or translate into actual behavior modification. Future research should incorporate follow-up assessments and real-world behavioral metrics, including data from driving simulators or vehicle telematics. Finally, the effectiveness of fear-based campaigns should be considered within a broader prevention framework that also includes road safety education programs, legislative changes, penalty point systems, positive reinforcement, normative feedback, and interactive training tools.

In conclusion, this study provides experimental evidence from a controlled laboratory setting that fear-based audiovisual content can increase perceived risk in traffic-related contexts. This effect was primarily driven by a modification in the decision threshold, characterized by a response bias toward more cautious responses. These findings advance our understanding of how fear appeals influence driving behavior, although further research is needed to clarify the connection between changes in risk perception and actual behavioral modifications. Such efforts may help resolve existing inconsistencies in the literature and inform ongoing debates

surrounding the effectiveness of fear appeals. At a practical level, this line of research can guide public health authorities and traffic safety agencies in designing more effective road safety campaigns.

Ethics statement

The studies involving humans were approved by University of Málaga (approval number: 14–2019-H). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MR-M: Conceptualization, Data curation, Methodology, Formal analysis, Writing – original draft. AM-R: Conceptualization, Resources, Methodology, Formal analysis, Writing – original draft, Writing – review and editing.

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Conflict of interest

The authors declare that they do not have any conflicts of interest.

Generative AI statement

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.ssph-journal.org/articles/10.3389/ijph.2026.1609207/full#supplementary-material

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