

Falling From a Height

Evaluation Report

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About this report

This report provides an evaluation of two versions of the Falling from a Height banner developed by Co-Pilot. The banners were designed to improve public understanding of the relationship between vehicle speed and impact on a pedestrian in a collision. The efficacy of the banners in promoting knowledge, road safety attitudes and behaviour change was compared with a control display issued by the Department for Transport (DfT) to communicate typical vehicle stopping distances.

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Disclaimer

The research and report were produced by Dr Jonathan Rolison, a behavioural science consultant at Insight and Impact Ltd. The author accepts full responsibility for the report, including any errors or omissions.

About the author

Dr Jonathan Rolison is a behavioural scientist at Insight and Impact Ltd. With nearly 20 years of experience applying psychological science to real-world challenges, he works with organisations to identify what drives, and what prevents, safer behaviour, and to design evidence-based strategies that lead to meaningful, measurable change.

He has held a variety of academic positions, including Reader (Associate Professor) in Psychology at the University of Essex, where he continues as a Research Associate. His research expertise centres on how people perceive, evaluate, and respond to risk. He provides specialist guidance on measuring and interpreting road users' awareness, attitudes, and beliefs about risk (including drink driving, speeding, and other high-risk behaviours), and on developing effective interventions to promote safer attitudes and behaviour.

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Executive summary

The aim of the research was to evaluate whether brief exposure to a “falling height = impact speed” banner improves understanding of the nonlinear relationship between vehicle speed and impact severity and strengthens negative attitudes towards speeding as well as intentions to comply with speed limits. Two versions of the banner were tested: a yellow banner depicting the nonlinear relationship between speed and impact and a blue banner that provided a more detailed depiction of this relationship and differed in colour.

The control display, issued by the Department for Transport (DfT) to communicate typical vehicle stopping distances, did not improve understanding of the nonlinear relationship between vehicle speed and impact severity. In contrast, exposure to the yellow banner resulted in larger pre–post gains in comprehension compared to the control display. The blue banner did not show a significant improvement relative to the control display.

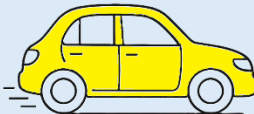
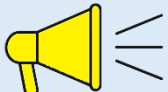
All three displays were effective in promoting more negative attitudes towards exceeding the speed limit. The attitude change across all three banners reflected a large intervention effect. The yellow and blue banners were equally effective as the DfT control display in changing attitudes. Similarly, all three displays were highly effective in reducing behavioural intentions to speed. This behaviour change across all three banners reflected a very large intervention effect. Both the yellow and blue banners were as effective as the control display in reducing self-reported likelihood of exceeding the speed limit. The yellow banner also matched the control display in reducing willingness to speed, both reflecting a very large intervention effect. By contrast, the blue banner showed a smaller post-intervention reduction in willingness to exceed the speed limit relative to the control condition. The intervention effect for the blue banner represented a medium-sized effect.

Across all conditions, exposure to the displays worsened mood, as evidenced by reductions in positive emotion and increases in negative emotion. Notably, the yellow banner elicited a larger increase in negative emotion than the control display, whereas the blue banner did not. This suggests that the yellow banner evoked a stronger emotional response, consistent with its greater salience and engagement.

Participants consistently rated the yellow banner more positively than the control display across multiple dimensions of message clarity, including ease of understanding, visual support, and the effort required to understand the message. These favourable evaluations were not observed for the blue banner, which was rated similarly to the control display. Participants perceived the yellow banner as more attention grabbing, relevant to them as a driver, convincing, credible, and persuasive, while no comparable advantage was evident for the blue banner. With respect to

acceptability and ethical considerations, participants judged the yellow banner to be the most appropriate for public display. Although both banners were perceived as potentially upsetting or distressing to some individuals, participants considered the yellow banner to strike the best balance between impact and sensitivity.

Overall, the findings support the yellow banner as an effective intervention that improves understanding of the nonlinear speed–impact relationship. It was rated as most appropriate overall, while acknowledging potential distress for some viewers.

Knowledge	Attitudes and behaviour	Emotional experience	Message clarity and cognitive response	Acceptable/ethical concerns
The yellow banner improved speed-impact knowledge  There was no knowledge gain for the blue banner	Both banners led to more negative attitudes towards speeding  Both banners reduced self-reported likelihood and willingness to exceed the speed limit  ...although the blue banner showed a smaller effect on willingness	Both banners worsened mood: decreasing/increasing positive/negative emotion  The yellow banner elicited larger increases in negative emotion	The yellow banner was rated most positively in terms of message clarity (e.g., ease of understanding, visual support)  And was rated as most attention grabbing, relevant, convincing, credible, and persuasive. 	the yellow banner was judged as most appropriate for public display, striking the best balance between impact and sensitivity 

Aim

The research aim was to evaluate whether brief exposure to a “falling height = impact speed” banner improves understanding of the nonlinear relationship between speed and impact severity, elicits constructive emotional reflection without undue distress or message rejection, and strengthens negative attitudes towards speeding and intentions to comply with speed limits. The nonlinear speed-impact relationship refers to the fact that the physical impact of a vehicle in a collision increases disproportionately faster than speed itself. Consequently, small increases in speed at higher speeds produce much larger increases in impact severity. Two versions of the banner were tested: A yellow banner that depicted the nonlinear speed-impact relationship and a blue banner that provided a more detailed depiction of the nonlinear relationship and differed in colour.

Objectives

The research tests whether exposure to the banner:

1. Improves knowledge of the nonlinear relationship between speed and impact.
2. Elicits an emotional and reflective response that is constructive and does not cause undue distress or message rejection.
3. Strengthens negative attitudes towards speeding, rather than promoting defensive or dismissive responses.
4. Leads to behavioural intentions to reduce speeding.

Intervention

Excessive and inappropriate speed is a major contributor to road traffic deaths and serious injuries. The relationship between vehicle speed and impact on a pedestrian in a collision is nonlinear: small increases in speed result in disproportionately large increases in the force of impact and the likelihood of fatal or serious injury. For example, the force of impact on a pedestrian increases steeply between 20 mph and 35 mph. The present project was developed to test a novel communication approach that visually and intuitively conveys the nonlinear relationship between speed and impact severity.

The intervention consists of large, life-size outdoor banners that present an analogy between vehicle impact speed and falling from height. The banners show that being struck by a vehicle at different speeds corresponds to falling from progressively greater heights, illustrating how relatively small increases in speed can result in substantially more severe impacts. This analogy is intended to make the consequences of speeding more tangible and emotionally salient, and to prompt drivers to reflect on their own speed choices. By framing speed in terms of physical harm rather than legal

compliance, the intervention aims to influence drivers' cognitive evaluations of speeding (e.g., perceived risk and severity), emotional responses, and behavioural intentions.

Two banner designs, a yellow version and a blue version, were developed, inspired by an effective campaign used in New Zealand. Both designs communicate the same core information, but differ in their visual presentation, colour scheme, and emphasis, in order to test which design is more effective at capturing attention, conveying the message clearly, and influencing attitudes and behavioural intentions.

Testing both designs allows the project to evaluate whether differences in visual framing influence message effectiveness, even when the underlying informational content is the same. This is important because small differences in design, such as colour, layout, and visual emphasis, can substantially affect attention, comprehension, emotional engagement, and behavioural impact. By experimentally comparing the yellow and blue versions against a control condition, the project aims to identify which design is most effective at improving understanding of the relationship between speed and impact, shifting attitudes towards speeding, and strengthening intentions to comply with speed limits.

Intervention: Logic Model
Inputs: Provide brief exposure to a “falling height = impact speed” banner to drivers in an online setting.
Activities: Delivery of a clear, analogy-based message illustrating the nonlinear relationship between speed and impact severity.
Short-term impacts: Improved understanding of how small increases in speed lead to disproportionately greater impact severity, alongside constructive emotional and reflective responses without undue distress or message rejection, and strengthened negative attitudes towards speeding.
Behavioural impacts: Stronger intentions to comply with speed limits and to reduce speeding behaviour in relevant driving contexts.
Health outcomes: Contribute to reductions in impact speeds and collision severity, helping to reduce the risk of serious injury and fatality among road users.

Methods

Participants

Two hundred and twelve UK residents were recruited through Prolific Academic and compensated £1.05 for participation (equivalent to an hourly rate of £9). Sample size was determined using a simulation-based power analysis. This involved simulating hypothetical datasets under varying sample sizes, assuming known “true” effect sizes, and repeatedly fitting the planned Bayesian models. Assumptions were made regarding baseline levels of attitudes and intentions, variability between participants and items, and plausible treatment effects. Under a true effect size of approximately $d = 0.35$, the simulations indicated that a sample size of 70 participants per condition would yield at least 83% probability of detecting that one of the banner conditions produced greater change than the control display.

Eligibility criteria were designed to ensure data quality and included a Prolific approval rate of at least 95%, completion of at least 20 prior studies, possession of a full driving licence, and English as a primary language. Participants completed the study in a median time of 8 minutes and 4 seconds. Two participants were excluded for completing the study in under 4 minutes. A 4-minute cutoff was used as it was determined that the study could not be completed diligently in less time. The final sample consisted of 210 participants (equal numbers of men and women) aged between 20 and 78 years ($M = 47.72$, $SD = 12.43$). Educational attainment and employment status were diverse and are shown in Table 1. All procedures complied with GDPR and data protection requirements. Participants provided informed consent and were debriefed (including a brief statement of the study purpose and researcher contact details) at the conclusion of the study.

Chi-square tests did not indicate any significant differences between conditions in their composition of participant gender ($p = .612$), educational attainment ($p = .345$), and employment status ($p = .347$).

Table 1: *Sample demographics*

	Control (<i>N</i> = 73)	Yellow banner (<i>N</i> = 68)	Blue banner (<i>N</i> = 69)
Mean age (SD)	49.58 (12.41)	46.16 (12.45)	47.26 (12.37)
Gender (% female)	34 (47%)	37 (54%)	33 (49%)
Educational attainment			
High school	14 (20%)	13 (20%)	8 (12%)
College	7 (10%)	15 (23%)	13 (19%)
University degree	39 (56%)	28 (42%)	36 (52%)
Post-graduate degree	10 (14%)	10 (15%)	12 (17%)
Employment status			
Employed full-time	33 (49%)	37 (57%)	40 (58%)
Employed part-time	6 (9%)	13 (20%)	6 (9%)
Self-employed	11 (16%)	9 (14%)	10 (14%)
Unemployed	4 (6%)	2 (3%)	2 (3%)
Homemaker	3 (4%)	0 (0%)	2 (3%)
Retired	10 (15%)	4 (6%)	9 (13%)
Student	1 (1%)	0 (0%)	0 (0%)

Design

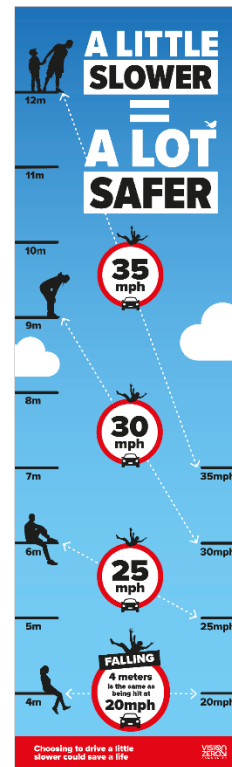
Participants were randomly assigned to one of three conditions: the DfT control display (*n* = 73), the yellow banner (*n* = 68), or the blue banner (*n* = 69). The DfT display was chosen as a typical public road safety message with proven effectiveness. The DfT display is designed to inform viewers about the relationship between vehicle speed and stopping distance, rather than the relationship between vehicle speed and impact, as communicated by the banners. As such, the DfT display provides a control for assessing the effectiveness of the banners in promoting knowledge gain specific to the speed-impact relationship.

Demographic characteristics were balanced across conditions by random sampling (see Table 1). To ensure an approximately equal gender distribution, male and female individuals were sampled equally using the Prolific Academic quota tool. The blue banner included additional illustrative detail compared to the yellow version. All materials are shown in Appendix A.

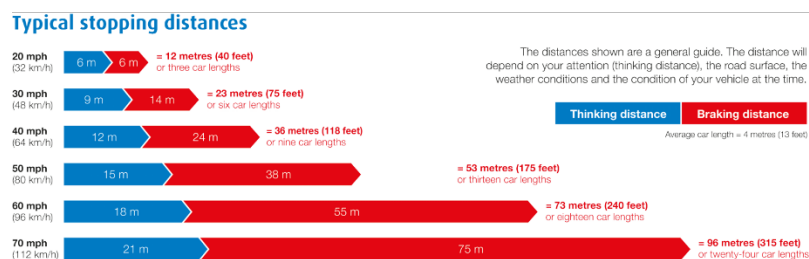
Yellow Banner



Blue Banner



Control (DfT) Display



Materials and procedure

Participants first completed a set of baseline measures to assess their driver behaviour, comprehension of the speed-impact relationship, attitudes and behaviour, and current emotional experience.

Baseline measures

Driver behaviour: Participants first reported how frequently they had driven during the past three months, the situations in which they exceeded the speed limit, and how often they kept within the speed limit while driving in built-up areas during this period.

Comprehension: Participants completed five comprehension items designed to assess their understanding of the non-linear relationship between vehicle speed and impact severity for a pedestrian involved in a collision. Responses were scored as correct (1) or incorrect (0).

Attitudes: Attitudes towards exceeding the speed limit while driving in built-up areas were assessed using four items adapted from Rowe et al. (2016). Participants rated the extent to which exceeding the speed limit was perceived as: (a) unpleasant–pleasant; (b) harmful–beneficial; (c) negative–positive; and (d) foolish–wise.

Behavioural intentions: Behavioural intentions were measured using two items. First, participants were asked how likely they would be to exceed the speed limit in a built-up area (adapted from Rowe et al., 2016). Second, participants were asked how willing they would be to drive over the speed limit in a built-up area (also adapted from Rowe et al., 2016).

Emotional experience: Emotional experience was measured using the Brief Emotional Experience Scale (BEES; Rogers et al., 2025). Participants indicated the extent to which they felt, at that moment, three positive emotions (happy, calm, confident) and three negative emotions (worried, sad, afraid).

All survey items are provided in Appendix B.

Post-intervention measures

Post-intervention, participants' comprehension of the speed-impact relationship was assessed for a second time. They were asked to provide judgements of message clarity, cognitive response, and acceptability/ethical concerns related to the display. Participants also reported their current emotional experience a second time.

Comprehension: Participants completed the same five items used to assess comprehension at baseline.

Message clarity: Following exposure to the intervention, participants indicated their level of agreement or disagreement with five statements assessing message clarity: (1) the message was easy to understand at a glance; (2) the visuals helped me understand the message; (3) the amount of information felt about right; (4) the message felt too complex to understand at a glance; and (5) I had to spend a lot of effort working out what the message meant.

Cognitive response: Participants were then asked to indicate their agreement or disagreement with five statements assessing their cognitive response to the intervention: (1) the message captured my attention and made me think; (2) the message felt relevant to me as a driver; (3) the message was convincing in showing why

higher speeds are more dangerous; (4) the message felt credible; and (5) the message was persuasive in encouraging me to take speed limits seriously.

Emotional experience: Participants completed the same BEES scale used to assess emotional experience at baseline.

Acceptable/ethical concerns: Participants also indicated their agreement or disagreement with five statements assessing the acceptability of the message and related ethical concerns: (1) the message is appropriate for public display; (2) I think most people would find this message acceptable; (3) the message could upset or distress some people; (4) the message balances impact with sensitivity; and (5) I felt resistant to the message.

All survey items are provided in Appendix B.

Analytic approach

All analyses were conducted within a Bayesian modelling framework using mixed-effects regression models. This approach was selected in preference to traditional ANOVA or ANCOVA methods because it provides a more appropriate and flexible framework for analysing the types of data collected in this study, and yields results that are directly interpretable in terms of probabilities and uncertainty.

A key advantage of the Bayesian approach is that it models the full probability distribution of the parameters of interest, rather than relying on null-hypothesis significance testing. This allows direct estimation of the magnitude of intervention effects and the uncertainty around those effects, expressed as credible intervals and posterior probabilities. These quantities are more informative than dichotomous significant/non-significant conclusions, particularly in applied intervention research where the magnitude and practical relevance of an effect are of primary importance. The Bayesian framework also allows probabilistic statements about meaningful thresholds (e.g., the probability that an intervention improves comprehension by at least a given amount), which cannot be directly obtained from conventional ANOVA or ANCOVA methods.

A further advantage is the ability to flexibly model different types of outcome variables. Several outcome measures in this study violated the assumptions required for standard linear models. In particular, the comprehension measure consisted of binary responses (correct vs. incorrect) at the item level. Such data are inherently discrete and bounded, and therefore do not satisfy the assumptions of normally distributed residuals and constant variance required for ANOVA or ANCOVA. Instead, comprehension was analysed using a Bayesian logistic mixed-effects model, which is specifically designed for binary outcome data. This model estimates effects on the log-odds scale and

naturally constrains predicted probabilities to the valid range between 0 and 1, providing statistically valid and interpretable estimates of comprehension performance.

Importantly, the mixed-effects modelling framework allowed inclusion of random intercepts for both participants and items. The random participant effects account for individual differences in baseline knowledge, ensuring that intervention effects are not confounded by variation in prior understanding across participants. The random item effects account for differences in item difficulty, recognising that some comprehension items are inherently easier or harder than others. This is critical because ignoring item-level variability can lead to biased or overconfident estimates of intervention effects. Traditional ANOVA approaches typically analyse total scores (e.g., number of correct responses out of five) and treat all items as equally informative. This aggregation masks meaningful variation in item difficulty and discards information about individual responses, which can reduce statistical accuracy and lead to misleading conclusions. By modelling responses at the item level, the mixed-effects logistic approach provides more precise and valid estimates of intervention effects.

The Bayesian mixed-effects framework was also advantageous for the analysis of continuous rating outcomes (e.g., attitudes, behavioural intentions, emotional experience). These models allowed inclusion of participant-level random effects to account for repeated measurements and individual differences, as well as item-level effects where appropriate. In addition, censored regression models were used for outcomes with substantial clustering at the scale boundaries, allowing estimation of underlying latent responses while appropriately accounting for truncation introduced by the measurement scale. Such flexibility is not readily accommodated within conventional ANOVA or ANCOVA frameworks.

Existing scales were used to assess attitudes and emotional experience. The internal consistency reliability of these scales was assessed, with a minimum acceptable Cronbach's α of 0.70.

Results

This section provides a report of the findings pre- and post-intervention.

Driver behaviour

The sample primarily comprised frequent drivers. Half of participants (50%) reported driving multiple times per week, and over one third reported driving daily (37%). In contrast, relatively few participants reported driving less than weekly (9%), less than monthly (2%), or not at all during the past three months (2%).

Unintentional speeding was the most commonly reported context in which participants exceeded the speed limit during the previous three months. Over a third of participants

(36%) indicated that they had sped when transitioning from a higher-speed to a lower-speed road or similar circumstance. One fifth (20%) reported speeding due to distraction, such as losing track of their speed, and close to one fifth (18%) reported speeding because they were unfamiliar with the road or did not notice a speed sign. Taken together, these findings indicate that speeding was most often unintentional in nature. In contrast, intentional speeding was reported far less frequently and was attributed to running late (12%, e.g., for work), frustration or impatience (11%), thrill-seeking motives (2%, e.g., for excitement), or emergency situations (2%, e.g., an urgent medical situation).

Nearly half of the sample (47%) reported that they kept within the speed limit nearly all the time when driving in built-up areas during the past three months. For comparison, in a 2025 study using Automatic Traffic Counters (ATCs), 57% of drivers were reported to comply with 30 mph speed limits (DfT, 2025). No participants reported never complying with speed limits. The mean rating on this item was 6.09 ($SD = 1.07$) on a 7-point scale, indicating a generally high level of self-reported compliance with speed limits.

Comprehension

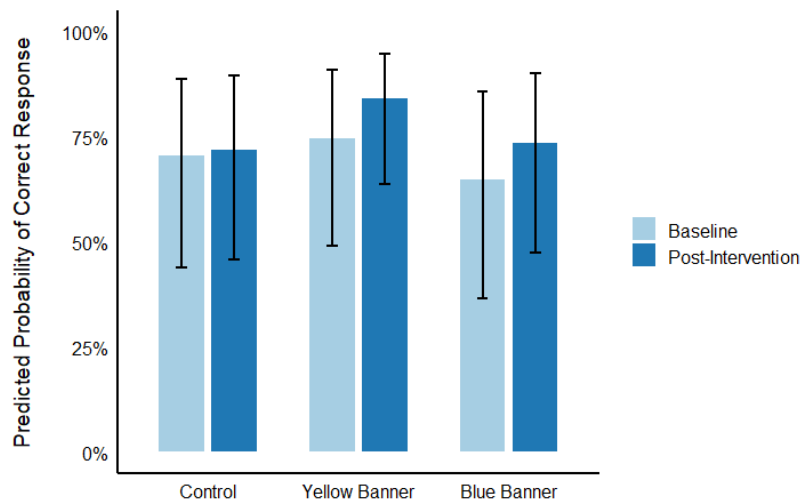
A mixed-effects Bayesian logistic regression was conducted on item-level comprehension accuracy, with responses coded as correct or incorrect. The model included random intercepts for participants to account for individual differences in prior knowledge, as well as random intercepts for items to capture variability in item difficulty. Fixed effects were specified for display condition (yellow banner vs. control; blue banner vs. control) and time (pre- vs. post-intervention). Participant age and sex were also included as covariates to control for individual differences. Age was controlled for because older participants may differ from younger participants in a number of important respects (e.g., prior driving experience, familiarity with road safety messaging). Sex was included because sex is also known to be associated with systematic differences in driving behaviour, risk perception, and responses to safety messaging. Interaction terms between display condition and time were included to assess whether changes in comprehension over time differed across displays.

In the control condition, there was no statistically significant change in comprehension from baseline to post-intervention ($b = 0.08$, 95% credible interval [CI]: -0.26 to 0.41). In contrast, the analysis revealed larger pre-post comprehension gains for the yellow banner compared with the control display ($b = 0.53$, 95% CI: 0.04 to 1.03). This effect corresponds to 1.70 times greater odds of providing a correct response for participants exposed to the yellow banner relative to those shown the control display (95% CI: 1.04 to 2.81).

Figure 1 presents the model-predicted comprehension gains for each condition. Posterior predictions indicated that the yellow banner increased comprehension by

approximately 7 percentage points more than the control display. However, the range of plausible values was wide, spanning from a slight decrease to an improvement of nearly 19 percentage points (95% CI: -1 to 19), reflecting substantial uncertainty in the magnitude of the true effect. There was no significant improvement in comprehension for the blue banner compared with the control display ($b = 0.37$, 95% CI: -0.09 to 0.85).

Figure 1: Comprehension: Speed-Impact Relationship



Attitudes

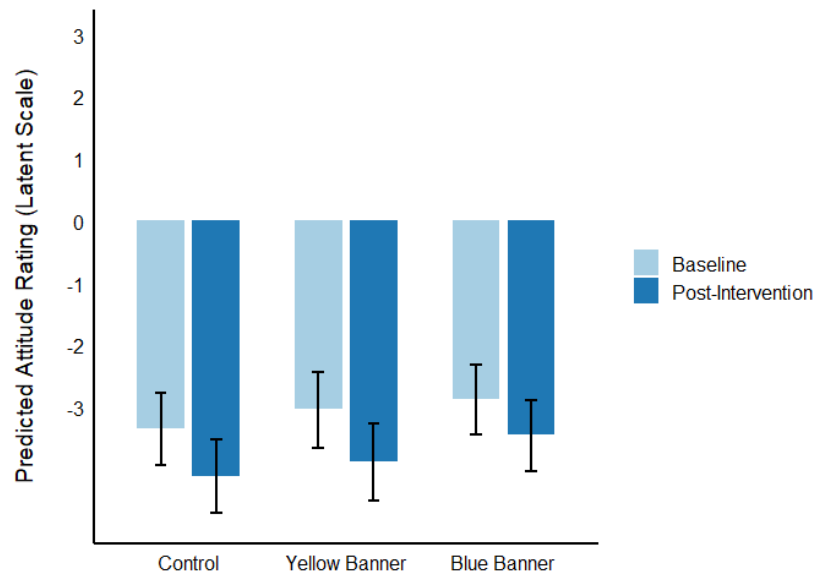
The attitude items demonstrated excellent internal consistency reliability (Cronbach's $\alpha = 0.90$). Responses, however, were heavily skewed towards the lower end of the scale, with a substantial proportion of ratings at the minimum scale value (e.g., “very harmful”; 501 of 840 total responses, 60%). To appropriately account for this truncation at the lower bound of the response scale, a censored Bayesian mixed-effects general linear model with a Gaussian link was fitted to the attitude ratings. This censored modelling approach assumes the existence of an underlying continuous latent attitude that could, in principle, extend below -3 (and above $+3$), but is constrained by the measurement instrument to observed values between -3 and $+3$.

The model included random intercepts for participants to account for individual differences in baseline attitudes, and fixed effects for display condition, time (pre- vs. post-intervention), and participant age and sex. Interaction terms between display condition and time were included to test whether changes in attitudes over time differed between displays.

Across all conditions, attitudes towards exceeding the speed limit became more negative from baseline to post-intervention, indicating an overall intervention effect. This overall change is illustrated in Figure 2. In the control condition, attitudes were estimated to be 0.76 points lower at post-intervention than at baseline (95% CI: -1.01 to

-0.53). This change reflects a large intervention effect, corresponding to a standardized mean change of $d = -0.83$ (95% CI: -1.08 to -0.57), as shown in Figure 2. In contrast, neither the yellow banner ($b = -0.07$, 95% CI: -0.41 to 0.25) nor the blue banner ($b = 0.19$, 95% CI: -0.13 to 0.50) exhibited a significantly different change in attitudes following the intervention relative to the control display.

Figure 2: Attitude Change



As all three interventions were associated with similar post-intervention attitude change, it is possible that these changes reflect non-intervention factors, such as demand characteristics (i.e., participants inferred the study goals of promoting safer attitudes and behaviour), rather than the unique content or design features of the displays. However, if the interventions themselves played a causal role in attitude change, then participants who engaged more deeply with a display would be expected to exhibit larger shifts in attitudes. The cognitive response items provide an appropriate index of engagement with, and commitment to, the display message, capturing the extent to which messages were perceived as thought-provoking, relevant, convincing, credible, and persuasive.

To test this possibility, a Bayesian mixed-effects linear model was fitted to mean post-intervention attitudes at the participant level. Fixed effects were included for mean pre-intervention attitudes, mean cognitive response, and participant age and sex. Crucially, an interaction term between pre-intervention attitudes and cognitive response was included to assess whether higher engagement predicted greater attitude change across conditions. This analysis revealed a significant interaction between pre-intervention attitudes and cognitive response ($b = -0.17$, 95% CI: -0.23 to -0.11), such that higher cognitive response ratings were associated with larger pre-post shifts, consistent with (but not definitive evidence of) message engagement playing a role.

Behavioural intentions

As observed for the attitude change items, participants' ratings of both their likelihood of speeding and their willingness to exceed the speed limit in a built-up area were skewed towards the lower end of the respective scales. This skew was reflected in a disproportionate number of responses at the minimum scale value for both the likelihood item (i.e., "very unlikely"; 192 of 420 total responses, 46%) and the willingness item (i.e., "not at all willing"; 185 of 420 responses, 44%). To appropriately accommodate truncation at the lower bound of the response scale, censored Bayesian mixed-effects general linear models with Gaussian links were fitted separately for the two behavioural intention outcomes. Each model included random intercepts for participants to account for individual differences, and fixed effects for display condition, time (pre- vs. post-intervention), and participant age and sex. Interaction terms between display condition and time were included to test whether changes over time differed by display.

Across all conditions, self-reported likelihood of exceeding the speed limit decreased from baseline to post-intervention. In the control condition, the likelihood of speeding was estimated to be 1.00 point lower at post-intervention than at baseline (95% CI: -1.41 to -0.60). This change reflects a very large intervention effect, corresponding to a standardized mean change of $d = -1.01$ (95% CI: -1.43 to -0.59), as shown in Figure 3A. Neither the yellow banner ($b = -0.06$, 95% CI: -0.66 to 0.53) nor the blue banner ($b = 0.19$, 95% CI: -0.36 to 0.75) exhibited a significantly different change in likelihood of speeding following the intervention relative to the control condition.

A similar pattern was observed for self-reported willingness to exceed the speed limit. Across conditions, willingness to speed decreased from baseline to post-intervention. In the control condition, willingness to speed was estimated to be 1.21 points lower at post-intervention (95% CI: -1.65 to -0.77). This represents a very large intervention effect, corresponding to a standardized mean change of $d = -1.12$ (95% CI: -1.53 to -0.71), as shown in Figure 3B. The yellow banner showed no significantly different change in willingness to speed relative to the control ($b = 0.57$, 95% CI: -0.05 to 1.18). In contrast, the blue banner demonstrated a slightly smaller reduction in willingness to speed relative to the control condition ($b = 0.63$, 95% CI: 0.02 to 1.25). Nevertheless, the intervention effect for the blue banner remained significantly different from zero, with willingness to exceed the speed limit estimated to decrease by 0.64 points (95% CI: -1.08 to -0.20). This reduction corresponds to a medium-sized intervention effect, with a standardized mean change of $d = -0.59$ (95% CI: -1.00 to -0.19).

Figure 3A: Behavioural intentions: Likelihood to exceed the speed limit in a built-up area (-3 = very unlikely, 3 = very likely)

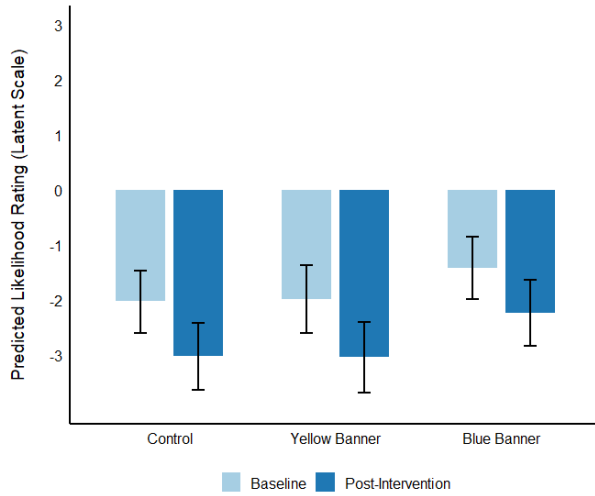
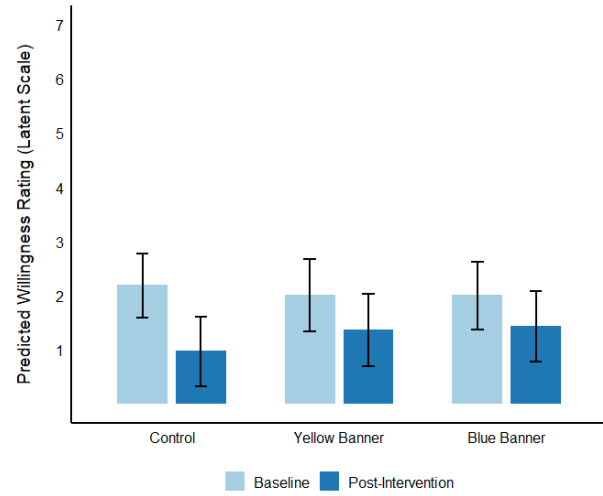


Figure 3B: Behavioural intentions: Willingness to exceed the speed limit in a built-up area (1 = not at all willing, 7 = very willing)



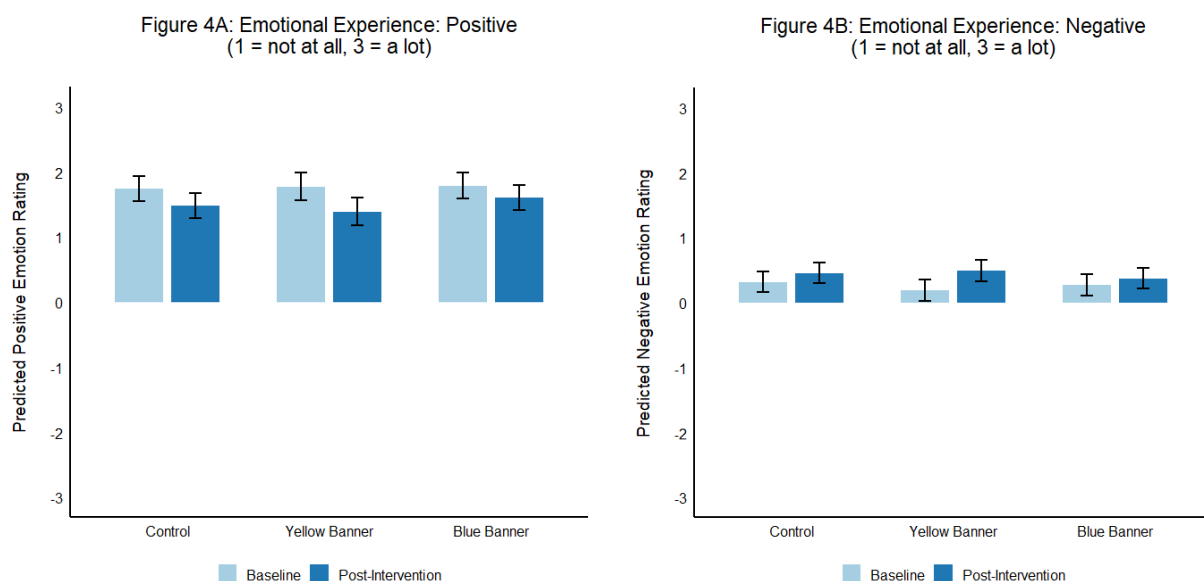
As observed for attitudes, all three interventions were associated with comparable post-intervention changes in behavioural intentions. To examine whether the interventions themselves played a causal role in behavioural intention change, Bayesian mixed-effects linear models were fitted to mean post-intervention intentions at the participant level. Fixed effects were included for mean pre-intervention intentions, mean cognitive response, and participant age and sex. Crucially, interaction terms between pre-intervention intentions and cognitive response were included to assess whether higher engagement predicted greater intention change across conditions. For likelihood of exceeding the speed limit, this analysis revealed a significant interaction between pre-intervention intentions and cognitive response ($b = -0.10$, 95% CI: -0.17 to -0.03). Similarly, for willingness to exceed the speed limit, a significant interaction was observed between pre-intervention intentions and cognitive response ($b = -0.14$, 95% CI: -0.23 to -0.06). Together, these findings provide evidence that the observed changes in behavioural intentions were driven by engagement with all three displays themselves, rather than by mere participation in the study.

Emotional experience

The emotional experience items demonstrated good internal consistency reliability (Cronbach's $\alpha = 0.84$). Mixed-effects Bayesian linear regression models were conducted on item-level ratings and fitted separately for positive- and negative-valence items. Each model included random intercepts to account for between-participant variability, as well as fixed effects for display condition, time (pre- vs. post-intervention), and participant age and sex. Interaction terms between display and time were included to examine whether changes in emotional responses over time differed by display condition.

Across all conditions, self-reported positive emotion decreased from baseline to post-intervention, as illustrated in Figure 4A. In the control condition, positive emotion was estimated to be 0.27 points lower at post-intervention (95% CI: -0.38 to -0.15). This decrease represents a small-to-medium intervention effect, corresponding to a standardized mean change of $d = -0.43$ (95% CI: -0.62 to -0.24). Neither the yellow banner ($b = -0.12$, 95% CI: -0.29 to 0.05) nor the blue banner ($b = 0.08$, 95% CI: -0.08 to 0.25) exhibited a credibly different change in positive emotion following the intervention relative to the control condition.

Across all conditions, self-reported negative emotion increased from baseline to post-intervention, as shown in Figure 4B. In the control condition, negative emotion was estimated to be 0.13 points higher at post-intervention (95% CI: 0.04 to 0.23). This increase reflects a small intervention effect, corresponding to a standardized mean change of $d = 0.27$ (95% CI: 0.08 to 0.46). The blue banner showed no significantly different change in negative emotion relative to the control ($b = -0.03$, 95% CI: -0.17 to 0.10), whereas the yellow banner demonstrated a significantly larger, but small, increase in negative emotion compared with the control condition ($b = 0.17$, 95% CI: 0.03 to 0.30).

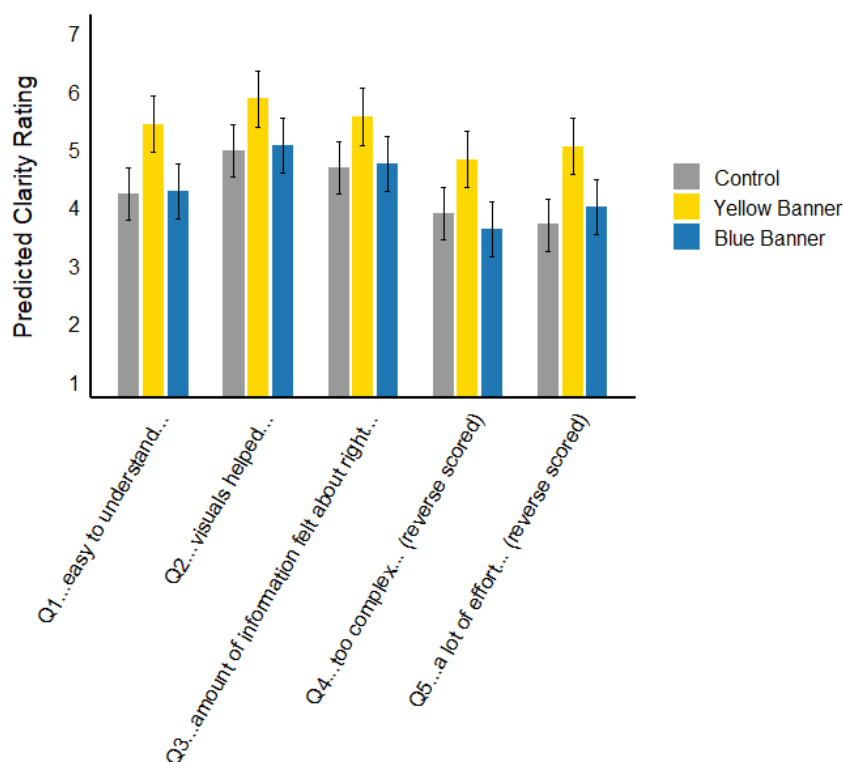


Message clarity

A mixed-effects Bayesian linear regression was conducted on item-level ratings of message clarity. The model included random intercepts for participants to account for between-participant variability, as well as fixed effects for display condition and participant age and sex. Interaction terms between condition and item were included to examine whether the effect of display condition on perceived message clarity differed across items.

Overall, participants rated the yellow banner as conveying a clearer message than the control display, as shown in Figure 5. Specifically, participants judged the yellow banner message to be easier to understand at a glance compared with the control display for Item Q1 ($b = 1.18$, 95% CI: 0.58 to 1.78), corresponding to a very large effect size ($d = 1.29$, 95% CI: 0.63 to 1.94). In contrast, there was no significant difference in message clarity ratings between the blue banner and the control display ($b = 0.04$, 95% CI: -0.55 to 0.62). No significant interactions between item and condition were observed, indicating that this pattern was consistent across the remaining four items.

Figure 5: Message Clarity
(1 = strongly disagree, 7 = strongly agree)



Cognitive Response

A mixed-effects Bayesian linear regression was conducted on item-level cognitive response ratings. The model included random intercepts for participants to account for between-participant variability, as well as fixed effects for display condition and participant age and sex. Interaction terms between condition and item were included to assess whether the effect of display condition varied across cognitive response items.

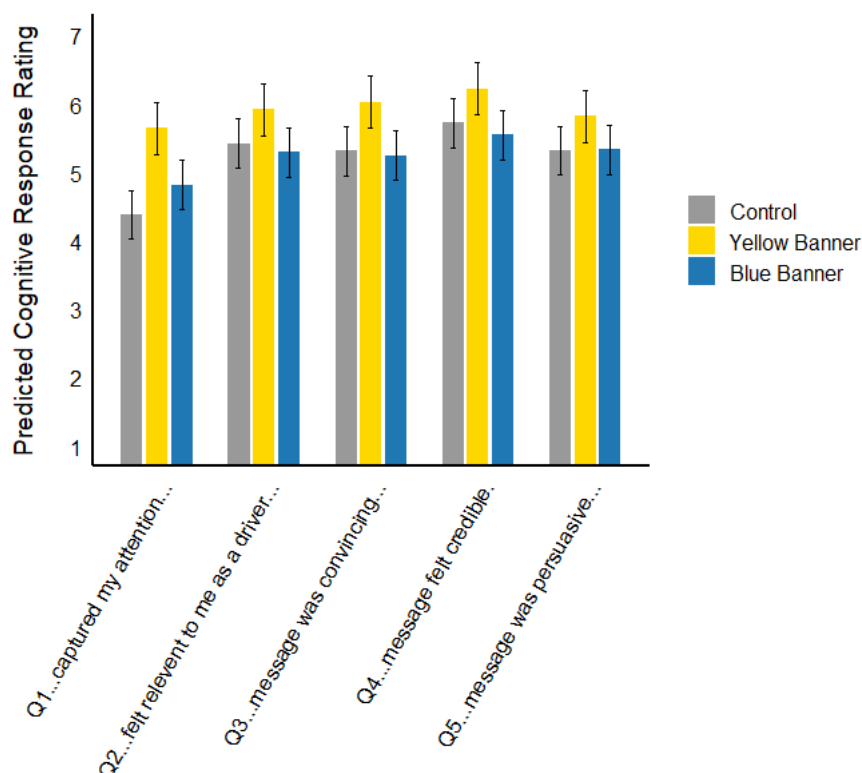
Overall, participants rated the yellow banner more positively than the control display (Figure 6). In particular, participants reported that the yellow banner captured their attention and prompted them to think more than the control display for Item Q1 (“...captured my attention...”; $b = 1.25$, 95% CI: 0.79 to 1.72), corresponding to a very large effect size ($d = 1.60$, 95% CI: 1.01 to 2.21). There was no significant difference in

ratings between the blue banner and the control display ($b = 0.43$, 95% CI: -0.02 to 0.87).

Significant interactions between condition and item indicated that the magnitude of the condition effects was smaller for all remaining items relative to Q1. For Item Q2 (“...felt relevant to me as driver...”), participants rated the yellow banner as more relevant to them as a driver than the control display ($b = 0.49$, 95% CI: 0.04 to 0.95), reflecting a medium effect size ($d = 0.63$, 95% CI: 0.05 to 1.22), whereas no significant difference was observed for the blue banner ($b = -0.14$, 95% CI: -0.59 to 0.31). Similarly, for Item Q3 (“...message was convincing...”), participants rated the yellow banner message as more convincing than the control display ($b = 0.70$, 95% CI: 0.24 to 1.17 ; $d = 0.90$, 95% CI: 0.31 to 1.49), with no significant difference for the blue banner ($b = -0.07$, 95% CI: -0.53 to 0.38).

For Item Q4 (“...message felt credible.”), participants reported that the yellow banner felt more credible than the control display ($b = 0.49$, 95% CI: 0.02 to 0.96), corresponding to a medium effect size ($d = 0.62$, 95% CI: 0.03 to 1.23), whereas the blue banner again showed no significant difference relative to the control ($b = -0.18$, 95% CI: -0.63 to 0.27). Finally, for Item Q5 (“...message was persuasive...”), participants rated the yellow banner as more plausible than the control display ($b = 0.49$, 95% CI: 0.04 to 0.96 ; $d = 0.63$, 95% CI: 0.05 to 1.24), while no significant difference was observed for the blue banner ($b = 0.01$, 95% CI: -0.43 to 0.47).

Figure 6: Cognitive Response
(1 = strongly disagree, 7 = strongly agree)



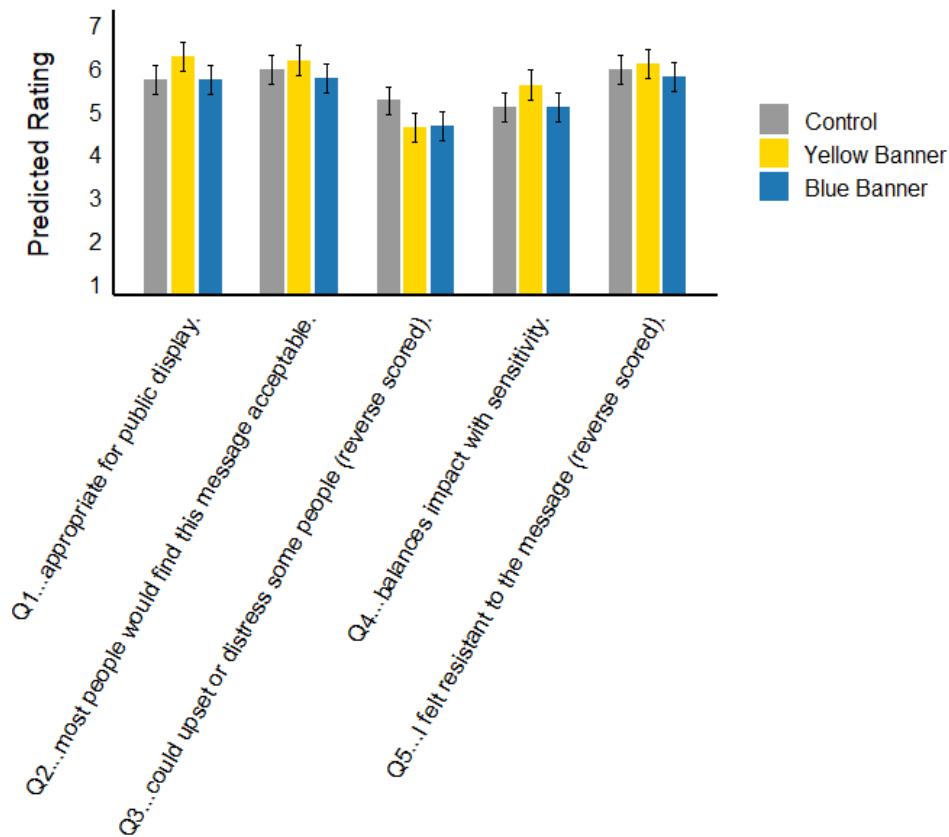
Acceptable/ethical concerns

A mixed-effects Bayesian linear regression was conducted on item-level ratings of acceptability and ethical concerns. The model included random intercepts for participants to account for individual differences, as well as fixed effects for display condition and participant age and sex. Interaction terms between condition and item were included to assess whether the effects of display condition varied across items.

Participants rated the yellow banner as more appropriate for public display than the control display for Item Q1 ($b = 0.52$, 95% CI: 0.09 to 0.96), corresponding to a medium effect size ($d = 0.51$, 95% CI: 0.08 to 0.95). There was no significant difference between the blue banner and the control display on this item ($b = -0.02$, 95% CI: -0.46 to 0.41; see Figure 7). For Item Q2, which assessed whether participants believed that most people would find the message acceptable, there was no significant difference between either the yellow banner ($b = 0.21$, 95% CI: -0.22 to 0.65) or the blue banner ($b = -0.20$, 95% CI: -0.65 to 0.25) relative to the control display.

For Item Q3, which assessed whether the message could upset or distress some people showed interactions with the control display. Specifically, participants rated both the yellow banner (reverse scored: $b = -0.63$, 95% CI: -1.07 to -0.18; $d = -0.62$, 95% CI: -1.06 to -0.18) and the blue banner (reverse scored: $b = -0.58$, 95% CI: -1.03 to -0.14; $d = -0.58$, 95% CI: -1.02 to -0.14) as more likely than the control display to upset or distress some people (Figure 7). For Item Q4, participants rated the yellow banner as better balancing impact with sensitivity compared to the control display ($b = 0.51$, 95% CI: 0.07 to 0.95), corresponding to a medium effect size ($d = 0.50$, 95% CI: 0.07 to 0.94). No significant difference was observed between the blue banner and the control display on this item ($b = -0.01$, 95% CI: -0.45 to 0.43). Finally, for Item Q5, which assessed resistance to the message, there was no significant difference between either the yellow banner (reverse scored: $b = 0.14$, 95% CI: -0.31 to 0.58) or the blue banner (reverse scored: $b = -0.17$, 95% CI: -0.61 to 0.28) relative to the control display.

Figure 7: Acceptable/Ethical Concerns
(1 = strongly disagree, 7 = strongly agree)



Qualitative responses

In their written comments on the displays, participants frequently reported that the control display required considerable effort to read and understand. They noted that it took time to process the information (e.g., “*It took a bit of effort to read it and understand it*”, “*The message does take a little study to see what is going on!*”, “*...the poster is a little visually overloading...*”, “*I think that a lot of people would fail to understand the poster*”, “*Currently it's a little confusing and you need to spend time looking at it and calculating things*”). Participants also commented that the control display was not attention-grabbing (e.g., “*It wasn't eye catching enough*”, “*...this graph is not attention grabbing*”; “*It doesn't really grab your attention...*”; “*By itself I don't think it will capture people's attention, or stay with them*”). In addition, they described the display as abstract and lacking sufficient context (“*...it is too abstract as a chart*”, “*...it doesn't make much sense as it has no context...*”).

Participants provided a more mixed pattern of positive and negative feedback for the yellow poster. On the positive side, they noted that it had clear and impactful visual features (e.g., “*I think the visual representation is very powerful and makes the message*

really easy to understand”, *“It's pretty clear as an overview what the main message is.”*, *“I think it's quite eye catching and would be easily noticeable by people nearby”*).

Participants also suggested that the message could influence attitudes and behaviour (e.g., *“It will make people stop and think about the impact instead of thinking it's only 5mph over the speed limit”*, *“This poster will modify my driving behaviour”*), and some explicitly endorsed its use in public settings (e.g., *“I think the poster is brilliant and should definitely be used!”*). However, participants also raised several concerns. These included perceptions that the display was overly detailed (e.g., *“I thought the poster was too busy ...it needs to be simplified”*, *“there is quite a lot of supplemental information that isn't absorbed at first glance”*, *“I think the info on the poster is too complex to be absorbed quickly”*), unnecessarily complicated (e.g., *“it's an overly complicated way of explaining it”*), and included features that were not essential (e.g., *“The stick figures of people are a bit, pointless”*). Some participants also questioned the method of message delivery (*“...there would be better ways of explaining the impacts. they are a little confusing.”*).

For the blue poster, participants again provided a mixture of positive and negative comments. Several participants commented on its impact (e.g., *“It's very impactful without using upsetting imagery”*, *“...It's a brilliant idea, I never thought of collision impacts in terms of heights. It's very impactful without using upsetting imagery”*) and on its perceived appropriateness for public use (e.g., *“...it feels appropriate for public display while still making people stop and think”*). At the same time, others indicated that the poster required time and effort to fully understand (e.g. *“I had to look at the poster a few times before I truly understood what it meant”*, *“It's a little difficult to understand at first glance”*, *“...it took me a while to understand the full message”*). Additional comments suggested that the message was overly complicated or required further clarification (e.g., *“I felt like it could have said/explained a little bit more”*), and that the poster contained too much information to be easily understood at a glance (e.g., *“I found the poster to be quite confusing. There was too much information on it and it was not easy to understand”*, *“A complicated poster at a glance, more time and thought is required by the viewer”*).

Discussion

The sample predominantly comprised frequent drivers, with most participants reporting that they drove multiple times per week or daily. Many participants reported engaging in unintentional speeding (e.g., transitioning from a high- to a low-speed road), whereas relatively few reported intentional speeding (e.g., due to running late). Close to half of the sample reported keeping within the speed limit nearly all of the time when driving in built-up areas.

The control display, issued by the Department for Transport (DfT) to communicate typical vehicle stopping distances, did not improve comprehension of the nonlinear relationship between speed and impact. In contrast, the yellow banner produced larger pre–post gains in comprehension relative to the control display. Although these gains corresponded to 1.70 times greater odds of a correct comprehension response, the analysis indicated substantial uncertainty regarding the true magnitude of the intervention effect. By comparison, the blue banner did not produce a significant improvement in comprehension relative to the control display.

The two banners and the DfT control display were highly effective in promoting safer attitudes towards exceeding the speed limit. The magnitude of these changes corresponded to a large sized effect, indicating value in changing attitudes. Notably, the yellow and blue banners were equally effective in changing attitudes as the DfT stopping distances display. The two banners were also as effective as the DfT control display in changing behavioural intentions. Both the yellow and blue banners were equally effective as the control display in reducing self-reported likelihood of exceeding the speed limit. The yellow banner was also as effective as the control display in reducing willingness to drive over the speed limit. The blue banner, in contrast, exhibited a slightly smaller reduction in post-intervention willingness to exceed the speed limit.

As all three interventions were associated with broadly similar post-intervention changes in attitudes and behavioural intentions, it remains possible that these effects reflect non-intervention factors rather than the specific content or design features of the displays. In particular, repeated measurement of closely related attitude and behavioural intention items at baseline and post-intervention, as well as demand characteristics (i.e., participants inferring that the study aimed to promote safer attitudes and behaviour), could plausibly account for the observed changes. If, however, the interventions themselves played a causal role in shaping attitudes and intentions, then participants who engaged more deeply with a display would be expected to show larger shifts in these outcomes. Other research has shown that road safety campaigns that are engaging or are perceived as credible or personally relevant, lead to more positive changes in attitudes and behaviour (Delany et al., 2004). The cognitive response items provide a suitable index of engagement with, and commitment to, the display message, capturing the extent to which the messages were experienced as thought-provoking, relevant, convincing, credible, and persuasive. Additional analyses revealed significant interactions between pre-intervention attitudes and intentions and cognitive response, indicating that higher engagement was associated with greater attitude and behavioural intention change. Taken together, these findings suggest that the observed changes were driven by engagement with the displays (banners & control display) themselves, rather than by mere participation in the study.

Across conditions, participants reported lower positive emotion and higher negative emotion following the intervention, indicating that the interventions worsened mood. This pattern suggests that the messages conveyed in the displays had a negative impact on emotional experience, potentially due to their implied association with road traffic collisions and injury. In addition, the yellow banner, but not the blue banner, produced a larger post-intervention increase in negative emotion relative to the control display. Given that the two banners were similar in overall style, one plausible explanation is that the yellow banner was more engaging than the blue banner (as evidenced by results on message clarity and cognitive responses), thereby eliciting greater emotional engagement and, consequently, a stronger emotional response.

Participants rated the yellow banner as having a clearer message than the control display across multiple dimensions. Specifically, they agreed more strongly that the yellow banner was easy to understand at a glance, that the visuals helped them understand the message, and that the amount of information felt appropriate. Other research has shown that visual displays (vs. text) are typically more engaging and compelling in road safety interventions (Wundersitz et al., 2010). By contrast, there were no significant differences between the blue banner and the control display on these measures. Thus, the more positive perceptions of message clarity associated with the yellow banner were not shared by the blue banner.

In terms of cognitive response, participants rated the yellow banner more positively than the control display across all assessed dimensions. In particular, they rated the yellow banner substantially higher in its ability to capture their attention, with this difference corresponding to a very large standardized effect size. Participants also rated the yellow banner as more relevant to them as a driver, and judged its message to be more convincing, credible, and persuasive than the control display. There were no significant differences between the blue banner and the control display on any cognitive response measures.

Although all three interventions were rated positively in terms of acceptability and ethical considerations, participants judged the yellow banner, but not the blue banner, to be more appropriate for public display than the control display. Both banners and the control intervention were rated positively with respect to the acceptability of their messages, and participants judged the messages to be as acceptable. Despite these positive endorsements, participants also indicated that both banners could be more upsetting or distressing to some people than the control display. Nonetheless, they judged that the yellow banner, but not the blue banner, achieved a better balance between impact and sensitivity relative to the control display. Participants reported low levels of resistance to the messages across all three displays, and did not indicate greater resistance to either banner compared with the control display. Taken together, these findings suggest that participants perceived the yellow banner as the most

appropriate option for public display. Although acknowledging that both banners could be upsetting or distressing to some individuals, participants judged the banners' messages to be as acceptable as the control display, and perceived the yellow banner as offering the most favourable balance between impact and potential distress.

Finally, participants' written comments provided further insight into these quantitative findings. Participants frequently reported that the control display required considerable effort to read and understand, noting that it took time to process the information. They also commented that the control display was not attention-grabbing, and described it as abstract and lacking sufficient context. Feedback on the yellow poster was more mixed. On the positive side, participants highlighted its clear and impactful visual features, suggested that it could influence attitudes and behaviour, and, in some cases, explicitly endorsed its use in public settings. However, participants also raised concerns, including perceptions that the display was overly detailed, unnecessarily complicated, and contained non-essential features, as well as questioning the overall approach to message delivery. Feedback on the blue poster similarly included both positive and negative comments. Participants noted its impact and perceived suitability for public display, but also reported that it required time and effort to understand, that the message was overly complicated or required clarification, and that the poster contained too much information to be easily understood at a glance.

The current evaluation has several limitations. First, the study was conducted online, and therefore participants did not view the displays under the same conditions in which the banners would typically be encountered when printed at full size and displayed in public environments. Although participants were shown mock-up illustrations designed to approximate how the posters would appear in real-world settings, it was not possible to fully replicate key aspects of real-world exposure, such as viewing distance, viewing angle, environmental context, or competing visual distractions. These factors may influence attention and message processing in public settings. Notably, the yellow banner was rated as particularly eye-catching and engaging, suggesting that its impact may be equal or greater when displayed at full scale in public locations, where its visual salience would likely be enhanced. In addition, participants were not required to view the displays for a minimum duration and were not financially incentivised based on their level of engagement or performance. This approach was intentionally adopted to more closely approximate naturalistic viewing conditions, in which exposure is typically brief and voluntary. However, this also introduces variability in the depth of processing across participants.

Second, baseline responses on the attitude and behavioural intention measures were strongly skewed towards the safer end of the scale, reflecting generally negative attitudes towards speeding and low self-reported intentions to exceed speed limits. This created limited scope for further reductions following the intervention, resulting in

potential floor effects. Such floor effects may have reduced sensitivity to detect differences between displays. Future research could explore alternative outcome measures that are less susceptible to floor and ceiling effects, such as implicit measures or measures that capture more context-specific behavioural intentions.

Third, the inclusion of baseline questions about driving behaviour and speeding may have made the study purpose more apparent to participants. This may have introduced demand characteristics, whereby participants inferred that the study aimed to promote safer attitudes and behaviour and adjusted their responses accordingly. However, additional analyses indicated that higher engagement with the displays was associated with greater changes in attitudes and behavioural intentions. This pattern is consistent with a causal influence of the displays themselves, rather than changes driven solely by social desirability bias or perceived study expectations. This finding provides evidence that engagement with the intervention content played an important role in shaping the observed changes.

In conclusion, the findings support the yellow banner as an effective intervention that improves understanding of the nonlinear speed–impact relationship. The yellow banner is likely to be an effective intervention for promoting public knowledge gain and for promoting safer attitudes and behaviour in the context of exceeding the speed limit. The yellow banner is also likely to be eye-catching and engaging when displayed in public places.

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Appendix A: Displays

[In all three conditions, participants were first shown prior instruction presented on a preceding page to prepare them for the display]

You will now be shown a poster designed to inform you about some of the consequences of driving at speed.

We would like to know your thoughts about the poster, so please study it carefully.

Please continue when you are ready to view the poster.

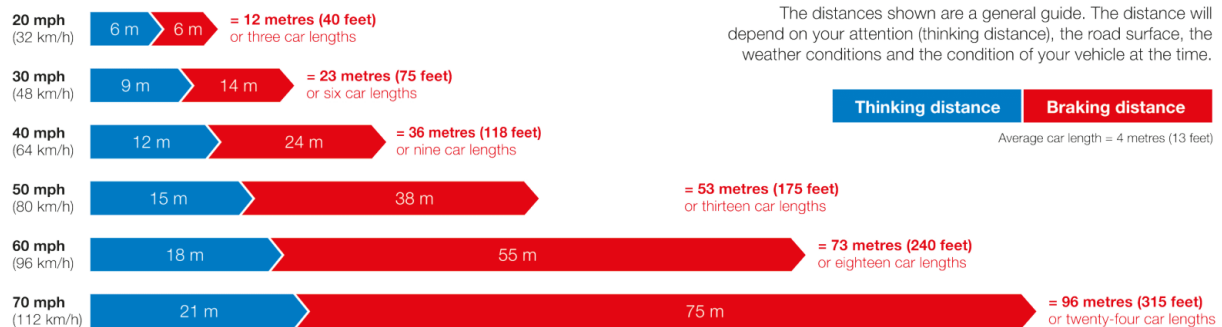
[next page]

Control display

Please study carefully the poster below.

The poster was produced by the UK Department for Transport (DfT) and has been distributed in the public domain in various ways (e.g., the Highway Code book, driving test materials, government websites).

Typical stopping distances



Yellow banner display

Please study carefully the poster below.

The poster will be printed and secured on a building for the public to see. The height and size of the poster will correspond with the heights displayed on the poster. For example, the 12m mark on the poster will be 12m from the ground to depict the actual height.

To help you visualise how the poster will look when secured for public display, the image below to the right shows a mock-up of the poster against the side of a building.



Lifesize mock-up

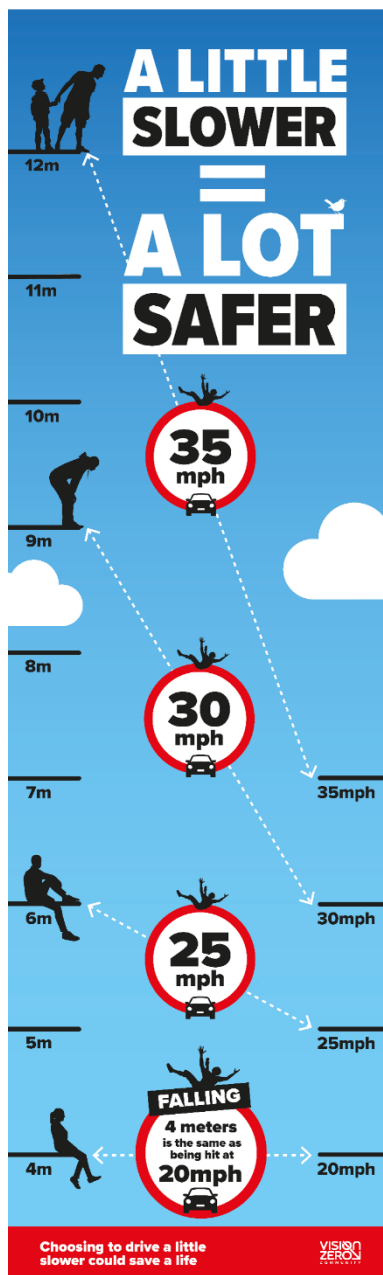


Blue banner display

Please study carefully the poster below.

The poster will be printed and secured on a building for the public to see. The height and size of the poster will correspond with the heights displayed on the poster. For example, the 12m mark on the poster will be 12m from the ground to depict the actual height.

To help you visualise how the poster will look when secured for public display, the image below to the right shows a mock-up of the poster against the side of a building.



Lifesize mock-up



Appendix B: Survey items

Baseline measures

Driver behaviour (baseline)

We would first like to know about your driving behaviour...

How frequently have you driven within the past 3 months?

Not at all ☐	Less than monthly ☐	Less than weekly ☐	Multiple times per week ☐	Daily ☐
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The following questions ask about speeding behaviours. Drivers may engage in speeding for various reasons and to varying degrees. Please answer the questions honestly. Your responses are confidential and will only be used for research purposes.

In which of the following situations have you exceeded the speed limit in the past 3 months?

Frustration or impatience	☐
Unintended speeding (e.g., transitioning from high- to low-speed road)	☐
Unfamiliar with the road (e.g., did not see speed sign)	☐
Distracted (e.g., lost track of speed)	☐
Thrill seeking (e.g., for excitement)	☐
Running late (e.g., for work)	☐
An emergency (e.g., urgent medical situation)	☐

How often have you kept within the speed limit while driving in built-up areas in the past 3 months?

Never (1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐	(6) ☐	Nearly all the time (7) ☐
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Comprehension (baseline)

We would now like to ask you a few questions about your understanding of the relationship between vehicle speed and the impact of a collision on a pedestrian...

Which of the following statements best describes how the impact of a collision on a pedestrian changes as vehicle speed increases?

Impact increases as speed increases at a constant rate	☐
Impact increases more rapidly at higher speeds	☐
Impact doesn't change as speed increases	☐
Don't know	☐

If a car increases its speed from 20mph to 30mph, how does the severity of the impact of a collision on a pedestrian change?

It increases a little

☐

It roughly doubles

☐

It increases more than double

☐

It stays about the same

☐

Don't know

☐

Please indicate whether the following statement is true or false.

Going from 30mph to 35mph increases the severity of the impact on a pedestrian in a collision by the same amount as going from 25mph to 30mph.

True

☐

False

☐

Don't know

☐

Please indicate whether the following statement is true or false.

Going from 30mph to 35mph increases the severity of the impact on a pedestrian in a collision only a little.

True

☐

False

☐

Don't know

☐

Please indicate whether the following statement is true or false.

Slowing from 35mph to 30mph reduces the severity of the impact on a pedestrian in a collision more than slowing from 30mph to 25mph.

True	☐
False	☐
Don't know	☐

Attitudes (baseline)

We would now like to ask you about your attitudes and behaviour in relation to speeding...

Exceeding the speed limit while driving in built-up areas is...

Unpleasant - Pleasant

Very unpleasant (-3) ☐	(-2) ☐	(-1) ☐	(0) ☐	(1) ☐	(2) ☐	Very pleasant (3) ☐
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Exceeding the speed limit while driving in built-up areas is...

Harmful - Beneficial

Very harmful (-3) ☐	(-2) ☐	(-1) ☐	(0) ☐	(1) ☐	(2) ☐	Very beneficial (3) ☐
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Exceeding the speed limit while driving in built-up areas is...

Negative - Positive

Very negative (-3) ☐	(-2) ☐	(-1) ☐	(0) ☐	(1) ☐	(2) ☐	Very positive (3) ☐
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Exceeding the speed limit while driving in built-up areas is...

Foolish - Wise

Very foolish (-3) ☐	(-2) ☐	(-1) ☐	(0) ☐	(1) ☐	(2) ☐	Very wise (3) ☐
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Behavioural intentions (baseline)

How likely is it that you would exceed the speed limit in a built-up area?

Very unlikely (-3) ☐	(-2) ☐	(-1) ☐	Neither likely nor unlikely (0) ☐	(1) ☐	(2) ☐	Very likely (3) ☐
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How willing would you be to drive over the speed limit in a built-up area?

Not at all willing (1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐	(6) ☐	Very willing (7) ☐
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Emotional experience (baseline)

Focussing on how you feel in this moment, please rate how much you feel each of the following emotions:

	Not at all	A little bit	Quite a bit	A lot
Confident	☐	☐	☐	☐
Calm	☐	☐	☐	☐
Happy	☐	☐	☐	☐
Afraid	☐	☐	☐	☐
Sad	☐	☐	☐	☐
Worried	☐	☐	☐	☐

Post-intervention measures

Comprehension (post-intervention)

Having viewed the poster above, we would now like to ask you a few questions about your current understanding of the relationship between vehicle speed and the impact of a collision on a pedestrian...

[comprehension items; same as at baseline]

Message clarity (post-intervention)

Thinking about the poster above, please indicate your agreement/disagreement with the following statements:

The message was easy to understand at a glance

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The visuals helped me understand the message

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (4) ☐
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The amount of information felt about right

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message felt too complex to understand at a glance

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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I had to spend a lot of effort working out what the message meant

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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Cognitive response (post-intervention)

The message captured my attention and made me think

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message felt relevant to me as a driver

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message was convincing in showing why higher speeds are more dangerous

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message felt credible

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message was persuasive in encouraging me to take speed limits seriously

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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Emotional experience (post-intervention)

Thinking about the poster above, please rate how much you feel each of the following emotions right now:

	Not at all	A little bit	Quite a bit	A lot
Afraid	☐	☐	☐	☐
Sad	☐	☐	☐	☐
Worried	☐	☐	☐	☐
Happy	☐	☐	☐	☐
Confident	☐	☐	☐	☐
Calm	☐	☐	☐	☐

Acceptable/ethical concerns (post-intervention)

Thinking about the poster above, please indicate your agreement/disagreement with the following statements:

The message is appropriate for public display

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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I think most people would find the message acceptable

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message could upset or distress some people

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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The message balances impact with sensitivity

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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I felt resistant to the message

Strongly disagree (1) ☐	(2) ☐	(3) ☐	Neutral (4) ☐	(5) ☐	(6) ☐	Strongly agree (7) ☐
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Please use the (optional) text box below to share any further reflections or concerns you may have.

Attitudes (post-intervention)

Having viewed the poster above, we would like to ask you about your attitudes and behaviour in relation to speeding...

[attitude items; same as at baseline]

Behavioural intentions (post-intervention)

[behavioural intentions items; same as at baseline]

Appendix C: Written comments on displays

The table below provides participants' responses to the question: Please use the (optional) text box below to share any further reflections or concerns you may have.

Control display	Yellow banner	Blue banner
It took a bit of effort to read it and understand it. It wasn't eye catching enough.	I think the visual representation is very powerful and makes the message really easy to understand	I had to look at the poster a few times before I truly understood what it meant
The message only shows stopping distance, there should be something else that conveys impact on a pedestrians you increase speed. The message does take a little study to see what is going on!	I thought the poster was too busy ...it needs to be simplified.	its a little difficult to understand at first glance.
I think the message is important and dealt with sensitively but the poster is a little visually overloading which may put some people off looking at it properly. I think a less visually crowded design might be better.	I think the poster is brilliant and should definitely be used!	I felt like it could have said/explained a little bit more.
I think that a lot of people would fail to understand the poster and would ignore it	It's pretty clear as an overview what the main message is, although I would note there is quite a lot of supplemental information that isn't absorbed at first glance (the scale on the left as an example of what I mean)	It's an excellent poster. My only issue was that I initially mistook the large round speed signs in the middle of the poster as the speed level indicators. They are much bigger than the smaller lines and labels on the right of the poster. So it took me a while to understand the full message. But it's a brilliant idea, I never thought of collision impacts in terms of heights. It's very impactful without using upsetting imagery.
I don't think the relationship between impact/damage and stopping distance was very clear	its an overly complicated way of explaining it	I felt the graphic hard to understand. I had to keep looking at it to answer the questions.
The visual could be designed in a way that gets the message across more quickly and easily without expecting	It was not easily visible the message of the poster when displayed on the building. I think it would need to be	misses the key point with a messy over fussy layout. could be a lot more harder hitting and more concisely

individuals to review and analyse the data as many of them simply won't. Currently it's a little confusing and you need to spend time looking at it and calculating things.	clearer for people to see in passing.	delivered in a simpler message.
I feel like there's a more interesting or impactful way to show this information so that people pay attention - this graph is not attention grabbing	i think the posters would have to be put where a car would stop. traffic lights for example. i also think there would be better ways of explaining the impacts. they are a little confusing.	I think it's a good illustration of the effects of speed
I think the message on the poster could be stronger and clearer about the impacts on pedestrians, including severities of injuries.	Although I know from the description of the poster that the distances from the ground will be the actual distances described on the poster, the poster does not indicate this.	I found the poster to be quite confusing. There was too much information on it and it was not easy to understand. Speeding is a very serious matter and I believe it is very important that the message is conveyed as clearly as possible. Drivers constantly speed past my house which in a 30 mile per hour zone. It worries me a lot.
I think it is clear and easy to understand	Too much info to read whilst driving. Surely stuff like this only increases distracted driving which is no better than speeding	I think it needs to be a bit more clear in how it helps.
Stopping distance won't be automatically converted to degree of pedestrian damage inflicted at speed by many people. The correlation is not obvious.	The stick figures of people are a bit, pointless. The graphic is designed to save lives and road safety, and yet the stick figures are just a man, woman, child etc looking a bit happy go lucky over the edge of a cliff. The person falling at the top of the circles is almost humorous, yet the reality is we are trying to stop road deaths. Maybe make the stick figures look afraid, kind of like how the reality of road accidents are terrifying.	The poster communicates its message clearly and effectively without being graphic. The visual comparison makes the impact of speed differences easy to understand, and it feels appropriate for public display while still making people stop and think.â€
it would have been good to show the impact severity, not just the distance it takes to stop	I think it is good being on a tall building so you can actually see the heights	A complicated poster at a glance, more time and thought is required by the viewer

It is a lot of information to take in and not easy to read and I suspect a lot of people will ignore this poster.	The poster is a great reminder to understand the impact of speed on pedestrians- It will make people stop and think about the impact instead of thinking 'its only 5mph over the speed limit'	I like the intent of the message but I feel it could be visualised in a clearer way. The 30mph could be directly opposite the 12m and so on.
Could be hard for some people to understand, but it made sense to me.	This poster will modify my driving behaviour	I felt that the poster was far too complicated to understand. The message could be conveyed much more simply. And you wouldn't want to be seeing that poster as you were driving along the road as it would take away your concentration from driving - and make you more likely to have an accident! Defeating the whole object
It is a long time since I sat my driving test, and there was no real theory test then apart from a few questions. I didn't realise how big the braking distance was when you are driving 60 or 70mph. I would like to see more public awareness on this. It is a wonder there are not more motorway accidents.	I think the info on the poster is too complex to be absorbed quickly	I had to take a look at this for a minute or so to really have the message sink in so i dont think its appropriate for the side of a road if youre expecting motorists to look at it. However, if you have it in a city centre for people sat at bars or walking past to look at it could work since once i understood what it was conveying I found it very compelling. Ie thinking about how much difference it would feel for me to jump four meters compared to twelve really helps visualise what you would do to someone if you hit them speeding. So it definitely a good way to express the message its just quite complex to try and visualise simply
the information given in the graphic was on braking speed and distance nothing related to impact on people , so the first question was not related to the graphic	The poster may be too full of data for someone driving down the street to read, though. So while the message is perfect it cause drivers to lose	The poster is good, but maybe better on a leaflet, as if I was driving that would be distracting for me and increase my chances of crashing. You have to

	concentration as they're driving because they're trying to read the poster	concentrate on it for a minute to work out what it is saying.
Couldn't read all the text as it was too small on my laptop screen. The poster is very detailed but difficult to take in all the information at a glance without spending time studying it to get the full picture	I think its quite eye catching and would be easily noticable by people near by, it would be easy to spot and easy to see the information included, even at quick glance you would know it is about speeding effects	I wouldn't feel as nonchalant about falling 4m as the person on the poster.
This was confusing at first. I had to read it for along while to grasp what it was saying.	It would be distracting as it takes too long to work out the message	it is too large and distracting for drivers
the issue is not just the speed, it is a combination of factors It also depends on what you are exceeding it by and road conditions.	I like the visuals but it's tricky to work out the rate of difference between each height / speed equivalent at a glance. It really requires a lot of mental effort.	Given the congestion in most cities it is possible that a large part of the message would be hidden as it looks like a bus lane marked on the road. The message should be overhead above the road. It could also take your eyes off the road to read it which is even worse.
The message about thinking and braking distances needs more clarification with regard to the impact of this on pedestrians - it is too abstract as a chart	i think people need to see this to understand the actual impact it could cause	The visual to me shows the severity increases at the same rate between 25-30 as it does between 30-35, which is slightly confusing, as you would expect it to increase as per the other speeds?
The poster looks like it was designed by bad AI. Hard to read, too much small text. What are you trying to convey with this chart? The questions asked about severity of collisions yet the chart showed stopping distances. We all know the faster you go the longer it takes to stop, but what about speed of impact versus severity? is a 35mph collisions twice as severe as 25mph collision? I still don't know, I know it takes longer to stop but that wasn't the question. Overall, poor chart. Even if the point of the chart was to convey stopping	I just felt that it would be clearer if the main message was delivered in reverse. So, instead of saying "falling 12 meters is the same as being hit at 35 mph" it would make more sense to phrase it as "being hit at 35 mph is the same as falling 12 metres, or from a 4-storey building." I think that would make it more impactful and more clear. As it's the being hit by a car that usually happens and you want to draw attention to, rather than the falling from buildings.	The poster is not very 'legible' in terms of conveying the meaning with a quick glance. In addition, I would be concerned that the length of time that a driver would have to gaze at it to parse the message, would have the counter-productive effects of increasing the risk of accidents.

distances increasing with speed, it's still poorly laid out and hard to decipher		
I understand the importance of stopping rates but adding the likelihood of a fatality as speed increases would also be a powerful message	The poster is a good and easy to understand poster, it makes you really think about the speed	i think it could be a lot clearer - difficult to read the text and notice the lines
i did not understand it straight away i had to re look a few times at what it was actually trying to show.	While impactful, I think it is a lot of information to process at a glance, particularly if you pass it while driving.	There's too much going on, and the text is too small to read as given, assuming you've made the mock up look like it would look to someone on the street. There's also a weird diagonal dotted line going on, whereby the labels for the speeds aren't actually next to the heights they relate to, which has shrunk the relationship between the two and made it very unclear and confusing. In fact, that's what I'd describe this as - unclear and confusing. I don't really know how to interpret it, and I looked at it for some time wondering what on earth was going on. Great idea, but a terrible execution.
I found the message on the poster a bit confusing and not really clear. Stopping distance is only part of the equation.	I think a message that size although it may have some positive effect would quickly become ignored. I also think the size and colour is too much signage and would be an eyesore.	
felt the bit explaining what the red part and the blue part meant should be at the top not the side as you waste time looking for it.	This is a great way to convey the information in a visual format	
poster gave info about stopping distances, but no info about how velocity decreases so it was hard to work out how the impact would change	If you wish to display this in the UK, then use the correct English spellings of words. STOP trying to Americanise everything. Secondly it would also be useful if you actually displayed the sign at the	

	proper heights, not just what you want to use to scare people. Because I can tell you now, that your '12 metre' mark is well above 12 metres. A metre is only 100 centimetres. Another useful tip in reducing traffic collisions would be to make all of the migrants and immigrants that keep being let into the country, take mandatory UK driving tests. As regardless of whether they have a full license from their home country or not, as their road networks and systems in their home country work differently. If they even exist, in some cases. Are we still educating children how to cross the road safely? Stop, look, listen. Oh wait can't use the listen part anymore now that more and more cars are electric and make no noise. So is it more... Stop, look, pray?	
The chart about stopping distances, doesn't really engage with the subject of pedestrian collision, or the reasons why the stopping distances are important. It is factual, without being educational or relevant.		
It takes a little while to work out the meaning of blue a red.		
It's an infographic rather than a poster - it doesn't make much sense as it has no context and does not get the message across at all about speed versus impact		
I thought the message was weak. Even though the facts of the message should make a person think, I'm not sure people will process the message. It doesn't really		

grab your attention and some people might not really appreciate what it is demonstrating.

To me it looks like a presentation slide that would work better if a person was explaining what the information implied, in a powerful and passionate way, to drive (no pun intended) the message home.

By itself I don't think it will capture people's attention, or stay with them.