Research Report Summary

Joseph K. Kearney, PhD, & Jodie M. Plumert, PhD *6/30/2017*

Do Prohibitive Warnings Improve Road-Crossing Safety for Texting Pedestrians?

Vehicle-to-pedestrian communication systems

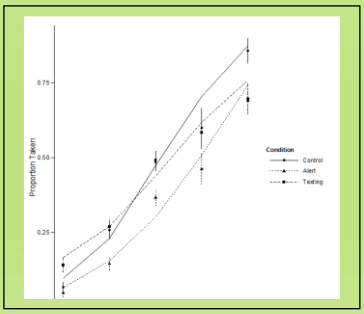
Pedestrian injuries and fatalities have increased at an alarming rate over the last several years. A mounting body of evidence points to distraction caused by increased pedestrian use of mobile technology as a key risk factor for pedestrian-vehicle collisions. This project used an immersive pedestrian simulator to evaluate how warnings of imminent collisions delivered to pedestrians via their cell phones influenced road crossing.

An earlier study examined the influence of permissive alerts that informed texting pedestrians when it was safe to cross a stream of traffic. We found that participants who received alerts chose larger gaps, were more discriminating in their gap choices, and better timed their crossing motions than did participants in the texting group. However, they relied heavily on the alert system and paid less attention to the roadway. The results

Texting in the Pedestrian Simulator

Condition	Wait time
Control	5.2s
Texting	5.2s
Warning	8.4s

Condition	Time to Spare
Control	.86s
Texting	.76s
Warning	.88s



Logistic regression curves depicting likelihood of taking gaps of different sizes.

highlight the potential of cell phone alerts to increase the safety of texting pedestrians. However, the results also raise concerns about the impact of overreliance on technology for making road-crossing decisions, leaving pedestrians vulnerable to unexpected changes in traffic or technological failures in predicting gap affordances.

This project examined a complementary approach to informing pedestrians about traffic conditions by sending warnings when they began to make unsafe crossings. Participants stood at the edge of a one-lane (virtual) road on which a continuous stream of traffic approached from their left. They were asked to safely cross the road while responding to a rapid-fire sequence of text messages sent from the computer. An audio alarm was sent whenever they initiated a motion toward the road and an approaching vehicle was within 2.7 seconds of the intersection.

We found those in the warning condition waited longer to select a gap compared to the non-texting and texting participants who received no warning. In addition, those in the warning group on average selected larger gaps to cross than those in the texting without warnings group.

"Surprisingly, participants did not heed warnings even though they were highly predictive of risk. The results call into question the effectiveness of warnings for the kinds of crossings participants made in this experiment."

The most surprising aspect of the results was that participants never heeded the warning by aborting their crossing even though the warning was highly predictive of risk; participants had collisions on 62% of the trials on which they received a warning and continued to cross the road. Why would participants have ignored the warning? It may be that the perceived risk was not sufficient to cause them to alter their behavior or that they judged that it was quicker and safer to finish crossing than to reverse direction and return to the curb.

For warnings to be effective, it may be necessary to detect movement into the roadway sooner, thereby generating the warnings more quickly. However, it may be very difficult to discriminate movements that signal the beginning of a crossing motion from postural adjustments. As a result, this may increase the false alarm rate, which may cause additional problems with compliance and use.

The results highlight the challenges in designing effective vehicle-to-pedestrian (V2P) communications systems and the critical importance of testing such systems using simulation before deploying them on real roads. Additional research is needed to better understand the causes of pedestrian-vehicle collisions and how information systems can reduce the risk of such collisions.

References

Thompson, L.L., Rivara, F. P., Ayyagari, R. C., & Ebel, B. E. (2013). Impact of social and technological distraction on pedestrian crossing behaviour: An observational study. *Injury Prevention, 19*(4), 232-237.