Accident Analysis and Prevention 45 (2012) 547–553

Contents lists available at SciVerse ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

The effects of driving experience on responses to a static hazard perception test

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ARTICLE INFO

Article history:
Received 21 November 2010
Received in revised form 23 August 2011
Accepted 6 September 2011

Keywords:
Novice drivers
Hazard perception
The effects of driving experience on responses to a static hazard perception test

ABSTRACT

Novice drivers exhibit deficits in hazard perception that are likely to increase their risk of collisions. We developed a *static* hazard perception test that presents still images to observers and requires them to indicate the presence of a traffic conflict that would lead to a collision. Responses to these scenes were obtained for young adult novice ($N = 29$) and experienced drivers ($N = 27$). Additionally, participants rated the hazard risk and clutter of each scene. Novice drivers rated traffic conflicts as less hazardous and responded more slowly to them. Using a subset of 21 scenes, we were able to discriminate novice and experienced young adult drivers with a classification accuracy of 78% and a scale reliability (Cronbach's alpha) of .91. The potential applications of this research include the development of standardized hazard perception tests that can be used for driver evaluation, training and licensure.

1. Introduction

Driving is one of the more risky behaviors in which people engage in terms of injury, death or related costs. While many drivers are quite safe, there are some driver groups, particularly novice drivers, that are at greater risk (McKnight and McKnight, 2003). Wells et al. (2008) found that almost 20% of new drivers had a self-reported collision in the first 6 months of driving and that fully 70% had at least one "near-accident" (p. 131). In the attempt to increase driving safety, several measures have targeted this group including graduated licensing, more systematic training, and more rigorous examinations for licensure. Included in this latter category are tests assessing a person's ability to identify and respond to road hazards.

Hazard perception is a critical component to safe driving (Insurance Institute for Highway Safety, 2010; McKnight and McKnight, 2003). Awareness of hazards protects against collision involvement in the early stages of driving (Wells et al., 2008), yet inexperienced drivers are less able to identify and respond to them (McKenna and Crick, 1994; Pollatsek et al., 2006a,b; Quimby and Watts, 1981; Renge, 1998; Wallis and Horswill, 2007; Whelan et al., 2002) and hazard response times are slowed in this group (Horswill et al., 2008; Quimby and Watts, 1981; Scialfa et al., 2011; Wetton et al., 2010, but see Crundall et al., 2003; Sagberg and Bjornskau, 2006).

There are both methodological and psychometric problems associated with investigating the association between crash risk and hazard perception (Horswill et al., 2010a,b), such as the poor psychometric properties of crash involvement measures and the fact that crash involvement is typically due to many factors including chance. Despite these limitations, hazard perception has been found to be associated with crash risk in multiple studies (e.g. Congdon, 1999; Horswill et al., 2010a,b; Darby et al., 2009; McKenna and Crick, 1994; Quimby et al., 1986; Watts and Quimby, 1979; Wells et al., 2008). For example, Pelz and Krupat (1974) found that there was a 1.2 s difference in HPT between those without a collision or conviction and those having both. Watts and Quimby (1979), McKenna and Crick (1994) and Darby et al. (2009) reported small but significant relationships between HPT scores and retrospective collision involvement. Similarly, Congdon (1999) observed that the VicRoads Hazard Perception Test was a successful predictor of more serious collisions and Wells et al. (2008) found that the UK Hazard Perception Test could predict certain crash types.

Because of their face validity and utility in identifying at-risk drivers, tests of hazard perception have been incorporated into the licensure process in both Australia and the U.K., generally in the form of a video-based series of dynamic scenes of roadway hazards. Dynamic HPTs are also being used for training purposes as in Driver ZED, developed under the AAA Foundation for Traffic Safety (see http://www.driverzed.org/home/), which has been shown to produce improvements in hazard perception of young, inexperienced drivers (Fisher et al., 2002). Training benefits have been found under several other platforms (Chapman et al., 2002).

Despite their promise, dynamic HPTs can be difficult to develop and administer, and some investigators have suggested that HPTs consisting of still images may offer an effective assessment or training alternative (e.g., Huestegge et al., 2010; Whelan et al., 2002).

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0001-4575/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.aap.2011.09.005