



Peer passenger norms and pressure: Experimental effects on simulated driving among teenage males



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ABSTRACT

Objective: Serious crashes are more likely when teenage drivers have teenage passengers. One likely source of this increased risk is social influences on driving performance. This driving simulator study experimentally tested the effects of peer influence (i.e., risk-accepting compared to risk-averse peer norms reinforced by pressure) on the driving risk behavior (i.e., risky driving behavior and inattention to hazards) of male teenagers. It was hypothesized that peer presence would result in greater driving risk behavior (i.e., increased driving risk and reduced latent hazard anticipation), and that the effect would be greater when the peer was risk-accepting.

Methods: Fifty-three 16- and 17-year-old male participants holding a provisional U.S., State of Michigan driver license were randomized to either a risk-accepting or risk-averse condition. Each participant operated a driving simulator while alone and separately with a confederate peer passenger. The simulator world included scenarios designed to elicit variation in driving risk behavior with a teen passenger present in the vehicle.

Results: Significant interactions of passenger presence (passenger present vs. alone) by risk condition (risk-accepting vs. risk-averse) were observed for variables measuring: failure to stop at yellow light intersections (Incident Rate Ratio (IRR) = 2.16; 95% confidence interval [95CI] = 1.06, 4.43); higher probability of overtaking (IRR = 10.17; 95CI = 1.43, 73.35); shorter left turn latency (IRR = 0.43; 95CI = 0.31, 0.60); and, failure to stop at an intersection with an occluded stop sign (IRR = 7.90; 95CI = 2.06, 30.35). In all cases, greater risky driving by participants was more likely with a risk-accepting passenger versus a risk-averse passenger present and a risk-accepting passenger present versus driving alone.

Conclusions: Exposure of male teenagers to a risk-accepting confederate peer passenger who applied peer influence increased simulated risky driving behavior compared with exposure to a risk-averse confederate peer passenger or driving alone. These results are consistent with the contention that variability in teenage risky driving is in part explained by social influences.

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1. Background

Adolescents in the US have higher crash-involvement rates than adult drivers (Bingham & Shope, 2005; National Highway Traffic Safety Administration, 2012), and die more often from injuries received in motor vehicle crashes than from any other cause (Centers for Disease Control and Prevention, 2014). Adolescents' greater risk is attributable to multiple factors, including their status as novice drivers and their stage of development. Their inexperience as novice drivers results in risk taking due to ignorance of common driving hazards and/or lack of essential driving skills (Williams, 2006). As a result of their developmental stage, teens relative to adults are less mature emotionally, psychologically, and neurologically (Bingham, Shope, Zakrajsek, & Raghunathan, 2008; Keating, 2007), more prone to inattention (Lee et al., 2009), and have a heightened propensity for risk taking (Dunlop & Romer, 2010; Romer, 2010; Williams, 2003). Their crashes may be a product of lacking an appreciation of potential consequences of risk taking or purposefully taking risks (Simons-Morton et al., 2011a; Williams, 2003). Factors associated with increased fatal crash risk for adolescents include being male (Williams, 2003) and the presence of young passengers (Curry, Mirman, Kallan, Winston, & Durbin, 2012; Ouimet, Simons-Morton, & Zador, 2010).

Fatal crash data indicate that adolescent drivers are more likely to crash when similar-aged passengers are present (in the absence of an adult passenger), an association that is especially true for male adolescent drivers (Chen, Baker, Braver, & Li, 2000; Doherty, Andrey, & MacGregor, 1998; Ouimet et al., 2010). Passenger sex has also been found to moderate adolescent driving risk, with male passenger presence associated with higher-risk driving for both male and female adolescents compared to a female passenger or driving alone (Ouimet et al., 2010; Shepherd, Lane, Tapscott, & Gentile, 2011; Simons-Morton, 2005). These associations suggest that the social influences of peers might affect adolescent driving (Shope & Bingham, 2008).

Peers can have powerful influences on adolescent health risk behavior. While there are various forms of social influence, social norms and peer pressure are two types that have been found to motivate adolescent involvement in health risk behaviors (Simons-Morton & Chen, 2006), and may also influence risky driving (Simons-Morton et al., 2011b). Having friends who are risky drivers has been associated with adolescent risky driving behavior, suggesting that norms and/or pressure may influence risky teen driving (Simons-Morton, Ouimet, & Chen, 2012; Simons-Morton et al., 2011b). Recent experimental research supports the contention that the mere presence of a peer as a passenger or simply as an observer can increase risky driving (Chein, Albert, O'Brien, Uckert, & Steinberg, 2010; Shepherd et al., 2011; Simons-Morton et al., 2014). These data are consistent with the idea that reward salience is greater in the presence of adolescent peers, increasing the propensity to engage or accept higher than usual levels of risk (Steinberg, 2008).

Although the results of these studies are persuasive, evidence is lacking that performance on computerized driving games (Shepherd et al., 2011) or while in a functional magnetic resonance imaging (fMRI) scanner (Chein et al., 2010) is a valid predictor of everyday driving. In contrast, driving simulation has been shown to be an externally valid predictor of real-world driving (Fisher, Pradhan, Pollatsek, & Knodler, 2008), and provides a safe method for investigating peer influence on adolescent risky driving. Recent research using full-cab high-fidelity visually-immersive simulators provides evidence that social norms influence adolescents' driving behavior. One such experiment demonstrated poorer hazard detection by male adolescents in the presence of a peer passenger (Ouimet et al., 2013). In another experiment, novice male adolescent drivers exhibited more high-risk driving behavior following a social norms manipulation leading them to believe that their same-sex passenger was risk-accepting compared to those perceiving their passenger as risk-averse (Simons-Morton et al., 2014). Although these studies are informative, the roles of social norms and peer pressure remain incompletely understood and neither previous simulated driving study directly manipulated peer pressure. Given the significance of these social influences in shaping adolescent behavior, and the need to reduce injury from crashes involving adolescent drivers, this area remains important for further study.

The Theory of Normative Social Behavior (TNSB) (Rimal, 2005) is a conceptual model positing that injunctive norms, defined as the perceptions of the behavioral expectations of salient others (e.g., peers, parents, teachers), influence behavior. Based on TNSB, it is logical to posit that in the presence of a salient peer who is perceived as preferring higher risk driving (e.g., norms favoring risky driving), an adolescent would be more likely to drive in a riskier manner than he would if driving alone or with a peer who prefers low-risk driving. In this way, injunctive norms influence volitional behavioral choices. However, evidence from available research is less clear regarding the influence of injunctive norms on unintentional behaviors, such as failure to attend to roadway hazards due to lack of skill or ability, or on learned risky behavior patterns that have achieved automaticity.

The study of social influences on risky driving is complicated by the susceptibility of novice teenagers to a variety of driving errors, which can be categorized as lapses, mistakes, and violations (McKnight & McKnight, 2000; Parker, Reason, Manstead, & Stradling, 1995; see Reason, 1990). *Lapses* are minor deviations from intentions, and typically contribute little to driver risk. *Mistakes* are the unintended failure to adequately perform an essential skill, and can arise from improper skill execution (e.g., due to distraction) or from the absence of essential skills. *Violations* result from a choice to disregard rules and regulations related to safety (Parker et al., 1995) and could be influenced by social influences to accept greater risk. Mistakes and violations are the most common contributors to crash risk. Violations may occur less frequently, but are most likely in response to an external factor, such as peer influence. Therefore, one would anticipate that peer influence in the form of risky driving norms and pressure would primarily influence violations, whereas mistakes would be less susceptible

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