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Excellent gamer, excellent driver? The impact of adolescents' video game playing on driving behavior: A two-wave panel study

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ABSTRACT

This study explored the impact of adolescents' playing of racing and drive'em up games on their risky driving behavior. Participants were 354 adolescent boys and girls who took part in a longitudinal panel survey on video game playing and risk taking attitudes, intentions and behaviors. In line with cultivation theory and theory of planned behavior the results showed that (even after controlling for aggression and sensation seeking) video game playing during adolescence succeeded in predicting later risky driving behavior through adolescents' attitudes and intentions to exhibit this behavior in the future. The results suggest that this relationship may in part be explained by the game content.

1. Introduction

Worldwide more than 1000 people a day under 25 die as a result of a traffic crash (World Health Organization (WHO), 2007). Despite all efforts to reduce the number of injuries and deaths on world's roads, traffic crashes remain the leading cause of death among young people (WHO, 2007).

Research has indicated that the high crash involvement among this group is partly explained by their risk taking propensity (Arnett et al., 2002; Ulleberg and Rundmo, 2002). Although risky driving has been found to be associated with a certain lifestyle (Bina et al., 2006; Chliaoutakis et al., 1999, 2005; Gregersen and Berg, 1994) and media use is an important aspect of adolescents' lifestyle (Gorely et al., 2007), the relationship between media use and risky driving has not yet been examined thoroughly. Adolescent boys' and girls' video game playing merits particular attention. In racing and drive'em up games, the player takes the position of driver and drives in a city or on a racing track. The objective of the racing game is to get to the finish first. In the case of drive'em up games points can also be gained by running into other cars or pedestrians, and finishing first is not an absolute requirement to win the game. In both genres risky driving behaviors such as speeding, fun riding (that is, taking risks in traffic in order to make driving more fun) and asocial driving behavior are extremely present in an often photographically realistic environment (Beullens et al., 2008).

Video game playing is a very popular pastime among adolescents (Malliet, 2007; Van Mierlo and Van den Bulck, 2004). Cummings and Vandewater (2007) have found that 36% of American adolescents games regularly. 80% of the players are boys, who play an average of 58 min during weekdays and 1 h and 37 min during the weekend. Girls play less often and for shorter time periods than boys do. In the weekend they play on average a little bit more than 1 h, during weekdays 44 min. Van Mierlo and Van den Bulck (2004, p. 105) also found significant discrepancies in adolescent boys' and girls' video game playing. Boys spent on average 31 h and 15 min a month playing games, whilst girls spent 6 h and 39 min. Racing and drive'em up games appear to be very popular game genres among boys and girls (Lucas and Sherry, 2004). Given their popularity and the fact that these games are much more realistic than they were about 10 years ago, extensive exposure to these games may have an impact on young people's driving behavior.

Several studies have found a relationship between video game playing and traffic related risk taking. Fischer et al. (2007) examined whether playing particular racing games affects risk taking cognitions, affect and behavior. In a first, cross-sectional, study they found a positive association between the amount of video game playing and self-reported obtrusive and competitive driving, and crash involvement. A negative relationship was observed between gaming and traffic cautiousness. More game playing was associated with reduced self-reported cautious road behavior. Study 2 and 3 examined experimentally whether playing racing games result in a higher accessibility of risk-related cognitions and affects

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(study 2) and individual willingness to take risks in traffic (measured with a computer system) (study 3). The results indicated a positive effect of 20 min of racing game playing on the accessibility of risk-promoting cognitions, on feelings of arousal/excitement and on participants' readiness to take risk in traffic (Fischer et al., 2007). In a subsequent study, Fischer et al. (2008) found that people exposed to risk-promoting images, movies scenes and video games are more inclined to take risks in traffic. The authors explained these findings from the perspective of priming theory. Exposure to risk promoting games is expected to increase the accessibility of risk taking cognitions, which in turn are supposed to result in an increase of risk-taking inclinations. Beullens et al. (2008) examined the impact of adolescents' playing of racing and drive'em up games on their intentions to engage in risky driving. Their results indicated that video game playing is a positive predictor of adolescents' attitudes toward fun riding, which predicted their intentions to engage in this behavior in the future.

The present study is an extension of this line of research by looking at the relationship between video game playing and risky driving longitudinally. Fischer et al. (2007, 2008) have expressed the need for longitudinal research in examining the impact of media on risk taking in traffic. Although the previously mentioned studies have indicated that there is a cause for concern since there appears to be a relationship between risk stimulating media such as racing games and drive'em up games and risky driving cognitions, attitudes, intentions and inclinations, these studies have only dealt with short-term effects (Beullens et al., 2008; Fischer et al., 2007, 2008). However from a prevention point of view it is important to know whether these effects persist for longer periods of time. Second, previous research has focused on risk taking inclinations. Consequently, the question to whether these inclinations translate into driving behavior has remained unanswered. Therefore the present study used a longitudinal panel survey to examine whether adolescent boys' and girls' video game playing has an impact on their self-reported driving behavior.

1.1. Aim of the study

The aim of the study is to examine whether adolescent media use, at the time that they do not have their driver's license yet, is a significant predictor of their self-reported driving behavior 2 years later. This research is framed within cultivation theory (Gerbner and Gross, 1976; Gerbner et al., 1986) and theory of planned behavior (TPB) (Ajzen, 1991). Cultivation theory proposes that television is an important source of socialisation and information. Cultivation theorists state that there are important discrepancies between the world as it is depicted on television ('television world') and the 'real world'. Since heavy television viewers are constantly exposed to similar images on television, they cultivate perceptions and attitudes similar to the television world (more than light viewers do). Thus, according to cultivation theory frequent exposure to similar television content may, in the long term, result in the development of a world view similar to the one depicted on television and may lead to alterations in its viewers' perceptions and attitudes (Gerbner and Gross, 1976; Gerbner et al., 1986). TPB, on the other hand, argues that attitudes are an important predictor of behavior through the intention to perform this behavior in the future (Ajzen, 1991; Armitage and Conner, 2001). Attitudes are in turn, according to the theory, determined by behavioral beliefs. These are defined as the subjective probability that a particular behavior leads to a given outcome (Ajzen, 1991).

The theoretical framework used in this study draws upon a combination of both theories. Although cultivation theory originally only dealt with television effects, a number of researchers have used it to examine the impact of games (Van Mierlo and Van den Bulck, 2004; Williams, 2006). Several important distinctions with television viewing must be taken into account. First, playing video games differs significantly from television viewing (Van Mierlo and Van den Bulck, 2004; Williams, 2006). Compared to television viewing, gaming is much more active. The player is more actively involved in the game and may even influence the game by making particular choices. Van Mierlo and Van den Bulck (2004) argue that this active involvement may result in a higher impact of video games than television. Second, video games' content is very diverse. Cultivation theory originally stated that television content is rather homogenous and that television viewing is non-selective and ritualistic. This viewing behavior is expected to result in the cultivation of a world view that is similar to the one that is portrayed on television. These assumptions of a uniform television content and ritualistic viewing have been heavily criticized in later cultivation research. Potter (1993) as well as Cohen and Weimann (2000), and Bilandzic and Rössler (2004) have argued that different genres focus on different aspects of reality and therefore have different effects. This is also the case for video games. While it may be argued that particular content (e.g. violent behavior cf. Van Mierlo and Van den Bulck, 2004, p. 99) appears in virtually all games, this is certainly not the case for driving behavior. Risky driving is present in racing and drive'em up games and hardly ever appears in other game genres. This implies that frequent players might not be exposed to risky driving in video games. Thus, in line with authors (e.g. Bilandzic and Rössler, 2004; Cohen and Weimann, 2000; Potter, 1993) looking at genre-specific cultivation effects of television viewing; the specific effects of the playing of racing and drive'em up games will be examined in the present study.

Several authors have used cultivation theory in examining video game effects. Anderson and Dill (2000) found a positive association between exposure to aggressive video games and feelings of safety. However, this relationship disappeared when gender was controlled for. No significant relationship was found between game playing and crime likelihood estimations. Van Mierlo and Van den Bulck (2004), however, did find a positive association between violent video games and estimations of the number of policemen on the one hand, and estimates of the prevalence of violent crime on the other hand. Williams (2006) also concluded that support was found for a cultivation effect of video games based on the results of an experiment. Apart from these studies which explicitly referred to cultivation theory several other researchers (mainly in research on the effects of gaming on aggression) have found associations between video game play, attitudes and behavior. In line with these results, cultivation theory and TPB, the present study examines the relationship between the playing of racing and drive'em up games and several risky driving behaviors.

1.2. Hypotheses

Following cultivation theory, it is expected that the frequent playing of racing and drive'em up games may alter players' perceptions and attitudes towards risk-taking in traffic. Three particular forms of risky driving were scrutinized: speeding, fun riding and driving after the consumption of alcohol. Speeding and fun riding are two forms of risky driving which are very closely related to the content of racing and drive'em up games. In these games points can be gained by winning a race or by driving recklessly. Consequently, and in line with cultivation theory, it is expected that the long-term exposure to these forms of risky driving in racing and drive'em up games is associated with positive attitudes towards these forms of risk taking. Unlike speeding and fun riding driving after the consumption of alcohol is largely absent from the story line of about all video games. Thus, this dependent measure is added in order to falsify our theoretical framework. Since it is expected that long-term exposure to a particular type of content may result in more positive attitudes toward the depicted forms of risk taking no relationship