Author's Post-print: Article published in Human Communication Research:

Beullens, K., Roe, K., & Van den Bulck, J. (2011). The impact of adolescents' news and action movie viewing on risky driving behavior: A longitudinal study. *Human Communication Research*, 37, 488-508. DOI: 10.1111/j.1468-2958.2011.01412.x.

Published version:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2958.2011.01412.x/abstract>

**The impact of adolescents' news and action movie viewing on risky driving behavior: a
longitudinal study**

Abstract

Traffic crashes remain an important cause of injury and death among young people. The aim of the current study was to examine whether adolescents' viewing of particular television genres predicted later risky driving. Data were collected with a two-wave panel survey (N=426), structural equation modeling was used in order to examine the relationships between television viewing and self-reported risky driving. Theoretically the study was framed within cultivation theory and the theory of planned behavior (TPB). In line with the hypotheses more news viewing appeared to be an indirect negative predictor of reckless driving, whereas more exposure to action programs was associated with more risk-taking in traffic. This relationship was mediated by risk-taking attitudes and intentions (cf.TPB). The implications for prevention are discussed.

Key Words: traffic, driving, risk-taking, media effects, television, news, action movies

Introduction

Worldwide traffic crashes are the leading cause of death among young people (World Health Organization, 2007). Mortality data indicate that in the member states of the European Union nearly 30% of deaths among 15-24 year olds are caused by transport collisions (Niederlaender, 2006). Recent research has shown that media use may be associated with young people's risk-taking in traffic. Fisher, Guter and Frey (2008) found that exposure to risk-promoting media is associated with risk-taking inclinations. Beullens, Roe and Van den Bulck (2008a) reported that the playing of racing and drive'em up video games is related to joyriding intentions. In another study Beullens and Van den Bulck (2008) showed that music video viewing was negatively associated with the assessment of the dangers of speeding and drunk driving, whereas television news viewers appeared to perceive these behaviors as more risky.

The aim of the current study is to extend this line of research by examining the longitudinal relationship between the viewing of specific television genres and self-reported risky driving behavior. The aforementioned studies have shown that there is a need to examine the relationship between media use and risky driving. However they have only dealt with short-term effects and focused mainly on risk-taking inclinations (Beullens et al., 2008a; Beullens & Van den Bulck, 2008; Fisher et al., 2008; Fisher, Kubitzki, Guter & Frey, 2007) However, from a prevention point of view, it is important to know whether these effects persist for longer periods of time and whether risk-taking intentions translate into actual behavior.

Two genres are particularly important in this context, namely news and action movies. Research has indicated that spectacular causes of death such as traffic crashes are overrepresented in newspapers (Combs & Slovic, 1979). Frost, Frank and Maibach's (1997) findings indicated that traffic crashes received 12.8 times more coverage compared to what could be expected based on their actual incidence. McArthur, Magaña, Peek-Asa and Kraus (2001), too, reported that visually intriguing causes of death received more attention in television news. Furthermore, within crash reports incidents with young people seem to be overrepresented (Connor & Wesolowski, 2004).

Thus, television news viewers appear often to be exposed to the consequences of risky driving behavior.

Action movie viewers, however, are confronted with a totally different message. Car chase scenes and risky driving in general are an important part of action movie content. A recent content analysis indicated that risky driving incidences are often depicted but that the drawbacks of this behavior remain unmentioned (Beullens, Roe & Van den Bulck, 2010). Beullens et al. (2010) reported that in 44.9% of the driving scenes in action movies one or another form of risk-taking is shown. Speeding, driving and braking with screeching tires, and quick braking or sudden decreases in speed were the risky driving acts most frequently encountered. However only 31.8% of the risky driving acts appeared to be followed by a traffic crash, only 2 people died, 4 people were injured and no legal penalties were observed in a total of 624 risky driving sequences. Other researchers have concluded that despite the frequent portrayal of risk-taking on television, the harmful or beneficial consequences of this behavior were only seldom shown (Cowan, Jones & Ho, 2006; Jacobson, Kreuter, Luke & Caburnay, 2001; Will, Porter, Geller & DePasquale, 2005).

Three particular forms of risky driving are under examination in this study, namely: speeding, joyriding (defined as taking risks in traffic in order to make driving more fun) and driving under the influence of alcohol. Research indicates that driving after alcohol consumption remains an important cause of traffic crashes (Chou et al., 2006). Alcohol consumption may result in an overestimation of driving abilities, a misperception of the risk in a particular situation and waning attention (Bos, Dreesen & Willems, 2006). These consequences already occur after consuming small quantities of alcohol. The relative risk of being involved in a fatal car crash appears to be 4 to 10 times greater for drivers with a blood alcohol concentration of .05 to .07 compared to drivers who have not consumed alcohol (Fell & Voas, 2006). Among young people the effects of alcohol consumption are even larger (Bos et al., 2006).

Speeding is another important cause of crashes, fatalities and injuries. Speeding shortens stopping distance and gives the driver less time to react in a dangerous situation (Williams,

Kyrychenko & Retting, 2006). Regardless of the fact that drivers acknowledge that speeding increases crash risk significantly, speeding is the most frequent traffic offense (De Pelsmacker & Janssens, 2007; Prigogine, 2003). An American survey on speeding and unsafe driving attitudes and behavior concluded that speeding is pervasive behavior since about three quarters of the respondents of the study reported having exceeded the speed limit within the past month (Royal, 2003). Speeding appeared to be more prevalent among younger drivers compared to older drivers, and declined with age (Royal, 2003). Even small violations of the speed limit increase the risk of being involved in a crash. The European Safety Council (1995) reported that a decrease in the average speed in the European Union of 5 km/h would result in 15% fewer injury crashes and 25% fewer fatal crashes.

The third form of risky driving that is under examination in the present study is fun riding or joyriding, defined as taking risks in traffic in order to make driving more fun (Ulleberg & Rundmo, 2002). This behavior appears to be portrayed on television a lot and poses obvious threats to traffic safety (Beullens et al., 2010; Chliaoutakis et al., 2002; Knight, Cook & Olson, 2004; Ulleberg & Rundmo, 2002, 2003). Chliaoutakis et al. (2002) found that the extent to which young drivers consider driving to be fun is a predictor of their involvement in traffic crashes. Li et al. (2008) reported that drivers with a street racing citation have a higher risk of being involved in traffic crashes compared to drivers without citations.

Theoretical framework

Theoretically the study is based on cultivation theory (Gerbner & Gross, 1976; Gerbner et al., 1986; Morgan & Shanahan, 2010) and the theory of planned behavior (TPB) (Ajzen, 1991). Cultivation theory posits that television is an important source of socialization and information for its viewers. Gerbner, Gross, Morgan, Signorielli and Shanahan (2002), for instance, defined cultivation effects as “the independent contributions television viewing makes to viewer conceptions of social reality” (p. 47). In the cultivation hypothesis it is assumed that long term

exposure to similar television content among heavy viewers may result in a world view similar to that which is frequently shown on television. Thus, cultivation theorists believe that there is a significant difference between the world as it is depicted on television and the 'real world' and that long term exposure to this television world may have an impact on viewers' perceptions and attitudes (Gerbner & Gross, 1976; Gerbner et al., 1986; Morgan & Shanahan, 2010). Although this implies that frequent television viewing may also exert an influence on viewers' behavior, this is not explicitly stated in cultivation theory. Most research on cultivation studies the relationship between television viewing and perceptions, judgments and attitudes. TPB (Ajzen, 1991) on the other hand proposes a framework for explaining individual behavior. In TPB it is argued that attitudes are good indirect predictors of behavior, through the intention to perform specific behavior in the future. Even though there are apparent discrepancies between TPB and cultivation, Nabi and Sullivan (2001) have argued that both have enough similarities to integrate them into one theoretical framework. According to cultivation theory, television viewing may lead towards the cultivation of values and opinions (referred to by some as 'second order beliefs') congruent with what is shown on television. According to Nabi & Sullivan (2001), these second order beliefs implicitly carry an evaluative component with them and as such they are similar to TPB's attitudes concept. Since both theories stem from different disciplines it is not surprising that their integration is not perfect. For example, whereas cultivation second order beliefs are more or less the result of an unconscious process, TPB conceptualizes them as the outcome of a more rational process. However, their combination proposes an interesting addition to both theories. For cultivation a link with behavior can be made, while for TPB television viewing is added as a possible indirect predictor of behavior. Following this rationale the present study examines whether long term exposure to particular television content, namely action programs and television news, is associated with several forms of risky driving behavior, via attitudes and intentions toward this form of risk-taking. Thus, following cultivation theory, it is expected that exposure to television viewing in the long run cultivates perceptions and attitudes in line with what is portrayed on TV. Following TPB it is expected that

these attitudes are good predictors of adolescents' intentions to drive riskily and that these intentions predict risky driving behavior (Ajzen, 1991). Ajzen has stated that a compatible level of specificity between the measurement of attitudes and behavior is necessary in order to find a relationship between both concepts. This 'principle of compatibility' means that measures of attitude and behavior have to involve "the same action, target, context, and time elements, whether defined at a very specific or at a more general level" (Ajzen & Fishbein, 2005, p. 183). Over the years this principle has been criticized in the literature (see Ajzen & Fishbein, 2005 and Armitage & Conner, 2001 for an overview). It has been argued that if attitudes toward a behavior are too specific, this would decrease their psychological significance. Ajzen and Fishbein (2005) replied to this criticism by arguing that these authors have misunderstood this 'principle of compatibility' and denoted that attitudes do not always have to be very specific but that they do have to be measured at the same level of specificity as behavior. Thus, while the prediction of specific behavior requires specific attitudes, the prediction of general behavior requires more general attitudes (Ajzen & Fishbein, 2005).

Cultivation theory has also been criticized over the years. Although cultivation theorists originally assumed that television content is relatively homogenous, and that tv-viewing is a mainly non-selective and ritualistic activity, these assumptions have been challenged by some cultivation authors. Several authors have argued that different genres focus on different aspects of reality and have therefore different effects (Bilandzic & Rössler, 2004; Cohen & Weimann, 2000; Potter, 1990, 1993). In their recent overview of cultivation research Morgan and Shanahan (2010) remark that the use of genres in cultivation research remains debatable, as cultivation deals with the metanarratives of television, while genres look at specific types of exposure. The authors do, however, acknowledge that it is now common for many researchers to use genres in cultivation research. In the current study we argue that different content types provide a different metanarrative regarding driving. Content analytic research indicates that the portrayal of driving behavior in television news and action programming is very different. An analysis of the framing of traffic crashes in television

news indicated that crashes were predominantly framed episodically (Beullens et al., 2008b). More specifically, in 85% of the cases a specific crash was emphasized without including additional information that might have provided a context for the crash, such as possible causal factors or preventive measures (Beullens et al., 2008b). Frequent viewers of action movies are exposed to a very different metanarrative. Dangerous driving behavior such as speeding and joyriding is frequently depicted in action movies and series, but the possible adverse consequences of this behavior are hardly ever shown. Furthermore, drivers in action movies often appear to be young males and characters with a lead role (Beullens et al., 2010). Since the portrayal of driving in action programming and television news is totally different, the study examines whether the frequent viewing of these genres is associated with different attitudes, intentions and behaviors.

The theoretical model which is tested in this study is presented in figure 1.

FIGURE 1: ABOUT HERE

We hypothesized that exposure to television news will be associated with more negative feelings toward speeding and joyriding in traffic, since traffic crashes are frequently covered in news stories. Action movie viewers, on the other hand, were expected to hold more positive attitudes toward speeding and joyriding since these behaviors are frequently portrayed in action movies, while their potential consequences are not.

Driving after the consumption of alcohol was examined as well. The expectations for this dependent measure were different. Beullens et al. (2011) reported that adolescents' video game playing predicts later risky driving behavior but only for behavior that is part of the content of the video game. For example, a relationship was found between the playing of racing and drive'em up games on the one hand and speeding and joyriding on the other hand, but no association was found between the playing of these games and driving after the consumption of alcohol. The authors

assumed that, unlike speeding and joyriding, driving after the consumption of alcohol is largely absent from the story line of most video games.

Similarly, content analytic research of action movies has shown that some forms of risky driving behavior occur more frequently than others. Beullens et al. (2010) found speeding to be the risky driving act that is most frequently portrayed in action movies, although joyriding, too, was portrayed regularly. Driving after consuming alcohol, however, appeared not to be frequently depicted in action movies. In a total sample of 287 driving scenes in action movies, driving after the consumption of alcohol was observed only 6 times (Beullens, 2009, p. 110). Therefore, we expected that exposure to action movies would not be related to driving after the consumption of alcohol. For news viewing we expected to find a negative relationship with driving after the consumption of alcohol, since news viewers are frequently confronted with the dangers associated with driving after the consumption of alcohol and research among adolescents has shown that more news viewing is associated with a higher perceived risk of drunk driving (Beullens & Van den Bulck, 2008). These expectations led to the following hypotheses:

H1: Adolescents' television news viewing is negatively related to respondents' attitudes toward speeding and joyriding.

H2: Adolescents' action movie viewing is positively related to respondents' attitudes toward speeding and joyriding.

H3: Adolescents' action movie viewing is not related to attitudes toward driving after the consumption of alcohol.

H4: Adolescents' news viewing is a negative predictor of attitudes toward driving after the consumption of alcohol.

Following TPB, attitudes toward risky driving behavior were expected to predict risky driving behavior indirectly through risk-taking intentions (Ajzen, 1991; Fishbein & Ajzen, 1975).

H5: Attitudes toward risky driving behavior positively predict risk-taking intentions.

H6: Risk-taking intentions positively predict self-reported risk-taking behavior.

Certain personality characteristics (aggression and sensation seeking) have been found to be associated with media use as well as risky driving behavior and were therefore added to the models as potential confounders. Several researchers reported an association between sensation seeking and a preference for certain media content. High sensation seekers appear to prefer stimulating and arousing media content such as action and horror movies, and watch these genres more often (Edwards, 1991; Perse, 1996; Potts et al., 1996; Schierman & Rowland, 1985; Zuckerman & Litle, 1986;). Aggression has also been found to be related with a preference for specific programs. Aluja-fabregat (2000) reported that adolescent males with a preference for violent movies were often described by their teachers as aggressive and short-tempered. Furthermore, it has been indicated that these personality characteristics are small but consistent predictors of risky driving. (o.a. Arnett, 1996; Chliaoutakis et al, 2002; Jonah, 1997; Sumer, 2003; Ulleberg & Rundmo, 2003). Arnett (1996) examined the extent to which sensation seeking and aggression are associated with risk-taking and found that both are positively associated with risky driving behavior such as speeding and driving under the influence of alcohol. Ulleberg and Rundmo (2003), too, emphasized the importance of adding personality characteristics to models examining the predictors of traffic related risk-taking but proposed a model in which sensation seeking and aggression (along with other personality characteristics) indirectly predict several forms of risky driving behavior such as speeding and joyriding.

Since it is the main objective of the study to examine whether adolescents' viewing of specific television genres predicts self-reported driving behavior, a longitudinal panel survey was used.

Method

Sample

Data were collected with a two-wave panel survey among a random sample of secondary schools in Flanders, Belgium. For the baseline measurement (2006), research assistants of the Katholieke Universiteit Leuven administered the questionnaires. These included measures of television and movie viewing, personality characteristics, attitudes and intentions toward risky driving. Confidentiality was explicitly assured before and after completion of the survey. The total sample consisted of 2193 adolescents, 65.2% were males, 34.8% were females. 41.7% of the respondents were born in 1988, 36.5% in 1989 ($M=1988$, $StD=.93$), thus the large majority of our respondents were 17 or 18 years old at baseline measurement. A large majority (91.3%) of the respondents in the first wave did not yet have their driver's license during data collection, since a definitive driver's license can only be obtained at the age of 18 in Belgium. As a result, their actual driving behavior was not assessed in the first wave of the survey. All respondents were given the option to opt in for the follow-up study. In total 89.5% agreed to take part in the second wave of the study and provided their home address, 71.3% provided their e-mail address.

Two years after the first wave of data collection the follow-up survey was administered. A follow-up web survey and two reminders were sent to all the students who had provided their email account (cf. Total Design Method (Dillman, 1978)). Respondents who did not reply were sent a pencil-and-paper questionnaire and a stamped addressed envelope at their home address. Two further reminders were sent in order to obtain as many respondents as possible. The postal survey and the web survey together resulted in 1104 respondents. Thus 50% of the respondents who completed the first questionnaire took part in the follow-up study.

For the current study a subsample ($N=426$) of respondents who completed both waves and had obtained their driver's license in the second wave of the study were selected for the data analyses. 48.3% were born in 1988, 25.5% in 1989 and 21.5% in 1987, 66.4% were males and

33.6% were females. Permission to interview the children was obtained from the legal guardians of the children. The study and sampling method were approved by the authors' Institutional Ethics Committee at the Katholieke Universiteit Leuven.

Measures

The aim of the study is to test whether news watching and action program viewing during adolescence predict later risky driving behavior. Since most adolescents did not have their driver's license at time 1, actual driving behavior was measured at time 2. Television viewing, attitudes, intentions and personality characteristics were seen as the predictors of risk-taking, thus they were measured in the first wave.

Joyriding and speeding were measured with items from Begg and Langley's (2004) risky driving scale: (1) How often do you drive fast for the thrill of it?; (2) How often do you take risks when driving to make driving more fun? (3) How often do you drive faster than allowed on the open road? Response categories were (0) never, (1) seldom, (2) sometimes, (3) often, (4) very often and (5) always. In accordance with Beullens et al. (2011) items 1 and 3 were used as a measure for speeding, and item 1 and 2 for joyriding.

Driving after alcohol consumption was assessed by 2 items: In the last year, how often have you (1) driven a car while you may have had too much alcohol?, (2) driven a car while you definitively had too much alcohol? Response categories were (0) never, (1) a few times a year, (2) about once a month, (3) a few times a month, (4) about once a week, (5) a few times a week, (6) (almost) every day.

Fishbein and Ajzen (1975, p. 288) defined intention as "[...] a person's subjective probability that he will perform some behavior". Risky driving intentions were assessed in the questionnaire as part of a list of items. Respondents had to indicate whether they thought they would (1) drive faster than allowed, (2) drive while they might have had too much alcohol, (3) drive while they had definitely had too much alcohol, (4) take risks to make driving more fun in the future (5) drive faster than allowed on the highway. Items 1 and 4 were used as measures for

joyriding intentions. Items 2 and 3 both loaded on the latent drinking and driving variable and items 1 and 5 were used as measures for speeding intentions (Beullens et al., 2011). Response categories were (0) never, (1) seldom, (2) sometimes, (3) often, (4) very often and (5) always.

Ulleberg and Rundmo's (2002) validated scale was used to measure risky driving attitudes. Principal components analysis with oblique rotation showed the same factor structure as the authors of the scale found. In the scale 3 items measure attitudes toward drunk driving (Cronbach's Alpha =.75) (e.g. 'I might get in the car with a driver who has been drinking'), 5 items are used for assessing speeding ($\alpha=.80$) (e.g. 'I think it is Ok to speed if the traffic conditions allow you to do so') and 3 items for joyriding ($\alpha=.78$) (e.g. 'Speeding and excitement belong together when you are driving'). Response (4-points) ranged from (1) do not agree at all, (2) do not agree, (3) agree, to (4) totally agree.

News exposure, television action programming and action movie viewing were measured as part of a long list of content types. Respondents had to answer 'how often do you watch' (1) television news, (2) action programming such as (list of programs aired at the time) and (3) action movies on a scale (1) never, (2) a few times a year, (3) about once a month, (4) a few times a month, (5) about once a week, (6) a few times a week and (7) (almost) every day. Action programming and action movie viewing both loaded on the latent construct 'action content'.

Finally, physical aggression was assessed with The Aggression Questionnaire (Buss & Perry, 1992) (Cronbach's Alpha=.81) and the intensity factor of sensation seeking with Arnett's Inventory of Sensation Seeking (AISS) (Arnett, 1994; Haynes, Miles & Clements, 2000). Principal components analysis with oblique rotation indicated that 6 items of the original scale loaded on the intensity factor. Two items were removed from the factor since they referred to media content (e.g. 'I like a movie where there are a lot of explosions and car chases'). 4 variables loaded onto the intensity factor and were kept in the analyses (Cronbach's Alpha =. 57). Responses for both personality characteristics ranged from (1) do not agree at all, (2) do not agree, (3) agree, to (4) totally agree.

Analyses

The aim of the current study is to examine whether exposure to particular television genres predicts later reckless driving and by which constructs this relationship is mediated. SPSS 17.0 was used for the descriptive statistics, AmosTM 17.0 for estimating structural equation models. Constructs which have been shown to correlate with the dependent variables and the exposures variable (i.e. measures of physical aggression and intensity) were added as potential confounders (Gulliver & Begg, 2004; Hall, 2005ab; Jonah, 1997). The technique of structural equation modeling was used in this study in order to test the theoretical framework. It was used to check whether the data support the theoretical model. The following ‘strategy for analyses’ was used. First the hypothetical model was constructed based on the literature. Second, this model was tested in order to see whether it fitted the data. The parameter estimates of the different relationships in the model were examined. Next, following the advice of Aish and Jöreskog (1990, p. 441), a new model was estimated without the non-significant parameters. The fit indices of this respecified model as well as the parameter estimates are discussed in the results section. Furthermore multiple group analyses were used to test whether the model applies for males as well as females. These analyses examine whether a model fits two or more datasets at the same time. This allows the comparison of multiple groups. Following Arbuckle (2005, p. 165) it may be argued that this analysis is more correct compared to executing separate analyses for different groups if there are only small differences between the groups.

Critical ratios for differences (crfd) were used in order to test whether the strength of standardized regression coefficients differs significantly for different relationships within one model or between groups. This critical ratio statistic was evaluated by using a table of the standard normal distribution. If the critical value was less in magnitude than 1.96, the hypotheses that two regression weights are equal was not rejected (Arbuckle, 2005, pp. 116-119).

Results

Frequencies of risky driving, news watching and the viewing of action programs

7.2% of the respondents never watched television news, 25.7% watched every day, 32% several times a week, 14.4% about once a week, 13.9% once or a few times a month.

Action movies too appeared to be very popular. Only 6.2% reported never to watch them, 20.4% a few times a year, 17.3% about once a month, 24.9% a few times a month and 31.2% at least once a week. 44.8% never watches action series, 11.8% a few times a year, 23.3% once or a few times a month and 20% at least once a week. Males watched significantly more action movies and series than females did (series: $t(370.073)=6.395$, $p<.01$; movies: $t(299.285)=11.748$, $p<.01$). No significant differences in news viewing were found.

All of the risky driving behaviors appeared to be more popular among males than females. Males reported driving more frequently under the influence of alcohol (item 1: $t(396,101)=4,381$, $p<.01$; item 2: $t(413,465)=3,335$, $p<.01$), speeding more frequently and taking risks in traffic in order to make driving more fun (item 1: $t(349.963)=7.156$, $p<.01$; item 2: $t(408.413)=6.785$, $p<.01$; item 3: $t(414)=7.414$, $p<.01$) more frequently than females did. Speeding was the most popular risk behavior.

29.9% of the respondents reported seldom driving for the thrill of it, 14.6% sometimes, 5.5% often and 3.1% very often or even on a daily basis. 1% admitted to taking risks when driving to make it more fun very often or always, 24.7% seldom and 11.5% regularly. 62.8% never exhibited this behavior. 87.5% of the drivers reported (at least seldom) driving faster than allowed on the highway. Only 12.5% never speed on the highway, whereas 46.2% do so regularly and 19.2% almost always.

Driving after the consumption of alcohol was less prevalent in the sample. 17.3% reported having engaged in driving while they might have had too much alcohol a few times a year and 6.1% at least once a month. 11.1% drove at least a few times a year when they definitely had consumed too much alcohol, 88.9% never took the car when they were in this condition.

News and action programs as predictors of risky driving

The relationship between news and action programming, on the one hand, and risky driving behavior on the other hand was tested for three specific forms of risky driving behavior, namely speeding, joyriding and driving under the influence of alcohol. Fernandes, Job and Hatfield (2007) have indicated that different forms of risky driving behavior are predicted by different variables. Therefore three separate structural equation models were estimated in order to test the hypothetical model.

Joyriding

First, it was examined whether adolescents' news and action movie viewing predict later joyriding. Although the fit indices for the initial model were acceptable, some of the standardized regression coefficients were not significant. Following Aish and Jöreskog (1990, p. 441) a new model was estimated without a relationship between physical aggression on the one hand and news viewing, attitudes toward joyriding and actual joyriding on the other hand (cf. figure 2). Maximum likelihood estimates provided support for this respecified model ($\chi^2=375.982$, $df=222$, $\chi^2/df=1.694$, $p=.000$, CFI=.941, RMSEA=.040). As shown in figure 2, and in line with the hypotheses, adolescents' viewing of action programs was a positive predictor of attitudes toward joyriding (standardized regression coefficient $\gamma=.24$) (H2). News viewing was a negative marker for these attitudes ($\gamma=-.13$) (H1). Respondents' attitudes predicted positively their intention to exhibit this behavior in the future ($\gamma=.71$) (H5). These intentions were a good indicator of later joyriding ($\gamma=.50$) (H6). These relationships remained significant after controlling for the intensity factor of sensation seeking and physical aggression. The model succeeded in explaining 39% of the variance in self-reported joyriding, 50% of the intention toward this behavior, 39% of action program viewing and 44% of joyriding attitudes.

FIGURE 2: ABOUT HERE

Multiple group analyses indicated that the model fitted for females as well as males ($\chi^2=645.158$, $df=444$, $\chi^2/df=1.453$, $p=.000$, $CFI=.900$, $RMSEA=.033$). However, a closer inspection of the standardized regression coefficients revealed that for females there is no significant relationship between television viewing and attitudes toward joyriding. Also, other associations were non-significant within this group, e.g. the relationship between intensity and action viewing, intensity and joyriding, and physical aggression and action viewing. For females 27% of the variance in the endogenous variable was explained by the model, for males the explained variance mounted up to 34%. The strength of the relationship between news, action viewing and joyriding attitudes is not significantly different between the two subgroups. However, within the total sample, the relationship between news viewing and joyriding attitudes ($\gamma=-.13$) was significantly less strong than the one between action viewing and joyriding attitudes ($\gamma=.24$) ($crfd=-2,946$).

In sum, these analyses provide support for hypotheses 1, 2, 5 and 6. Young adults self-reported joyriding seems to be predicted by their television viewing two years earlier. Television news viewing is associated with negative feelings toward joyriding, action movie viewing was associated with more positive feelings toward this particular form of risk-taking. These attitudes indirectly predict joyriding through the intention to perform this behavior in the future.

Speeding

A second model was estimated in order to check whether the hypothetical model also succeeds in predicting speeding behavior. The analyses indicated that some of the standardized regression coefficients were non-significant. Therefore, a new model was estimated without these relationships. This resulted in the model presented in figure 3.

FIGURE 3: ABOUT HERE

The fit indices show that the model fits the data ($\chi^2=506.670$, $df=269$, $CMIN/df= 1.884$, $p=.000$, $CFI=.914$, $RMSEA=.046$). The model succeeded in explaining 44% of the endogenous variable 'speeding behavior', 51% of the variance in action programming, 24% of speeding attitudes and 50% of speeding intentions. Contrary to what was hypothesized (cf. H1), television news viewing

was not significantly related to the respondents' attitudes toward speeding. Action program viewing however was a significant predictor of these attitudes (H2). Frequent exposure to this content was associated with more positive feelings toward speeding ($\gamma=.49$).

Furthermore, hypotheses 5 and 6 were also confirmed. Self-reported speeding behavior appeared to be predicted by adolescents' intentions to speed ($\gamma=.52$) and their attitudes ($\gamma=.71$) toward this behavior. These relationships remained significant after controlling for sensation seeking and physical aggression.

Multiple group analyses were executed in order to check whether the relationship between tv-viewing and speeding attitudes exists for males as well as females. Although the fit indices indicated that the model fits for both subgroups ($\chi^2=808.467$, $df=538$, $CMIN/df=1.5$, $p=.000$, $CFI=.874$, $RMSEA=.034$), some of the standardized regression coefficients appeared to be non-significant. In neither of the subgroups was a significant relationship between intensity and speeding and between physical aggression and action program viewing found. For females the relationship between intensity and action viewing was non-significant. The strength of the standardized regression coefficient for the relationship between action viewing and attitudes did not differ for males and females. Thus, the relationship occurred in both groups and was of equal strength ($crfd=.175$).

Driving after the consumption of alcohol

Finally, a last model was estimated in order to falsify our theoretical framework. Since the combination of drinking and driving is not frequently portrayed in action movies, we expected not to find a relationship between the exposure to action movies and self-reported driving (H3). In order to test this hypothesis, the model specification was adapted by fixing the parameter of the relationship between action viewing and attitudes at zero. For news viewing a different hypothesis was proposed. News viewers are predominantly confronted with the consequences of dangerous driving behavior through the frequent portrayal of traffic crashes in the news. Therefore we

hypothesized that the relationship between news viewing and attitudes toward driving after the consumption of alcohol would be negative (H4).

Similar to the other models, changes had to be made to the original model since some of the standardized regression coefficients were not significant. The respecified model is shown in figure 4. The fit indices provided support for this new model ($\chi^2=370.363$, $df=224$; $CMIN/DF=1.653$, $p=.000$; $CFI=.944$; $RMSEA=.039$). In line with hypothesis 3 no significant relationship was found between action program viewing and driving after the consumption of alcohol. However no confirmation was found for hypothesis 4. Television news viewing was not a significant predictor of attitudes toward drunk driving.

In line with the previously estimated models and in line with our expectations, attitudes toward risky driving predicted intentions (H5), which in turn were direct predictors of self-reported behavior (H6). Multiple group analyses indicated that the model fitted for males as well as females ($\chi^2=625.781$, $p=.000$, $CMIN/DF=1.403$, $df=446$, $CFI=.918$, $RMSEA=.031$)

FIGURE 4: ABOUT HERE

Discussion

In the past scholars have expressed their concerns about the portrayal of driving in the media (Arnett et al., 2002; Reinhardt-Rutland, 2007). Content analyses have indicated that television fiction, movies and even children's programming often portray risky driving behavior while the negative consequences associated with this behavior are hardly ever shown (Cowan et al., 2006; Glik et al., 2005; Jacobson et al., 2001; Will et al., 2005). This contrasts with the depiction of driving in the news. The analyses of driving in the media are often performed from the hypothesis that media content may influence its users. However, to our knowledge, the current study is the first to look at the longitudinal relationships between specific television genres and self-reported driving behavior.

In line with action programming's content, it was hypothesized that the viewing of action programs would positively predict adolescents' joyriding and speeding, via attitudes and intentions towards these behaviors. For television news viewing the opposite was expected. In view of the overemphasis on traffic collisions in the news media and the overrepresentation of teenagers in this reporting, it was hypothesized that more news viewing would result in more negative attitudes toward joyriding and speeding. These attitudes were expected to be a good predictor of later joyriding behavior. Measures for physical aggression and intensity seeking were added to these models since past research has indicated that these constructs are associated with television viewing and risk behavior in traffic.

The data largely confirmed the proposed hypotheses. Both action viewing and news viewing predicted later self-reported joyriding, although in different directions. More action viewing was associated with more positive attitudes toward joyriding. More news viewing was negatively associated with attitudes toward joyriding. Contrary to what was expected, television news viewing was not an indirect predictor of speeding behavior, but action movie viewing was. More specifically, action movie viewing positively predicted self-reported speeding. The relationships between television viewing and risky driving were indirect and were mediated by adolescents' attitudes and intentions. Thus the structural equation models provided support for our hypothetical model.

In the current study the relationship between the viewing of specific television genres and risky driving behavior was examined from the perspective of cultivation theory and TPB. It was hypothesized that the relationship between television viewing and risky driving behavior may be explained by the content of these television programs. In order to test this assumption, an extra structural equation model with driving after the consumption of alcohol was estimated. Given that research has indicated that driving after consuming alcoholic beverages is not frequently portrayed in action movies (unlike joyriding and speeding), no relationship should have been found between action movie viewing and self-reported drunk driving. For news viewing a negative relationship

with this dependent construct was hypothesized since traffic crashes are frequently displayed in television news. Partial support was found for these hypotheses. In line with our expectations, action content viewing did not predict driving after alcohol consumption. Opposite to our expectations, neither did television news viewing succeed in explaining driving after the consumption of alcohol. In sum, all the hypotheses concerning action programming were confirmed. Adolescents' action program viewing predicted the extent to which they report engaging in joyriding and speeding two years later and this relationship was mediated by attitudes and intentions. The hypotheses concerning news viewing were only partly confirmed since news viewing appeared to be a negative indirect predictor of joyriding (through attitudes and intentions) but did not explain self-reported speeding. In line with cultivation theory the results seem to indicate that this relationship between the viewing of particular television genres and specific forms of risky driving might be explained by the content of these programs.

The results of this study are in line with what Beullens et al. (2011) reported on the longitudinal relationship between video game playing and risky driving behavior. In this study it was found that the playing of racing and drive'em up games was an indirect predictor of risky driving behavior, under the condition that the specific behavior was depicted in the game content. Furthermore, it was found that this association between gaming and risk-taking was mediated by attitudes and intentions. The fact that the results of the current study are in line with previous research findings provides extra support for the theoretical framework.

In general, the results of this study provide support for the assumptions of genre specific cultivation research and show that different genres might have differential effects. Furthermore, the integration of TPB and cultivation proposes an interesting theoretical extension to cultivation theory. While cultivation research usually implies that frequent television viewing may also exert an influence on viewers' behavior, this is not explicitly stated in cultivation theory. By examining the link between television viewing and behavior explicitly, the current study goes a step further than is usual in the literature. By combining these theories a deeper insight into some of the ways media

use might lead to behavior is gained. For the future development of TPB the theoretical framework used is interesting since media use is added. The theory states that attitudes and beliefs influence behavior indirectly, but does not elaborate on how beliefs and attitudes are formed. Cultivation theory addresses this issue by postulating television as our cultural storyteller and by examining the relationship between tv-viewing, perceptions and attitudes.

Transportation theory (Green & Brock, 2000) might explain the small predictive power of television news viewing in this study. Transportation theory argues that the persuasive impact of a narrative depends on the extent to which recipients are absorbed or ‘transported’ into the story. The more a recipient is involved with a protagonist, the bigger the persuasive influence of that particular story will be. Green and Brock (2000) stated that when transportation into a story is high, parts of the world of origin become inaccessible, which results in a higher degree of acceptance of the presented story. Thus, highly transported people may be more likely to believe story claims which may result in beliefs congruent to what is depicted in the story, regardless of whether the story is fictional or nonfiction. Green and Brock’s study (2000) provided support for this theory and indicated that a high degree of transportation is associated with more story-consistent beliefs and more positive evaluations of the story protagonists. In view of transportation theory, the results of the current study are not surprising. It might be assumed that the narrative content of action movies, more than television news, is directed at absorbing viewers into the story. Therefore a larger effect from action movies might be expected than from television news. Self-evidently more research is needed in order to test this assumption.

The current study adds four main findings to the literature on risky driving. First, it showed that television viewing is a significant predictor for risky driving attitudes, intentions and self-reported behavior. Although scholars have argued that there may be an impact of media use on risky driving (Arnett et al., 2002; Harré, 2000; Reinhardt-Rutland, 2007), this relationship has remained largely unexamined. Second, the findings demonstrated that the direction of this relationship is different for different television genres. This indicated that the content of these media

may have something to do with the occurrence of the relationship. However, further research is necessary in order to confirm this assumption. Third, the models seem to show that the relationship between television viewing and attitudes towards joyriding cannot be explained by the confounding effect of intensity seeking or physical aggression, since these variables were controlled for in the models. Fourth, the fact that the media use of adolescents predicts later risky driving behavior is of particular importance for prevention campaign planners. In the current study adolescents' attitudes at time 1 (when they did not yet have their driver's license) were a marker for their self-reported driving behavior two years later. This suggests that traffic safety campaigns should promote safe driving before adolescents develop attitudes or intentions regarding driving and that these intentions predate and predict actual driving. This finding is in line with previous research which has also indicated that attitudes about safety are formed at a very early age (long before legal driving) and that it is therefore important to try to target young adolescents (Berg, 2006; Whissell & Bigelow; 2003). The results of the current study provide information on which subgroups might be interesting to address with prevention campaigns. Thus, prevention can take place before these adolescents put themselves and other people at risk in traffic. Research has indicated that well-executed mass media campaigns can lower risky driving behavior (Elder et al., 2004; Wakefield, Loken & Hornik, 2010). Especially when these campaigns are part of a comprehensive more community based approach which tries not only to alternate individual behavior but also focuses on the larger social system (Abroms & Maibach, 2008; DeJong & Hingson, 1998).

Although the present study found some interesting results, several limitations remain. First, although panel data were used, the study does not allow us to make causal claims. The possibility remains that other factors, which have not been added to this study, explain both television viewing and risk-taking attitudes. This would mean that no causal relationship exists between tv-viewing and risk-taking attitudes. Second, the current study used a limited sample of Flemish adolescents. Therefore it is a priori impossible to state that the relationships found in this study also exist in other populations. In Flanders 61.1% of the movies broadcast on public television and 88% of the

movies shown on commercial television originate from the US (De Bens & De Smaele, 2001). In other European regions/countries, too, American movies predominate on television (De Bens & De Smaele, 2001). Thus, the content to which the respondents in the current study are exposed is to a certain extent similar to what other adolescents around the world are exposed to. However, this would not automatically imply that no cross-cultural differences exist. Third, self-report measures were used in order to assess the different constructs of the study. Although research has shown that these have a good validity when the confidentiality of the study is assured (Campanelli, Dielman & Shope, 1987; White, 1991), they remain a non-objective measure of risk-taking.

Experimental and ecological studies may be helpful to provide insight into the direction of the relationship between media use and risk-taking in traffic and the reason for this association. However, in our view, the causal question is not the most important one. Even if media use does not cause risky driving, the data of this study indicate that it partly succeeds in predicting it. For prevention workers this is in itself noteworthy. The data showed that future risk takers may be identified through their media use before actual risk-taking occurs. Thus, the results of the study provide us with more knowledge as to which young people may be at risk, and through which channels they might best be addressed.

Acknowledgement

The study was funded by a subsidy from the “Lifeline Project” (grant n° 7.0003.05) of the Research Foundation – Flanders (FWO). The corresponding author is a postdoctoral fellow of the Research Foundation – Flanders (FWO). We thankfully acknowledge the foundation’s support. Furthermore we would like to thank the reviewers for their insightful comments on an earlier version of this manuscript. Their comments and advice have greatly improved the manuscript.

References

- Abroms, L.C., & Maibach, E.W. (2008). The effectiveness of mass communication to change public behavior. *American Review of Public Health*, 29, 219-234.
- Aish, A.M., & Jöreskog, K.G. (1990). A Panel Model for Political Efficacy and Responsiveness: An Application of LISREL 7 with Weighted Least Squares. *Quality and Quantity*, 24, 405-426.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I., & Fishbein, M. (2005). The influence of Attitudes on Behavior. In D. Albarracin, B.T. Johnson & M.P. Zanna (Eds.), *The Handbook of attitudes* (pp. 173-221). Mahwah, New Jersey-London: Lawrence Erlbaum Associates.
- Aluja-Fabregat, A. (2000). Personality and curiosity about TV and films violence adolescents. *Personality and Individual Differences*, 29(2), 379-392.
- Arbuckle, J.L. (2005). *AmosTM 6.0 User's guide*. Chicago: Amos development Corporation.
- Armitage, C.J., & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40, 471-499.
- Arnett, J.J. (1994). Sensation seeking: A new conceptualization and a new scale. *Personality and Individual Differences*, 16, 289-296.
- Arnett, J.J. (1996). Sensation seeking, aggressiveness, and adolescent reckless behavior. *Personality and Individual Differences*, 20(6), 693-702.
- Arnett, J.J., Irwin, C.E., & Halpern-Felsher, B.L. (2002). Developmental sources of crash risk in young drivers. *Injury Prevention*, 8(Suppl. 2), 17-21.
- Begg, D., & Langley, J. (2004). Identifying predictors of persistent non-alcohol or drug-related risky driving behaviors among a cohort of Young adults. *Accident Analysis and Prevention*, 36(6), 1067-1071.
- Berg, H.Y. (2006). Reducing crashes and injuries among young drivers: what kind of prevention

should we be focusing on. *Injury Prevention*, 12(Suppl 1), i15-i18.

Beullens, K., & Van den Bulck, J. (2008). News, music videos and action movie exposure and adolescents' intentions to take risks in traffic. *Accident Analysis & Prevention*, 40, 349-356.

Beullens, K. (2009). *Stuurloos? Een onderzoek naar het verband tussen mediagebruik en risicogedrag in het verkeer bij jongeren* [doctoral thesis]. Leuven: School for Mass Communication Research, K.U.Leuven.

Beullens, K., Roe, K., & Van den Bulck, J. (2008a). Video games and adolescents' intentions to take risks in traffic. *Journal of Adolescent Health*, 43(1), 87-90.

Beullens, K., Roe, K., & Van den Bulck, J. (2008b). Television news' coverage of motor vehicle crashes. *Journal of safety research*, 39(5), 547-553.

Beullens, K., Roe, K., & Van den Bulck, J. (2010). The portrayal of risk-taking in traffic: A content analysis of popular action movies. *Journal of Communications Research*, 2(1), 1-7.

Beullens, K., Roe, K., & Van den Bulck, J. (2011). Excellent gamer, excellent driver? The impact of adolescents' video game playing on driving behavior: a two-wave panel study. *Accident Analysis & Prevention*, 43, 58-65. .

Bilandzic, H., & Rössler, P. (2004). Life according to television. Implications of genre- specific cultivation effects: The Gratification/Cultivation model. *Communications*, 29, 295-326.

Bos, K., Dreesen, A., & Willems, B. (2006). *Ongevalbetrokkenheid van jongeren. Deel I – Internationale literatuurstudie naar oorzakelijke en/of bijdragende factoren*. Steunpunt voor verkeersveiligheid. Retrieved from <http://www.steunpuntverkeersveiligheid.be>.

Buss, A.H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, 63, 452-459.

Campanelli, P.C., Dielman, T.E., & Shope, J.T. (1987). Validity of adolescents' self reports of alcohol use and misuse using a bogus pipeline procedure. *Adolescence*, 22(85), 7-22.

Chliaoutakis, J.E., Demakakos, P., Tzamalouka, G., Bakou, V., Koumaki, M., & Darviri, C.

(2002). Aggressive Behavior While Driving as Predictor of Self-Reported Car Crashes. *Journal of Safety Research*, 33(4), 431-443.

Chou, S.P., Dawson, D.A., Stinson, F.S., Huang, B.J., Pickering, R.P., Zhou, Y., & Grant, B.F.

(2006). The prevalence of drinking and driving in the United States, 2001-2002: Results from the national epidemiological survey on alcohol and related conditions. *Drug and Alcohol Dependence*, 83(2), 137-146.

Cohen, J., & Weimann, G. (2000). Cultivation revisited: some genres have some effects on some viewers. *Communication Reports*, 13(2), 99-114.

Combs, B., & Slovic, P. (1979). Newspaper Coverage Of Causes of Death. *Journalism Quarterly*, 56(4), 837-849.

Connor, S.M., & Wesolowski, K. (2004). Newspaper framing of fatal motor vehicle crashes in four Midwestern cities in the United States, 1999-2000. *Injury Prevention*, 10, 149-153.

Cowan Jr., J.A., Jones, B., & Ho, H. (2006). Safety Belt Use by Law enforcement Officers on Reality Television: A Missed Opportunity for Injury Prevention? *The Journal of Trauma, Injury, Infection, and Critical Care*, 61(4), 1001-1004.

De Bens, E., & de Smaele, H. (2001). The inflow of American Television Fiction on European Broadcasting Channels Revisited. *European Journal of Communication*, 16, 51-76.

DeJong, W., & Hingson, R. (1998). Strategies to reduce driving under the influence of alcohol. *Annual Review of Public Health*, 19, 359-378.

De Pelsmacker, P., & Janssens, W. (2007). The effect of norms, attitudes and habits on speeding behavior: Scale development and model building and estimation. *Accident Analysis & Prevention*, 39(1), 6-15.

Dillman, D.A. (1978). *Mail and telephone surveys. The total design method*. New York: Wiley.

- Edwards, E.D. (1991). The ecstasy of horrible expectations: Morbid curiosity, sensation seeking, and interest in horror movies. In B.A. Austin (Ed.), *Current research in film: Audiences, economics, and law* (Vol. 5, pp. 19-38). Norwood, NJ: Ablex.
- Elder, R.W., et al. (2004). Effectiveness of mass media campaigns for reducing drinking and driving and alcohol-involved crashes. A systematic review. *American Journal of Preventive Medicine*, 27(1), 57-65.
- European Transport Safety Council (ETSC) (1995). *Reducing traffic injuries resulting from excess and inappropriate speed*. Retrieved from <http://www.etsc.be>.
- Fell, J.C., & Voas, R.B. (2006). The effectiveness of reducing illegal limits for driving: Evidence for blood alcohol concentration (BAC) lowering the limit to .05 BAC. *Journal of Safety Research*, 37(3), 233-243.
- Fernandes, R., Job, R.F.S., & Hatfield, J. (2007). A challenge to the assumed generalizability of prediction and countermeasure for risky driving: Different factors predict different risky driving behaviors. *Journal of Safety Research*, 38, 59-70.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior. An introduction to Theory and Research*. Reading, Massachusetts: Addison-Wesley Publishing Company.
- Fischer, P., Guter, S., & Frey, D. (2008). The effects of risk-promoting media on inclinations toward risk-taking. *Basic and Applied Social Psychology*, 30, 1-11.
- Fischer, P., Kubitzki, J., Guter, S., & Frey, D. (2007). Virtual driving and risk-taking: Do racing games increase risk-taking cognitions, affect and behaviors? *Journal of Experimental Psychology: Applied*, 13(1), 22-31.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior. An introduction to Theory and Research*. Reading, Massachusetts: Addison-Wesley Publishing Company.
- Frost, K., Frank, E.F., & Maibach, E. (1997). Relative Risk in the News Media: A Quantification of Misrepresentation. *American Journal of Public Health*, 87(5), 842-845.

- Gerbner, G., & Gross, L. (1976). Living with television: the violence profile. *Journal of Communication*, 26(26), 172-194.
- Gerbner, G., Gross, L., Morgan, M., & Signorielli, N. (1986). Living with Television: The Dynamics of the Cultivation Process. In J. Bryant & D. Zillmann (Eds.), *Perspectives on Media Effects* (pp.17-40). New Jersey: Lawrence Erlbaum Associates..
- Gerbner, G., Gross, L., Morgan, M., Signorielli, N., & Shanahan, J. (2002). Growing up with television: Cultivation processes. In J. Bryant & D. Zillmann (Eds.), *Media effects: Advances in theory and research* (pp. 43-67). Mahwah, NJ: Erlbaum.
- Glik D, Kinsler J, Todd W, et al.(2005). Unintentional injury depictions in popular children's television programs. *Injury Prevention*, 1(4), 237-241.
- Green, M.C., & Brock, T.C. (2000). The Role of Transportation in the Persuasiveness of Public Narratives. *Journal of Personality and Social Psychology*, 79(5), 701-721.
- Gulliver, P., & Begg, D. (2004). Influences During Adolescence on Perceptions and Behaviour Related to Alcohol Use and Unsafe Driving as Young Adults. *Accident Analysis & Prevention*, 36, 773-781.
- Hall, A. (2005a). Audience Personality and the Selection of Media and Media Genres. *Media Psychology*, 7, 377-398.
- Hall, A. (2005b). Sensation Seeking and the Use and Selection of Media Materials. *Psychological Reports*, 97, 236-244.
- Harré, N. (2000). Risk Evaluation, Driving, and Adolescents: a Typology. *Developmental Review*, 20, 206-226.
- Haynes, C.A., Miles, J.N., & Clements K. (2000). A confirmatory factor analysis of two models of sensation seeking. *Personality and Individual Differences*, 29, 823-839.
- Jacobson, H.A., Kreuter, M.W., Luke, D., & Caburnay, C.A. (2001). Seat Belt Use in Top Grossing Movies vs Actual US Rates 1978-1998. *American Journal of Public Health*, 91(9), 1395-1396.

- Jonah, B.A. (1997). Sensation seeking and risky driving: a review and synthesis of the literature. *Accident Analysis & Prevention*, 29(5), 651-665.
- Knight, S., Cook, L.J., & Olson, L.M. (2004). The fast and the fatal: street racing fatal crashes in the United States. *Injury Prevention*, 10, 53-55.
- Li, Z., Knight, S., Cook, L.J., Hyde, L.K., Holubkov, R., & Olson, L.M. (2008). Modeling motor vehicle crashes for street racers using zero-inflated models. *Accident Analysis & Prevention*, 40, 835-839.
- McArthur, D.L., Magaña, D. Peek-Asa, C., & Kraus, J.F. (2001). Local television news coverage of traumatic deaths and injuries. *Western Journal of Medicine*, 175, 380-384.
- Morgan, M., & Shanahan, J. (2010). The state of cultivation. *Journal of Broadcasting & Electronic Media*, 54(2), 337-355.
- Nabi, R.L., & Sullivan, J.L. (2001). Does television viewing relate to engagement in protective action against crime? A cultivation analysis from a theory of reasoned action perspective. *Communication research*, 28(6), 802-825.
- Niederlaender, E. (2006). *Causes of Death in Europe. Eurostat. Statistics in focus*. Eurostat. Population and social conditions. Health. European Communities[online]. Retrieved from http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-06-010/EN/KS-NK-06-010-EN.PDF.
- Perse, E.M. (1996). Sensation Seeking and the use of television for arousal. *Communication Reports*, 9(1), 37-48.
- Potts, R., Dedmon, A., & Halford, J. (1996). Sensation Seeking, Television Viewing Motives, and Home Television Viewing Patterns. *Personality and Individual Differences*, 21(6), 1081-1084.
- Potter, J.W. (1990). Adolescents' perceptions of the primary values of television programming. *Journalism Quarterly*, 67(4), 843-851.

- Potter, J.W. (1993). Cultivation Theory and Research: 'A conceptual Critique'. *Human Communication Research*, 19(4), 564.
- Prigogine, J. (2003). *Beeld over snelheid in België*. Belgisch Instituut voor verkeersveiligheid (BIVV). Brussel. Retrieved from <http://www.bivv.be>.
- Reinhardt-Rutland, T.H. (2007). Transportation safety issues portrayed on television: some thoughts on driver distraction. *Injury Prevention [eLetter]* Retrieved from <http://injuryprevention.bmj.com/cgi/eletters/12/6/400#1626>.
- Royal, D. (2003). *Volume II: Findings National Survey of Speeding and Unsafe Driving Attitudes and Behavior: 2002*. The Gallup Organization. Washington DC. Retrieved from http://www.nhtsa.dot.gov/people/injury/drowsy_driving1/speed_volII_finding/SpeedVolumeIIFindingsFinal.pdf.
- Schierman, M.J., & Rowland, G.L. (1985). Sensation-seeking and selection of entertainment. *Personality and Individual Differences*, 6(5), 599-603.
- Sumer, N. (2003). Personality and behavioural predictors of traffic accidents: testing a contextual mediated model. *Accident Analysis and Prevention*, 35(6), 949-964.
- Ulleberg, P., & Rundmo, T. (2002). Risk-Taking Attitudes Among Young Drivers: the Psychometric Qualities and Dimensionality of an Instrument to Measure Young Drivers' Risk-Taking Attitudes. *Scandinavian Journal of Psychology*, 43(3), 227-237.
- Ulleberg, P., & Rundmo, T. (2003). Personality, Attitudes and Risk Perception as Predictors of Risky Driving Behaviour Among Young Drivers. *Safety Science*, 41(5), 427- 443.
- Wakefield, M.A., Loken, B., & Hornik, R.C. (2010). Use of mass media campaigns to change health behaviour. *Lancet*, 376, 1261-71.
- White, H.R. (1991). Marijuana use and delinquency: a test of the 'independent cause' hypothesis. *Journal of Drug Issues*, 21(2), 231-256.
- Whissell, R.W. & Bigelow, B.J. (2003). The speeding attitude scale and the role of sensation seeking in profiling young drivers at risk. *Risk Analysis*, 23(4), 811-820.

Will, K.E., Porter, B.E., Geller, E.S., & DePasquale, J.P. (2005). Is Television a health and safety hazard? A cross-sectional analysis of at-risk behaviour on primetime television. *Journal of Applied Social Psychology*, 35(1), 198-222.

Williams, A.F., Kyrychenko, S.Y., & Retting, R.A. (2006). Characteristics of speeders. *Journal of Safety Research*, 37, 227-232.

World Health Organization (2007). *Youth and road safety*. Retrieved from http://whqlibdoc.who.int/publications/2007/9241595116_eng.pdf.

Zuckerman, M., & Litle, P. (1986). Personality and curiosity about morbid and sexual events. *Personality and Individual Differences*, 7(1), 49-56.

Appendices

Figure 1: hypothetical model

Figure 2: the relationship between adolescents' news and action program watching and self-reported joyriding (N=426)

*p=.074, all other standardized regression coefficients were significant at level $p<.02$.

Figure 3: the relationship between news and action program viewing and self-reported speeding (N=426)

*p=.076, all other standardized regression coefficients were significant at level $p<.01$.

Figure 4: the relationship between action program viewing and news viewing and self-reported driving after the consumption of alcohol (N=426)

* $p > .05$, all other standardized regression coefficients were significant at level $p < .01$.