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Street racing video games and risk-taking driving: An Internet survey of automobile enthusiasts

Evelyn Vingilis[a,*], Jane Seeley[a,1], David L. Wiesenthal[b,2], Christine M. Wickens[c,3], Peter Fischer[d,4], Robert E. Mann[e,5]

[a] Family Medicine, Schulich School of Medicine and Dentistry, the University of Western Ontario, Dr. Don Rix Clinical Skills Building, London, ON, Canada N0M 2K0
[b] Department of Psychology, York University, 288 Behavioural Science Building 4700 Keele St., Toronto, ON, Canada M3J 1P3
[c] Social and Epidemiological Research, Centre for Addiction and Mental Health, 33 Russell Street, Toronto, ON, Canada M5T 1R8
[d] Department of Social Labour, Institute for Experimental Psychology, University of Regensburg, Universitätsstraße 31, 93040 Regensburg, Germany
[e] Public Health and Regulatory Policy Section, Centre for Addiction and Mental Health, 33 Russell Street, Toronto, ON, Canada M5T 1R8

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ABSTRACT

Purpose: The purpose of this study was to examine the relationships among risky driving attitudes, self-perceptions as a risky driver, playing of "drive'em up" (which rewarded players for frequent traffic and other violations) and "circuit" racing video games as well as self-reported risky driving through a web-based survey of car and racing club members in relation to a socio-cognitive model of the effects of racing video game playing.
Method: An Internet questionnaire was developed and included: (1) self-perceptions as a risky driver scales (Driver Thrill Seeking and Competitive Attitude Toward Driving); (2) attitudes regarding street racing; (3) street racing video game playing, and (4) self-reported risky driving (Risk-Taking Driving Scale). A sequential logistic regression was performed entering age and driving exposure as control variables in the first block, self-perceptions as a risky driver in the second block, attitudes in the third block and playing "drive'em up" and "circuit" racing games in the last block to examine their effects on self-reported risk-taking driving.
Results: A total of 503 survey respondents were included in the analyses and only 20% reported any risk-taking driving. Higher score on the Competitive Attitude Toward Driving Scale, more positive attitudes toward street racing, and more frequent reported playing of "drive'em up" video games were associated with higher odds on the self-reported Risk-Taking Driving Scale. However, the Driver Thrill Seeking Scale and "circuit" video game playing failed to predict self-reported risk-taking driving.
Conclusions: Self-perceptions as a risky driver, positive attitudes toward risky driving and "drive'em up" street-racing games, but not "circuit" racing games, are associated with increased risk-taking driving. These findings are congruent with experimental studies in which games that reward driving violations increased risk taking, suggesting that risk taking may be a function of type of street racing game played by affecting self-perceptions as a risky driver.

1. Introduction

"Drive dangerously. . .Drive like a madman through everyday traffic: swerve into oncoming lanes, cut people off and take loads of risks—hyperventilating is part of the fun." (Burnout video street racing game back cover promotional information)

Risky driving is a key contributor to motor vehicle injuries and deaths. Despite the potential negative consequences of risky driving, there is much risk-glorifying content in media such as in street racing video games, movies, television shows or advertisements (Ferguson et al., 2003; Fischer et al., 2011a; Sheehan et al., 2006; Shin et al., 2005; Watson et al., 2010; Vingilis and Smart, 2009). Yet only recently have risk-taking inclinations and actual behaviours been examined in relation to risk-glorifying street racing games. As Beullens et al. (2008) stated: "It is therefore remarkable that the relationship between playing such games and reckless driving has remained largely unexamined" (p. 89). Their cross-sectional survey examined the relationship between the playing of street racing

* Corresponding author. Tel.: +1 519 858 5063x2; fax: +1 519 661 3878.
E-mail addresses: evingili@uwo.ca (E. Vingilis), jsseeley@uwo.ca (J. Seeley), davidw@york.ca (D.L. Wiesenthal), Christine_Wickens@camh.net (C.M. Wickens), peter.fischer@psychologie.uni-regensburg.de (P. Fischer), Robert_Mann@camh.net (R.E. Mann).
[1] Tel.: +1 519 858 5063x1; fax: +1 519 661 3878.
[2] Tel.: +1 416 736 2100x30114.
[3] Tel.: +1 416 535 501x4711; fax: +1 416 595 6899.
[4] Tel.: +49 0 941 943 3676; fax: +49 941 943 1994.
[5] Tel.: +416 535 8501x4496; fax: +1 416 5956899.

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games on intention to engage in risky driving among a sample of 2193 Belgian adolescents. Playing street racing video games was a significant predictor of positive attitudes toward risky driving which, in turn, predicted intention to drive this way in the future. Similarly, Fischer et al. (2007), in his survey of 198 Germans, found that playing street racing games was positively associated with self-reported competitive driving, exhibitionistic driving, and collisions. Kubitzki et al. (2007) conducted a focus group study with young German illegal street racers and found that street racing video games were perceived by the illegal street racers to play an important role in their deviant driving.

Recent experimental, laboratory studies by Fischer et al. (2007, 2008, 2009) have also tested whether exposure to risk-glorifying video games promotes increased risk-taking inclinations similar to the negative effects found for violent video games. These negative effects have been explained by the interactional General Aggression Model (GAM) positing that aggressive video games trigger aggressive ideas which increase accessibility of other aggressive cognitions, emotions and behaviours (Anderson and Bushman, 2001, 2002; Anderson and Dill, 2000). Fischer et al. (2007), in their first paper, hypothesized that racing video games can "prime" not only other cognitions, but also affective and behavioural reactions (Fischer et al., 2007). Participants randomly assigned to play a racing game subsequently exhibited significantly more cognitions and emotions associated with risk taking than participants who played a neutral (non-racing) game. A second experimental study found that participants who played a racing game subsequently took greater risks in video-simulated critical road traffic situations than participants who played a neutral game. Subsequent studies similarly supported the findings that risk-promoting racing games, compared to neutral video games, increased accessibility of risk-promoting attitudes, were associated with self-perceptions as a risky driver and resulted in more risk-taking in video-simulated critical road traffic situations (Fischer et al., 2008, 2009).

Within the context of GAM, Fischer et al. (2011a,b) have argued that self-perception changes underlie the risky response to racing video game play. Specifically, they suggest that active participation, as opposed to passive consumption of viewing pictures or reading articles, is especially relevant as video games require self-involvement through the active control of the game character. This can affect self-perception in which the player identifies with the game character. Self-perception of being a reckless driver should occur more often among participants who play "drive'em up" racing games (e.g., Grand Theft Auto, Carmageddon, Burnout, Need for Speed) which reward traffic violations, collisions, risk-taking and dangerous driving than among participants who play either "circuit" driving Formula 1 type games (e.g. Gran Turismo, Ridge Rager, MotoGP) which includes similar imagery, but rewards accuracy instead of violations of road traffic rules or non-racing neutral video games. Indeed, Fischer et al. (2009) found that risk-promoting effects of racing games only occurred when participants were randomly assigned to play "drive'em up" racing games compared to those randomly assigned to play either "circuit" driving games or non-racing games. Moreover, they found that participants who were randomly assigned to play a "drive'em up" racing game perceived reckless driving more positively and themselves as a reckless driver more than participants who were randomly assigned to play either "circuit" or neutral games. In other words, although it is possible that those who are risky drivers with risky self-perception are attracted to video racing games, Fischer and colleagues' studies are experimental in which game playing was the manipulation used with a sample of university students. They found that self-perceptions as a risky driver only occurred after the participants were randomly assigned to play the "drive'em up" games but did not occur among the participants who were randomly assigned to play the "circuit" or neutral games.

As Fischer et al. (2011b) wrote: "the racing game effect requires the player to perceive that he or she is actively involved in breaking traffic rules, which leads to the self-perception that one is a reckless driver, and thus finally to more risk taking." (p. 703) Despite the fact that experimental studies have found greater risk taking inclinations and attitudes among participants playing "drive'em up" compared to "circuit" racing games, it is unclear whether this experimental, laboratory effect in a controlled environment occurs in the real world. No community-based research has been conducted to examine similar relationships. Additionally, Fischer et al. (2009) did not include validated measures of self-perceptions as a risky driver. Thus it would be important to use validated measures of self-perceptions to examine the relationship between self-perceptions and risky driving and to examine the relationship among these variables in a community-based sample.

The purpose of this study was to examine the relationships among self-perceptions as a risky driver, risky driving attitudes, playing of "drive'em up" and "circuit" racing games and self-reported risky driving through a web-based survey of a sample of car and racing club members. Car and racing club members were chosen as an information rich sample of automotive enthusiasts to examine risky driving attitudes and behaviours. A population-based sample of Ontario drivers found low levels of reported risky driving behaviours such as street racing (Smart et al., 2011) or driving after drinking during the previous year (Mann et al., 2010). Thus a population-based sample would be limited in its ability to examine risky driving activities and their correlates.

The web survey focussed on car club members' opinions about, attitudes on and experiences with, various aspects of driving and traffic legislation. Additionally, information was gathered on self-perceptions as a risky driver and leisure activities, such as video game playing.

2. Method

2.1. Measures

The Internet survey was designed using the expert panel method for content validity. Using the principles of questionnaire design (Krishner and Guyatt, 1985; Weiler et al., 1993) and based on the theory to be tested, a panel of 11 traffic safety researchers, academic psychologists and/or car enthusiasts went through the process of item generation, review and reduction of a pool of questions primarily based on validated instruments or questions developed for other surveys. The Survey Monkey-based questionnaire underwent numerous revisions and was pretested and piloted. The questionnaire included the following variables:(1) *Sociodemographic* – control variables of age and driving exposure (average hours per week spent driving). As the exposure variable was positively skewed, a square root transformation was used in the analyses.(2) *Self-perceptions as a risky driver* – (i) Driver Thrill Seeking Scale, an eight item 7-point Likert-style scale, based on work of Matthews et al. (1997), cited in Stradling et al. (2004; $\alpha = .91$). Each item was scored from 1 = strongly disagree to 7 = strongly agree. Items included questions such as: "I get a real thrill out of driving fast", "I would like to risk my life as a racing driver". "I like to raise my adrenaline levels while driving" "I sometimes like to frighten myself a little while driving". Higher scores reflected higher driver thrill seeking; (ii) Competitive Attitude Toward Driving Scale is a five item 4-point Likert-style scale (Patil et al., 2006; $\alpha = .81$). Items included: "It's fun to beat other drivers when the light changes; it's a thrill to out-manoeuvre other drivers; it's really satisfying to pass other cars on the highway; it is fun to weave through slower traffic; and, taking risks in traffic makes driving more fun". Responses ranged from 1 = strongly disagree to 4 = strongly agree and were

summed with higher scores representing a more competitive and risky attitude toward driving.(3) *Attitudes* – (i) Attitudes Toward Street Racing were measured by a 12 item 7-point Likert-style scale (1 = strongly disagree to 7 = strongly agree) that was a subset of questions from a larger attitudinal scale with subscales of positive, negative and neutral attitudes toward street racing and related activities, based on Akers' (1990) work on social learning theory in criminology (Leal, 2010; αs for subscales = .62–.84). Leal (2010) found a significant association between the full attitudinal scale and self-reported frequency of illegal street racing in last month. Items included questions such as: "I think it's OK to race other cars as long as you don't get caught", "We need harsher penalties for street racing", "I think it's OK to do things like burnouts, donuts, fish tails, drifting or skids as long as you don't get caught", "People who race other cars are generally better drivers". Questions reflecting negative attitudes were reverse coded and summed with the positive attitude items; higher scores represented more positive attitudes toward street racing.(4) *Racing video games played* – two item 6-point Likert-style scale (1 = never to 6 = almost every day) with questions measuring frequency of playing "drive'em up" games (e.g. Grand The Auto, Carmageddon, Burnout, Need for Speed) and "circuit" racing games (e.g. Gran Turismo, Ridge Rager, MotoGP), with higher scores connoting more self-reported game playing.(5) *Risky driving* – the Risk-Taking Driving Scale, a seven item 4-point Likert-style scale (1 = never to 4 = very often) to measure risky driving (Patil et al., 2006; α = .83). The scale included questions such as: "While driving how often do you—take chances for the fun of it, see how fast you can drive out of curiosity, drive dangerously because you enjoy it, test your skills in ways others might find risky."

2.2. Sample

Using the Internet, 134 car club and race track websites located in southern Ontario were identified. The car clubs and sanctioned race tracks varied in membership size, type (e.g., Mustang, vintage), coverage (i.e., city, province), active administrators and level of activity on the website/forum. All groups with an active email address were invited to participate through electronic information letters sent to the club's or track's listed contact person (e.g. webmaster or executive member). The electronic information letters asked if the contact person would be willing to post information about the survey on the website with a link to our online survey. The online survey link included an information letter and the survey. As we were not sure what the response rate would be, the electronic information letters were sent out each week to three websites at a time. The modified Dillman method was used (Dillman, 2000) in which clubs were sent reminders once every week for three weeks. The clubs who agreed to participate posted our invitation on their website. Once posted, club members or visitors were invited to fill out the anonymous survey. Respondents were offered a $5 voucher for Tim Horton's, a national coffee shop chain, for completion of the survey. The survey took about 20 min to complete. The University of Western Ontario Ethics Board approved the study. The recruitment period was from June 2, 2010, to February 2, 2011.

A total of 111 clubs and race tracks had active email addresses, although it was not possible to assess if mailboxes were ever or often viewed. Of these, three refused to participate, 29 clubs and race tracks had at least one completed survey and the others never responded back. Thus response rate of clubs and race tracks was 26.1%. Given the nature of the methodology, it was not possible to identify a denominator to determine the response rate of actual respondents to the survey or the representativeness of the sample.

Vingilis et al. (2011) in their examination of the general opinions, attitudes and practices of this sample of Ontario car club members found that members had the same concerns about various road safety issues (e.g. drinking drivers, distracted drivers, young drivers, red light runners, speeding drivers, street racing drivers, cell phone using drivers, elderly drivers, etc.) as a survey of Canadian drivers. For example, Vanlaar et al. (2008) found in their population-based sample of Canadian drivers that 87.1% were very or extremely concerned about drinking drivers, similar with 77.8% of car club members (Vingilis et al., 2011). The only substantive difference in concerns about various road safety issues was for speeding and street racing. Among Canadians sampled in the Vanlaar et al. (2008) survey, 68.7% were very or extremely concerned with street racing and 67.9% with excessive speeding compared with car club members of whom 45.9% were very or extremely concerned with street racing and 46.0% with excessive speeding (Vingilis et al., 2011). Thus, survey respondents shared similar concerns regarding various road safety issues with a sample of Canadian drivers, although the car club respondents were less concerned about speeding-related driving.

Car club respondents were also asked about collisions and violations: 27.8% of respondents reported being in at least one collision in the past five years while 23.1% reported being stopped by police for any traffic-related offence in the past 12 months (Vingilis et al., 2011). The most common traffic-related offence reported for being stopped was speeding (85.13%), followed by traffic light signal infractions (5.4%), stop sign infractions (5.4%), street racing (2.7%), and drinking and driving (1.4%) (Vingilis et al., 2011). Comparably, in the province of Ontario, approximately 6% of male drivers are involved in a collision in any given year (Ministry of Transport of Ontario, 2012).

2.3. Statistical analysis

The online survey data were downloaded into a SPSS data file for analysis. The dataset was cleaned and screened and an alpha level of $p < .05$ was adopted for all analyses.

A sequential logistic regression was performed considering self-reported risk-taking driving as the dependent variable, and entering age (16–44, 45+) and driving exposure as control variables in the first block, self-perceptions as a risky driver in the second block, attitudes in the third block and playing "drive'em up" and "circuit" racing games in the last block in order to examine the direct and indirect effects of the predictor variables on the dependent variable. Sequential (sometimes called hierarchical) logistic regression is a commonly used statistic (e.g. Chen et al., 2005; Dissanayake and Lu, 2007; Jung et al., 2010; Ouimet et al., 2008) that allows the researcher to assign order of entry of variables based on logical or theoretical considerations and to determine whether prediction of the dependent variable improves with the additional blocks of independent variables to the equation (Tabachnick and Fidell, 2007). The ordering of variables for the sequential logistic regression reflected the conceptualization and findings of causal ordering based on Fischer et al. (2007, 2008, 2009) experimental studies. PASW Statistics 20 (formerly SPSS) software was used in all analyses.

3. Results

A total of 503 respondents completed the survey. Table 1 presents the socio-demographic characteristics of the sample. The vast majority of the sample was male and almost half were under 35 years of age. About one third were grade/high school educated, about three fifths were junior/community college or university educated and about one tenth were in trades. The majority were working with over half requiring their driver's licence for employment.

Table 1
Sociodemographic characteristics of survey sample.

		N[a]	%[a]
Respondent characteristics		Total = 503	
Gender	Male	428	92.4
	Female	35	7.6
Age	16–24	115	24.8
	25–34	107	23.1
	35–44	45	9.7
	45–54	97	21.0
	55–64	72	15.6
	65 and above	27	5.8
Educational level	Grade or high school	140	30.4
	College	148	32.2
	Trade apprenticeship	49	10.7
	University	123	26.8
Current employment (click all that apply)	Employed – full-time	248	49.3
	Employed – part-time	52	10.3
	Employed – casual	7	1.4
	Self-employed	91	18.1
	Studying	59	10.1
	Retired	51	10.1
	Not working	27	5.4
Type of driver			
Do you need to drive for your job?	Yes	251	56.7
	No	192	43.3
What type of driver's licence(s) do you currently hold? (click all that apply)			
Licence class	A–F	80	15.9
	G	416	82.7
	M	127	25.2

[a] N's do not total 503 because of missing data but percentages are based on valid sample.

Table 2
Descriptive statistics and internal consistency of scales.

Variables	*n*	*n*-Items	Range	α	*M*	S.D.
Sociodemographics						
Age	463	1	1 = 16–44 2 = 44+		1.42	.495
Aver. h/week driving	455	1	0–80		14.31	11.85
Driver thrill seeking	455	8	8–56	.87	34.45	10.93
Competitive attitude toward driving	457	5	5–20	.86	7.69	3.00
Attitudes to street racing	448	12	12–80	.85	37.24	14.37
Video game playing						
Circuit games	457	1	1–6		2.35	1.62
Drive'em up games	446	1	1–6		1.87	1.29
Risk-taking driving	458	7	7–28	.86	9.06	3.09

Table 2 outlines descriptive statistics for the variables included in the regression analysis and Cronbach's alphas for each of the scales. Driver Thrill Seeking, Competitive Attitude Toward Driving, Attitudes to Street Racing and Risk-Taking Driving all had acceptable Cronbach's alphas. Because, responses to the Risk-Taking Driving Scale exhibited substantive skewness and kurtosis, with only 20.3% of respondents reported engaging in any risk-taking driving, the Risk-Taking Driving Scale was re-coded for any self-reported risk-taking driving = 1 and no self-reported risk-taking driving = 0, which improved both skewness and kurtosis. The inter-correlations among self-reported variables are presented in Table 3. Driver Thrill Seeking, Competitive Attitude Toward Driving,

Table 3
Inter-correlations among self-reported variables (Spearman).

Variables	1	2	3	4	5	6	7	8
(1) Age	1.000							
(2) Aver. h/week driving	.053	1.000						
(3) Driver thrill seeking	−.287**	.086	1.000					
(4) Compet att.	−.173**	−.061	.439**	1.000				
(5) Att street racing	−.252**	−.010	.348**	.391**	1.000			
(6) Circuit games	−.547**	.002	.227**	.111*	.157**	1.000		
(7) Drive'em up games	−.586**	.000	.265**	.218**	.249**	.743**	1.000	
(8) Risk-taking driving	−.051	−.038	.083	.333**	.209**	.010	.113*	1.000

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 4
Sequential binary logistic regression analysis for risk-taking driving ($N = 389$).

	Stunt driving						
	β	S.E.	Wald	df	Sig.	Exp (β)	95% CI
Block 0							
(Constant)	−1.367	.126	117.667	1	.000	.255	
Block 1[a]							
Age	−.235	.261	.814	1	.367	.790	.474–1.318
Aver. h/week driving	−.054	.097	.309	1	.578	.947	.783–1.146
(Constant)	−.850	.492	2.991	1	.084	.427	
Block 2[b]							
Age	.099	.291	.117	1	.733	1.105	.624–1.954
Aver. h/week driving	−.030	.103	.083	1	.733	.971	.794–1.187
Driver thrill seeking	−.005	.014	.116	1	.733	.995	.968–1.023
Compet. att.	.258	.048	29.168	1	.000	1.294	1.178–1.421
(Constant)	−3.376	.808	17.465	1	.000	.034	
Block 3[c]							
Age	.250	.302	.685	1	.408	1.284	.711–2.320
Aver. h/week driving	−.034	.104	.109	1	.741	.966	.788–1.184
Driver thrill seeking	−.011	.015	.578	1	.447	.989	.961–1.018
Compet. att.	.226	.049	21.381	1	.000	1.254	1.139–1.380
Att. street racing	.027	.011	6.439	1	.011	1.028	1.006–1.049
(Constant)	−4.158	.896	21.517	1	.000	.016	
Block 4[d]							
Age	.472	.350	1.817	1	.178	1.604	.807–3.187
Aver. h/week driving	−.040	.105	.147	1	.701	.960	.781–1.181
Driver thrill seeking	−.010	.015	.474	1	.491	.990	.962–1.019
Compet. att.	.214	.050	18.759	1	.000	1.239	1.125–1.365
Att. street racing	.027	.011	6.040	1	.014	1.027	1.005–1.049
Drive'em up games	.344	.159	4.663	1	.031	1.410	1.032–1.927
Circuit games	−.161	.142	1.281	1	.258	.851	.645–1.125
(Constant)	−4.689	1.018	21.213	1	.000	.009	

[a] $X^2 = 1.217$, df = 2, $p = .544$; −2 Log likelihood = 391.400.
[b] $X^2 = 40.304$, df = 4, $p = < .000$; −2 Log likelihood = 352.313.
[c] $X^2 = 46.806$, df = 5, $p < .000$; −2 Log likelihood = 345.811.
[d] $X^2 = 52.034$, df = 7, $p < .000$; −2 Log likelihood = 340.583.

Attitudes Toward Street Racing, street racing video game playing and risk-taking driving are all correlated in the expected direction.

The next step of our analysis was to determine variables that differentiated self-reported risk-taking drivers from non-risk-taking drivers. Within a sequential logistic regression, predictor variables were entered hierarchically in blocks, consistent with Fischer et al. (2007, 2008, 2009, 2011a,b) socio-cognitive model. Collinearity diagnostics revealed absence of multicollinearity with all tolerance statistics above .47 and Variance Inflation Factor (VIF) statistics all below 2.1. Of the 503 participants in the sample, 114 were eliminated from the regression analysis because of missing data. As Table 4 shows, in Block 1, the control variables of age and driving exposure provided no significant improvement over the constant only model ($X^2 = 1.217$, df = 2, $p = .544$). In Block 2, the Driver Thrill Seeking and Competitive Attitude Toward Driving scales significantly improved the model, over and above that accounted for by the control variables ($X^2 = 40.304$, df = 4, $p = < .000$). When Attitudes Toward Street Racing was added in Block 3, the model showed further significant improvement ($X^2 = 46.806$, df = 5, $p < .000$). In Block 4, when racing video game playing was entered, the model showed additional significant improvement ($X^2 = 52.034$, df = 7, $p < .000$).

When evaluated with the Wald test, the significant predictors in the model included self-perceptions as a risky driver (Competitive Attitude Toward Driving scale) (OR = 1.239; CI, 1.125–1.365), positive Attitudes Toward Street Racing (OR = 1.027; CI, 1.005–1.049) and more frequent reported playing of "drive'em up" video games (OR = 1.410; CI, 1.032–1.927) but Driving Thrill Seeking and "circuit" video game playing were not associated with higher odds of self-reported risk-taking driving.

4. Discussion

The results of this study show some congruence with the experimental findings of Fischer et al. (2009, 2011a,b) and with the GAM. Specifically, Fischer et al. (2009) have argued that the effects of risk-glorifying racing video games on risk-taking in video-simulated critical road traffic situations are partially explained by "altered self-perceptions" by which "participants who play a racing game may develop automatic self-views that are in line with breaking rules and reckless driving, which subsequently carry over to real road traffic situations" (p. 1398). This study found that self-perception as a risk-taking driver (Block 2) significantly improved the model over and above that accounted for by the control variables, although the Wald statistic indicated that the Driver Thrill Seeking Scale was not statistically significant. Moreover, the playing of "drive'em up" racing games, and not the "circuit" racing games, significantly increased the odds of self-reported risk-taking driving. Fischer et al. (2009) postulated that video game playing requires continuous practice, leading to processes of over-learning and automation. Additionally, their findings indicate that "drive'em up" games, by systematically reinforcing rule breaking, "make the player actively break rules, which leads to a more positive evaluation of reckless driving and increased self-perceptions as a reckless driver" (p. 1406). Certainly, the results of this study found that self-perception as a risky driver was significantly associated with

positive attitudes toward street racing which contributed significantly to explaining self-reported risk-taking driving.

The key limitation of this study is that it is correlational and cannot establish causal relationships among the predictor and outcome variables. With the current study directionality of the relationship cannot be determined; that is, whether risk-taking drivers with self-perceptions as risky drivers would be attracted to "drive'em up" games or whether the playing of "drive'em up" games lead to the development of risk-taking driving attitudes and behaviours. It is the experimental studies of Fischer and colleagues that have established causality and directionality. They found effects of increased self-perceptions as a risky driver and increased risk-taking in video-simulated critical road traffic situations only in those participants who were randomly assigned to play the "drive'em up" video games but not the "circuit" or non-racing games, thus establishing a causal link between "drive'em up" games, self-perceptions and risk-taking in video-simulated critical road traffic situations. However, the combination of laboratory/experimental and epidemiological studies can provide the best information for understanding the causal connection between video game playing and risky driving (Vingilis and Macdonald, 2002) because external validity is limited in laboratory and simulator experiments as laboratory findings may not reflect actual patterns of driving in the real world. Other limitations include the use of self-report measures, the use of some measures that have not been formally validated, the potential shared variance of variables, the disproportionately large number of males in the sample and the unknown representativeness of the sample. Thus, these results might be particular to a sample of automobile enthusiasts. However, automobile enthusiasts are drivers who would be more likely to be racing enthusiasts and thus be a more information rich sample by which to examine risky driving behaviours as a population-based sample might not have a large enough sample of risky drivers. For example, a study of a similarly aged representative sample of Ontario residents examined prevalence of street racing in the last year and found only one percent self-reported street racing (Smart et al., 2011). Even so, in this car and racing club sample four fifths reported never engaging in any of the risky driving behaviours listed on the Risk-Taking Driving Scale. Thus, even among this sample of automobile and racing enthusiasts, risk-taking driving is reported among a small minority of drivers.

In summary, the findings of this study show some consistency with the experimental findings of Fischer et al. (2009, 2011a,b) and suggest that the playing of street racing video games that rewards risky driving, positive attitudes toward risky driving and identification with risky driving may find its way to the real world of driving. Additionally, the findings are congruent with the survey and focus group studies conducted in Europe that found associations among street racing video game playing, positive attitudes toward risky driving and self-reported risky driving behaviours (Beullens et al., 2008; Fischer et al., 2007; Kubitzki et al., 2007). The results of this study and Fischer's studies can inform future research and traffic safety interventions. First, this study needs to be replicated with other samples of drivers to examine whether or not these findings are unique to the sample of automobile enthusiasts who participated in this study or are more generalizable. Additionally, the study needs to be replicated with a wider range of risky driving measures. Importantly, research needs to be conducted on whether playing of street racing video games and risky driver self-perceptions lead to observable measures of increased risk-taking in road traffic, although research of this type would be an ethical challenge (Fischer et al., 2011a). Clearly, the ubiquity with which young men play street racing video games would suggest that further research be conducted on the topic and consideration be given to the educational information and rating systems for these video games.

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