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Running Head: THE CULTIVATION APPROACH TO VIDEO GAME EFFECTS

Benchmarking the Cultivation Approach to Video Game Effects:

A Comparison of the Correlates of TV Viewing and Game Play

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Abstract

This study found significant relationships between first and second order cultivation measures and TV viewing, but found a relationship with video game play for only two variables in a sample of 322 Flemish 3rd and 6th year secondary school children. This suggests that the absence of a relationship with video game play is not the result of the absence of cultivation effects in Flanders. On the other hand it shows that the relationship between TV viewing and cultivation measures is not an artifact of systematic over reporting. The study concludes that cultivation measures typical of the “television world” are not related to playing video games. To study video game cultivation measures must be sought which reflect the mainstream of (particular genres of) video games. The role of selectivity needs to be studied more closely. As gamers play an active role in the violence of the games the possibility that self-protecting strategies are employed in processing video game contents must be taken into consideration. Existing process theories explaining what happens in television cultivation may be challenged by research into the cultivation effects of video games.

Benchmarking the Cultivation Approach to Video Game Effects:

A Comparison of the Correlates of TV Viewing and Game Play

While video games are a fairly recent new form of entertainment, the first meta analyses (e.g. Sherry, 2001; Anderson & Bushman, 2001) show there is a steadily growing body of research looking at their impact on players. The prominence of violent content in many types of games (Heintz-Knowles, 2001) and its potential association with aggression has attracted particular attention (e.g. Griffiths, 1999, 2000). At the time of writing there appear to be only a limited number of studies applying the television effects theory known as cultivation theory to the impact of video games on perceptions of the world and attitudes of gamers (Griffiths, 1999, 2000; Sherry, 2001; Subrahmanyam et al., 2001). A notable exception is, for instance, Anderson and Dill (2000) who looked at measures of crime likelihood and safety feelings in their study of aggressive thoughts, feelings and behavior (p. 778). The authors found no significant influence of playing videogames on the estimates of ‘crime likelihood’ but did find a significant relationship between video game play and ‘safety feelings’, even though it became non significant when controlled for gender. These are interesting findings because they are the opposite of what television researchers would normally expect to find. Shanahan and Morgan (1999), in a meta-analysis of 5633 results from hundreds of studies conducted in the past 20 years, conclude that, in television research, evidence can only be found for “first order effects” and not for “second order effects”. They argue that such findings are ‘fully congruent with the cultivation theory which posits that television will teach us societal-level lessons about what “the world” is like, but not necessarily impact our perceptions of our own personal reality, where a much wider range of influences and everyday non-mediated experiences may play a stronger role’ (p.66). The label “first order effects” refers to estimations of frequency and probability of aspects of social reality that seem to be empirically observable and verifiable in the real world, while

“second order effects” are opinions, beliefs and attitudes (see: Hawkins & Pingree, 1990, p. 49; Hawkins et al., 1987, p. 553; Shrum, 1995, p. 404).

The results of Anderson and Dill suggest that studying video games from the point of view of cultivation theory might be interesting for three reasons. First, it is a media effects theory which deals with the impact of exposure to messages in entertainment media from a longitudinal point of view (although the methods used are usually cross sectional). Many questions about violence, fear or aggression resulting from long term exposure to similar messages apply to the discussion about video games as much or more as they do to television. Second, studying a television effects theory in a different context, might shed a different light on that theory. Third Morgan and Shanahan's (1997; Shanahan & Morgan, 1999) meta-analysis found a mean overall effect size of approximately $r = .09$ between amount of TV viewing and perceptions of reality reflecting television's view of the world (Morgan & Shanahan, 1997). It is a logical step to start formulating hypotheses and gathering data to discover whether similar relationships of a similar size exist between video games and the gamer's view of the world.

Video Games and Cultivation Theory

Stated most simply, the central hypothesis guiding cultivation research, developed by George Gerbner and his associates of the Annenberg School for Communication of the University of Pennsylvania, is that heavy viewers are more likely to perceive the real world in ways that reflect the television world (Shanahan & Morgan, 1999).

Linking video game play to cultivation theory is not self evident for several reasons. Arguably violence in video games differs from television violence (Dominick, 1984, p.138; Sherry, 2001). Similarly, one might argue that the position of the game-player is very different from that of the television viewer. A television viewer cannot influence what happens or what is being shown in fictional television. A game player, on the other hand,

plays an active part in the video game. Unlike the TV viewer, who sees people, monsters, aliens, objects, etc. being shot or destroyed, game players are offered the illusion that they are doing the shooting or destroying themselves (Cristoffelson, 2000; Sherry, 2001). Such an “active” involvement might mediate the impact of video games, compared to what happens to a TV viewer. The higher level of involvement may mean that violence in computer games has a much bigger impact than violence on television (Dill & Dill, 1998, p. 411; Griffiths, 1999; Anderson & Dill, 2000, p.772; Sherry, 2001, p. 411).

In 1984, Dominick (Dominick, 1984) argued that there is a large difference in the effects of violence in video games and the effect of violence on television, because ‘video game violence is abstract and generally consists of blasting spaceships or stylized aliens into smithereens’ (p.138). In the author’s view video games were a lot less realistic and would therefore not have the same impact. Video games from around 1984 could undeniably be characterized as being less realistic than television. At the present time, however, the realism of video games is becoming comparable to the realism of television violence. Herz has noted as early as 1997 that video games have acquired more graphic resolution, and therefore became more realistic (Herz, 1997, p. 183). Nevertheless, there is still a difference between the realism of videogames and the ‘perfect’ realism of television. The TV viewer’s experience is geared toward the highest achievable illusion of realism (e.g. Bauer, 1992; Shanahan & Morgan, 1999), whereas video games can not yet reach this level of realism.

Another problem associated with applying cultivation theory to video game users is the ‘selectivity’ of video games. Shanahan and Morgan note that Gerbner’s emphasis on overall exposure to television, regardless of genre, channel of program type is what is most unusual and important about cultivation analysis (Shanahan & Morgan, 1999, p. 29). Selectivity appears to be much more evident in the case of video games. Video game players select the game they want to play at the moment they want to play. They play the genres they

like to play most. Consequently, there may be players who like games without any violence and these players will not be exposed to violence. On the other hand, some players will be exposed only to violent games, because that is all they play. Cultivation analysis, while not denying the potential importance of selective viewing (Shanahan and Morgan, 1999, p. 31) focuses on what is shared across program types and among large groups of otherwise heterogeneous viewers. They analyze ‘the mainstream’ and argue that heavier viewers of television cannot or will not avoid being exposed to all aspects of that mainstream more than lighter viewers (Signorielli, 1996). There is a lot of evidence that there is, indeed, little selectivity in heavy viewers and that heavy viewers watch a lot of everything (e.g., Van den Bulck, 1995). The issue of the distinction between the television mainstream and video games, however, might not be as contentious as it seems. While video game players appear to be selective by definition, a content analysis performed by Heintz-Knowles and colleagues showed that 87% of the video games contains some sort of violence. This percentage is indisputably large enough to state that ‘violence’ is a near-ubiquitous fixture of video games. (Heintz-Knowles et al., 2001). Fourth-grade girls (59%) and boys (73%) report that the majority of their favorite games are violent ones (Buchman & Funk, 1996). Violence plays such an important role in video games that consequently it is safe to assume that most players will be exposed to it.

Purpose of this Study

Any cultivation study of video game users is bound to elicit comparisons with television studies. The present study aims at offering material which should serve to prevent a number of pitfalls that might otherwise be inevitable. Several points are likely to be raised.

First, champions of cultivation theory have been quick to point to methodological or contextual (e.g. cultural) differences of studies which failed to reproduce the cultivation effect. Most well-known, perhaps, has been the response to Wober’s “view from Great

Britain” (Wober, 1978, see also: Wober & Gunter, 1988). The “View from Great Britain” suggested that cultivation might not exist outside the United States. Shanahan and Morgan (1999, p. 62) felt that Wober’s measures failed to measure true cultivation concepts. The present study will try to avoid this criticism by using various measures used in different kinds of studies. Thus, first- and second order measures will be asked. Also, both forced choice and open ended questions will be used, because some have argued that differences in results (and validity) might be associated with the use of either method (Potter, 1991, p. 567). Typical of some of the criticism is disagreement about the measures used by various studies. Some, for instance, have referred to the amazing array of different operationalizations of viewing volume (Hawkins & Pingree, 1982; Potter & Chang, 1990), which may all, to a larger or lesser extent, measure different concepts, particularly as TV viewing is notoriously difficult to measure accurately and validly (Allen, 1981; Salomon & Cohen, 1978). This means that different conclusions reached by different studies may be a result of the fact that those studies actually looked at different things. In other words, just using the term “viewing volume” does not mean that all viewing volume variables measure the same thing. Differences in operationalization mean that both proponents and opponents of certain results always have a reason to ignore results they do not like. To establish a starting point in the study of video game cultivation, this study therefore combines measures of TV viewing, similarly measured indicators of video game play and traditional cultivation variables.

A second conclusion has been drawn regarding Wober’s “view from Great Britain”. It has been argued that the contents of television in the United States is more homogenous and violent (cf. Blumler et al., 1986; von Feilitzen et al., 1989), leading Shanahan and Morgan to conclude that a ‘more diversified and balanced flow of media messages that [are] not driven entirely by commercial interests’ means that one would not actually expect to find a cultivation effect outside the USA (Morgan & Shanahan, 1997, p.11). Any European study

trying to link video game use to the kinds of variables commonly used in television cultivation research, should therefore first establish whether a relationship with television viewing can be established. Finding no relationship between traditional variables and video game use would be meaningless if there were no relationship with TV viewing, as this would imply that cultivation effects might not exist in that culture.

Third, such an approach might also shed a light on one particular criticism of cultivation theory. It has been argued that that ‘cultivation effects may reflect the tendency of some people to overestimate various quantities. Those who overestimate their chances of victimization also may overestimate their television exposure’ (Rubin et al., 1988, p. 109, Wober & Gunter, 1986; Perse, 1986; Potter, 1986). Should this study reproduce a relationship between television viewing and cultivation measures, but not between those measures and video game play, then this criticism would be challenged. If the relationship Gerbner and his associates have found is an artifact of consistent over-reporting, then a similar relationship should be found with all variables measuring similar behaviors.

Gerbner’s cultivation analysis measures the long-term, cumulative contribution of consistent and largely unavoidable message patterns. Adapting this theory to video game users would imply that the total time spent playing video games should be the measure used in the analysis. However, a large number of media studies state that whenever total time spent and time spent on violent media are compared, time spent on violent media yields bigger effects (Bushman & Huesmann, 2000).

The research questions of this study therefore are:

R1: Is there evidence of a positive relationship between TV viewing and first- and second-order measures of cultivation?

R2: Is there evidence of a positive relationship between total video game play and the same measures of first- and second-order cultivation?

R3: Is there evidence of a positive relationship between playing violent video games and first- and second order measures of cultivation?

Regarding the validity of cultivation theory the hypotheses are:

H1: If television content in Europe is different from content in the United States, no evidence of a positive relationship between TV viewing and first- and second-order measures of cultivation should be found.

H2: If a positive relationship between TV viewing and first- and second-order measures of cultivation are the result of a tendency of some respondents to overestimate all their answers, then a similar relationship should be found between video game play and cultivation measures which measure the mainstream of the TV world, rather than the world as portrayed in (violent) video games.

Method

Sample

Subjects were 322 Flemish secondary school students. They were selected in classes of the third and sixth year, in four randomly selected schools that had agreed to take part in the study. Boys comprised about 48% of the respondents. 54 % of the respondents were in the third year. Mean age in the third year was 15.22 (SD .53) and was 18.43 (SD .69) in the sixth year. Respondents were given a printed questionnaire in class, to fill out in the presence of one of the authors

Variables

Overall viewing and gaming: The respondent had to fill in the amount of time he or she watched television and the amount of time he or she spent playing video games. These questions were based on the Swedish Media Panel Program (Rosengren & Windahl, 1989) as adapted for use in a Flemish context by Van den Bulck (1995). The respondent had to report how often (how many days a week, how many Fridays, Saturdays and Sundays a month) and

how long (in hours and/or minutes) he or she played video games or watched television on (1) weekdays, (2) Fridays, (3) Saturdays and (4) Sundays.

Preference: preference questions listed a number of video game genres and asked respondents to indicate how often they played them on a four point scale (1. never; 2. seldom; 3. often; 4. very often; Different genres in the questionnaire were: action games, puzzles, educational games, combat and fighting games, sports games, racing games, adventure games and simulation games).

Cultivation variables: Table 1 gives an overview of all cultivation variables in the analyses, including means, standard deviations and Cronbach's alpha for all measures and items. Table 2 shows the correlations between all variables.

Somehow the translation of two of the forced choice questions into Dutch seems to have caused some confusion. As a result some respondents felt they could either check one of the two answers offered in the questionnaire or offer their own estimate, the way they had done for the preceding variables. The third forced choice variable did not suggest such an option as both answer categories were part of the phrase. In all 133 respondents offered their own estimate of the first forced choice question (asking whether they felt that a large or small proportion of all crimes were violent crimes) and 110 respondents offered their own estimate of the question regarding the number of working men employed as law enforcement officers. Strictly speaking this is not a split ballot experiment because the respondents were not randomly assigned to the forced choice or the open ended condition. Nevertheless, both ways of answering will be analyzed separately because they might offer some insight into the use of both ways of asking questions.

Control variables: control variables were age, gender and level of education.

TABLE 1 ABOUT HERE

TABLE 2 ABOUT HERE

In Flanders most children start their secondary schooling at age 12. The curriculum consists of six grades. There is a distinction between three levels: general education, often called “humaniora” (which includes both arts, languages and basic science), technical education and vocational training. Because these levels are indicative of job prospects and access to higher learning they can be seen as three levels of education, with humaniora as the highest and vocational training as the lowest.

Results

TV viewing and video game play

Mean overall TV viewing volume was 74 hr 15 min per month (SD 39 hr 44 min), mean overall video game playing volume was 18 hr 29 min per month (SD 25 hr 15 min). These numbers are comparable with what was found regarding the time devoted to these media in the USA a number of years ago. Mean overall viewing volume in the USA was 81 hr 43 min per month. Average time devoted to playing video games was 15 hr per month. (von Feilitzen & Carlsson, 2000). Table 3 shows that 3rd year students watch more than 6th year students. The former also play video games more than the latter. As table 4 shows, there is a large difference in game play volume between male and female respondents. Boys play approximately 31 hr 15 min per month (SD 30 hr 07 min hours). Girls play only 6 hr 39 min per month (SD 9 hr 51 min). Girls watch more TV than boys. Monthly they watch television 78 hr 22 min (SD 41 hr 49 min), boys watch 69 hr 48 min (SD 37 hr 00 min).

TABLE 3 ABOUT HERE

TABLE 4 ABOUT HERE

Multiple regression analyses for first and second order variables

Analysis of the measures in the study showed that when total gaming time was entered in the model together with the control variables (age, gender and level of education), this variable had no significant predictive value regarding any of the first or second order cultivation measures.

By summing the answers about exposure to three categories of games (combat games, action games and adventure games) a measure of exposure to 'violent games' was created. Puzzle games, sport games, racing games and simulation games were left out of the measure, assuming that these did not contain as much violence as combat games, action games or adventure games. (An exploratory factor analysis using maximum likelihood estimation resulted in the following factor loadings: combat games .86, action games .85 and adventure games .74. Eigenvalue:2.016, R^2 : .67, Chronbach's α =.75, n=322).

Table 5 shows the results of multiple regression analyses in which both media variables (TV viewing and violent video game play) were entered along with age, gender and level of education as control variables. Total game play was not entered in these models to avoid multicollinearity with violent game play (R =.63). The results show that television viewing was positively related to higher estimates of death by murder, by accident and by heart attack. Television viewing was also significantly related to the scales measuring anomie and Law & Order. Violent video game play was not related to any of the dependent variables.

TABLE 5 ABOUT HERE

Analyses of the forced choice questions

As mentioned in the method section two of the forced choice questions somehow led some respondents to believe they could either give one of the two answers offered by the questionnaire, while others felt they could also offer their own estimates. Both types of answers were analyzed separately, the forced choice answers by means of logistic regression, the open ended answers by means of regression analyses. The third forced choice question was less confusing because both answers were part of the question wording. Nobody offered an alternative solution. As luck would have it this variable was printed on another page, which may have acted as another cue that it was a different type of question for those who had offered an alternative to the two previous questions.

The logistic regressions show no relationship between the first order cultivation measures and violent video games. Television viewing was significantly related to giving the higher estimate of numbers of criminals released as a result of procedural error. Television was not a significant predictor of which answer was chosen in the two other cases. The linear regressions of these variables, however, offer a very different picture. Television viewing is not related to the cultivation measures. Exposure to violent video games, however, was significantly related to these cultivation measures, despite the small number of respondents.

TABLE 6 ABOUT HERE

Discussion

This study found evidence of first and second order cultivation effects of TV viewing in a European country. It reproduced a number of relationships thought to be typical mainly of research in the United States. This should, perhaps, come as no surprise. As is the case in

many countries a large proportion of what is shown on Flemish television is produced in the United States. At least to some extent European viewers appear to be exposed to messages very similar to those their American counterparts are exposed to. For the purpose of this study it was important to reproduce the findings of cultivation studies regarding television because it offers an objective point of reference for the study of video game effects. It counters any criticism which would imply that cultivation effects cannot exist outside the United States.

Regarding the second research question the conclusion is that no relationship was found between total video game play and the same measures of first and second order cultivation. The picture was somewhat different for the third research question. While exposure to violent video games did not seem to be related to most first order and all second order measures, violent video game play did predict higher estimates of the prevalence of violent crime and of the number of policemen in the total workforce. Caution is needed regarding the results pertaining to these two variables, however, as about a third of the sample decided not treat these items as forced choice questions. We do not know what caused some respondents to misinterpret the two questions, which means that we cannot rule out the possibility that an unrelated underlying factor has created a spurious result. Nonetheless, the results suggest that a result supporting the notion of a cultivation effect of violent video games was only produced when open ended questions were used and disappeared when forced choice questions were used, at least in this instance. Choosing one type of question wording over another (with few methodological arguments to support either side in the case of cultivation research) seems to have far reaching implications for the results.

Overall, the results suggest a number of conclusions regarding research on cultivation effects of video games.

First, while it can still be argued that heavier viewers of television cannot escape the underlying meta narrative of television, the same is probably not true of video games. There

are many different video games and different players may be looking for different things in different games. Measures of selectivity are probably better indicators of the kind of message the gamer is exposed to than measures of overall game play.

Second, it is clear that the message of television is probably very different from the message of video games. As a result variables referring to what is typical of television reality are not necessarily also suited for doing research about video game effects. Further research into cultivation effects of video games should start from a “message system analysis” as elaborate as the one used in television research. Only by deciding what the “video game answer” is, can one start doing research about the effect of video games on the “real world answer” a respondent gives. It is, perhaps, not surprising that violent video game play was related to estimates of violent crime and the proportion of policemen (both regular fare of many games) but that no relationship was found between estimates of the prevalence of murder and violent video games. After all, in video games much of the killing is done by the gamer. This active role might call forward cognitive processing or coping strategies which protect the gamer’s self image. Future research should therefore look for intervening processes which may be typical for the situation of the video gamer.

The present study also looked at two hypotheses regarding the validity of cultivation theory. First, it was found that the kind of relationship found in the United States was also found in a sample of Flemish secondary school children. Second, the pattern of results shows that cultivation effects are not an artifact of systematic over reporting. It has been argued that some respondents may display a tendency to overestimate all kinds of measures. This suggests that people who give high estimates of crime prevalence will do so only because they have a tendency to overestimate just about everything, including TV viewing. Such an artifact would, indeed, have explained a positive relationship between measures of media use and measures of cultivation. The present study shows that different patterns emerge when one

looks at the results for TV viewing on the one hand and video game play on the other hand. Game play was not related to measures which do not tap into the “meta narrative” of games, while television viewing was related to some of the typical measures used in television cultivation research. The results cannot be dismissed as an example of systematic over reporting.

This study tried to avoid two pitfalls. If no relationship between video game play and cultivation measures had been found, critics could have claimed that no relationship was found because cultivation is process typical of North America. By including TV measures an attempt was made to avoid this kind of criticism. The second pitfall would have opened up when the study did find cultivation effects. Other critics might then have rejected the findings by arguing that systematic over reporting creates a spurious relationship between any behavior (including media use) and any measure of belief or perception (including cultivation variables).

The results of the present study suggest that future research should take a number of conclusions into account. First, without careful mapping of the demographics of the video game world and a good understanding of the meta narratives of violent video games it will be difficult to measure cultivation effects accurately. Variables used for television research may tap into the same underlying message structure sometimes, but they are more likely to be too alien to the world of video games to be used as an accurate measure of what the gamer learns from playing games. Second, overall use of video games does not appear to be a productive variable. The issue of selectivity deserves further attention. Even though it has been shown that a lot of game play invariably involves violence, there is probably more selectivity than in the case of TV viewing. One explanation for this might be that the active role the gamer plays in what unfolds before her or him increases the differences there are between types of games. As such it may be true that virtually all gamers are exposed to violence sooner or later, but

that only those reporting high levels of exposure to violent games get so immersed that they assimilate the lessons it teaches them. If other studies confirm this hypothesis it would be an intriguing finding, particularly because Shrum's (2002) heuristic processing model shows that motivation to process and a higher awareness of the source of mediated messages should attenuate the effects of television on perceptions of the world. It appears that new models may have to be developed to explain what happens when cultivation effects are found in video gamers.

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Table 1
Means, Standard Deviations and alpha's of measures and items.

Set		Items	<u>M</u>	<u>SD</u>
1. perception of violence	Hawkins & Pingree, 1981	1. Is the proportion of criminals released due to procedural errors close to 1 % (20.2 % of the respondents) or is it closer to 10 % (79.8 % of the respondents)? 2. the proportion of policemen in the total male workforce Forced choice: 1 % (25.9 % of the respondents) or 5 % (74.1 % of the respondents) (Subsample: N=189) Open ended (Subsample: N=212)	29.57	18.98
		3. the prevalence of serious violence (rape, murder, assault or robbery) as a proportion of the total crime rate Forced choice: 5 % (41.3 % of the respondents) or 20 % (58.7 % of the respondents) (Subsample: N=133) Open ended (Subsample: N=110)	13.37	9.74
2. causes of death	Van den Bulck, 1995	1. the proportion of people who died in accidents (open ended) 2. the proportion of people who died of a heart attack (open ended) 3. the proportion of people who were murdered (open ended)	31.15 17.65 11.78	19.33 14.34 15.18
3. crime likelihood	Sparks & Ogles, 1990	Chance of becoming a victim of crime in the following year (0 to 10)	2.61	2.35
4. safety	Sparks & Ogles, 1990	To what degree do the respondents feel safe in their neighborhood (0 to 10)	3.78	2.78
5. fear of crime ($\alpha=.86$)	Sparks & Ogles, 1990	1. How afraid are you that a stranger will threaten you with a weapon? 2. How afraid are you that somebody that a stranger will physically assault you? 3. How afraid are you strangers hanging around your house at night? 4. How afraid are you of getting murdered?	3.28 3.34 3.00 3.01	3.09 3.00 2.95 3.43
6. law and order (5 point scale, $\alpha=.78$)	Rubin & Peplau, 1975; Van den Bulck, 1996	1. It often happens that somebody who is guilty is acquitted by the judge. 2. Judges should punish criminals more severely. 3. The ordinary citizen is not protected against petty crime 4. A person who is arrested should be kept in jail until he can appear in court. 5. Criminals have too many rights.	3.16 4.03 3.50 3.59 3.53	.94 .99 .96 1.09 1.08

		6. The death penalty should be reintroduced for crimes like murder or terrorism.	3.11	1.57
		7. The police should be tracking criminals instead of directing traffic.	3.29	1.12
		8. The police are not interested in petty crime of which ordinary citizens are often the victims.	2.98	1.12
		9. If the police were to shoot sooner, there would be fewer innocent victims	2.82	1.22
		10. There are too many restrictions on what the police can do'	3.23	.99
		11. In order to catch criminals, the police should have heavier weapons	2.65	1.17
7. Anomie (5 point scale, $\alpha=.72$)	Srole (1956)	1. People can say what they want, but the situation of regular people does not get better, but worse.	3.11	.97
		2. The way the future looks today, it is unjustified to put children on the world.	2.37	1.15
		3. Most politicians are not interested in the problems of the normal people.	3.39	1.07
		4. Most people do not care about there fellow-men.	2.93	1.00
		5. Currently, everything is uncertain and unpredictable.	3.50	.97

Table 2

Correlation matrix of all the variables in the regression analyses

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Sex	–	–	,11	–,11*	,12	,13	,16*	,13	,12*	,09	,05	,01	,29**	,04	–,01	–,09
2. Violent Games	--	,63**	,12*	,07	,02	,17*	–,05	,11	,07	,07	,06	–,01	–,10	,01	,09	,17**
3. Games		--	,10	,06	–,01	,08	,01	–,06	,05	,07	,06	,04	–,04	,02	,05	,14*
4. TV			--	,14*	,12	,27**	,11	,15	,25**	,26**	,17**	,10	,19**	,13*	,23**	,29**
5. Mistake				--	–,02	,32**	,10	,04	,05	,11*	–,05	,10	–,01	,18**	,27**	,34**
6. Serious crime forced ¹					--	--	--	--	,32**	,37**	,24**	–,09	,24**	,09	,23**	,17*
7. Serious crime open ²						--	--	--	,39**	,38**	,24**	,25**	,34**	,31**	,35**	,38**
8. Police men forced ³							--	--	,15*	,18**	,10	,05	,22**	,07	,15*	,21**
9. Police men open ⁴								--	,46**	,49**	,51**	,05	,27**	,01	,22*	,21*
10. Murder									--	,41**	,24**	,12*	,39**	,09	,24**	,25**
11. Accident										--	,41**	,15**	,19**	,09	,24**	,23**
12. Heart attack											--	–,03	,07	,00	,04	,08
13. Crime likelihood												--	,32**	,21**	,23**	,16**
14. Fear													--	,21**	,26**	,25**
15. Safety														--	,22**	,23**
16. Anomie															--	,51**
17. Law and order																--

* $p < .05$, two tailed.** $p < .01$, two tailed.N=322;¹ N=189;² N=133;³ N=212;⁴ N=110

Table 3
Average Monthly Viewing and Playing in Hours by Grade

Age		TV	Video Games
3 rd year	<u>M</u>	80:32	22:05
	<u>N</u>	174	174
	<u>SD</u>	40:54	26:56
6 th year	<u>M</u>	66:52	14:16
	<u>N</u>	148	148
	<u>SD</u>	37:07	22:26
All Respondents	<u>M</u>	74:15	18:29
	<u>N</u>	322	322
	<u>SD</u>	39:44	25:14

Note. Time is presented in hours:minutes.

Table 4

Average Monthly Viewing and Playing in Hours by Gender

Gender		TV	Video Games
Male	<u>M</u>	69:48	31:15
	<u>N</u>	155	155
	<u>SD</u>	37:00	30:07
Female	<u>M</u>	78:22	6:39
	<u>N</u>	167	167
	<u>SD</u>	41:49	9:51

Note. Time is presented in hours:minutes.

Table 5

Regression analysis on the cultivation measures (betas)						F(df)	R ²
	TV	violent games	sex	age	level of education		
prevalence of murder	.119*	.109	.184**	-.127*	.252**	11.423(5,321)	.140**
prevalence of accidents	.182**	.107	.132*	-.010	.159**	7.195(5,321)	.088**
prevalence of heart attack	.137*	.106	.094	.083	.088	3.415(5,321)	.036**
victimization likelihood	.056	-.023	-.005	.037	.161**	2.312(5,321)	.020*
fear of crime	.018	-.016	.302**	-.247**	.310**	19.878(5,321)	.227**
neighborhood safety	.093	-.002	.032	-.040	.089	1.669(5,321)	.010
anomie	.132*	.069	.026	.022	.277**	9.077(5,321)	.112**
law & order	.223**	.092	-.054	-.018	.175**	9.421(5,321)	.116**

* $p < .05$, two tailed.** $p < .01$, two tailed.

Table 6

Logistic and linear regression analysis on the cultivation measures

logistic regression	N	TV	violent games	sex	age	level of education	X ² (df)	Nagel- Kerke R ²
procedural error	322	1,012**	,981	,471*	1,620	,982	15,295(5,317)	,073
serious crime	189	1,001	1,082	2,288*	,659	1,626*	12,505(5,184)	,086
police men	212	1,005	1,053	2,361*	1,445	1,247	10,101(5,207)	,068
linear regression	N	TV	violent games	sex	age	level of education	F(df)	R ²
serious crime	133	,148	,202*	,210*	-,122	,246**	6,137(5,127)	,195
police men	110	,059	,215*	,228*	,045	,254**	3,291(5,104)	,137

* $p < .05$, two tailed.** $p < .01$, two tailed.

Values of the logistic regression analyses are odds ratios. Values of the linear regression analyses are standardized betas.