MANUSCRIPT FORMAT FOR JOURNAL ARTICLES SUBMITTED TO AMMONS
SCIENTIFIC, LTD. FOR POSSIBLE PUBLICATION IN PERCEPTUAL AND MOTOR
SKILLS OR PSYCHOLOGICAL REPORTS\textsuperscript{1, 2}

FIRST I. SURNAME

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Affiliation

FIRST I. I. SURNAME AND FIRST I. SURNAME

\textit{Same Affiliation for Two Authors}

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\textit{Same Affiliation for Three Authors}

FIRST SECOND SURNAME

Affiliation

FIRST SECOND HYPHENATED-SURNAME

Affiliation

FIRST I. COMPOUND SURNAME

Affiliation

\textsuperscript{1} Address correspondence to [Name, Complete Address] or e-mail [(insert e-mail address in parentheses)].

\textsuperscript{2} [Optional footnote, if needed, for recognition.]
Summary.—Type the Summary in one paragraph, on a page by itself. 150 words are allowed in this section. Numbers, in this section only, should be typed as numerals. In this section and throughout the paper, do not break long words by hyphenating but allow words to wrap automatically. Margins should all be set at 1 in., lines should be left-justified, and paragraphs should be indented to .5 in. Line numbering should be turned on in the body of the manuscript to facilitate the reviewing and editing processes. Type only one space following the end of a sentence. Please read our instructions for authors at http://www.amonsscientific.com/pages/docs/Instructions-for-Submitting-a-Manuscript.pdf.
Basic Sections of a Manuscript

After the Summary, begin the introductory section on a new page. There is no heading for this section, which should briefly introduce the subject and give a brief background of previously published research on the subject. Be sure to include appropriate articles from the Journal to which the article is submitted.

The text of a note-size manuscript, i.e., one or two published pages, may be placed entirely in this section. In such small papers, sections may be designated by using italicized, indented paragraph headings, as described below.

End this section with a clear statement of hypotheses based on the literature review. For more detailed instructions, refer to the Publication Manual of the APA (American Psychological Association, 2001).

Method

In the Method section, give a clear description of the study and how it was carried out. Specifically describe the procedures and materials used, so the study can be replicated. The subsections, with brief content descriptions, in order, are:

Participants

Describe the sample: how many participants, how they were recruited. Provide basic demographics (age and $SD$, sex distribution, etc.).

Measures

Each subsection here should describe one questionnaire or interview or objective observation. Include details of the origin of the measure, the number of items and subscales, format of responses, scoring and known psychometric qualities.
Procedures

Explain how the experiment was done. Who tested participants, where were they tested or observed, etc.

Analysis

Describe the analyses applied to the data. It is helpful if you arrange this section to be coherent with the hypotheses.

Results

Describe the results of the study in the Results section. Use tables if possible to present data in a clear and easy-to-interpret format. Present first the descriptive statistics so that the results can be more easily compared to other studies. You are strongly encouraged to use statistical analyses that can be reported also as effect size, or odds ratio, etc., to facilitate readers’ understanding and ability to compare with the literature.

Discussion

Use this section to discuss the results, mention any limitations of the current study, and suggest further research that would be helpful.

(Alternatively:) Results and Discussion
In some cases, when both the Results and Discussion sections are short, they may be combined into one section.

References

A reference list should be placed at the end of the text portion of the paper, beginning on a new page.

After the paper has been completed, please recheck all references carefully to be sure they are correct, in our format, and cited in the text. Also be sure every citation has a corresponding reference. Use of correct spelling of names and complete titles is essential.

References should be hang-indented. Examples of references are listed at the end of this paper in the References section.

Tables and Figures

Do not place tables and figures in the text of the paper, but present them on separate pages at the end of the manuscript following the References. In the text of the paper, indicate approximately where tables and figures should appear (e.g., insert Table 1 here). For detailed information regarding appropriate construction of tables and figures, use the following links to our web pages:

(http://www.ammonsscientific.com/pages/docs/Guidelines-for-Tables.pdf)

References


[NOTE: the following references are given as examples only.]


APPENDIX

General Instructions Relating to Journal Style

Citing of References

Throughout the paper, cite each reference as described below. Note that an ampersand (&) is used only inside parentheses.

Citing a Reference with a Single Author

Smith (2007) or (Smith, 2007) is the correct way to cite a reference with a single author.

Citing a Reference with Two Authors

When citing a reference with two authors, list both names with each citation, e.g., Smith and Jones (2007) or (Smith & Jones, 2007).

Citing a Reference with Three to Six Authors

When citing multiple authors, the first citation of each reference must contain each author’s name and the year—for example: Smith, Jones, Brown, and Green (2007), or (Smith, Jones, Brown, & Green, 2007). Subsequent citations to that reference would be written as Smith, et al. (2007) or (Smith, et al., 2007).

Citing a Reference with Seven or More Authors


When citing more than six authors, list only the first six followed by *et al.* in the first citation (Smith, Jones, Brown, Green, Webb, Smart, *et al.*, 2006); thereafter, Smith, *et al.* (2006).

All the authors should be listed in the References.

Citing Similar References

If more than one article has the same authors (listed in the same order) and the same year of publication, the year must be designated as 2007a, 2007b, etc., in both the reference list and all citations to distinguish between the papers. In some cases all authors’ names must be spelled out in every citation—if that is the only way to distinguish it from a similar reference.

Labels and Headings

Labels

Centered labels in all capital letters should be used only in the title of the manuscript, the names of authors on the title page, and for an appendix (APPENDIX). The only other use of a heading in all capital letters is described below in *Examples of Headings in Papers Requiring Five Levels*.

Headings

For signature-size papers (i.e., three or more published pages), the main divisions of the paper, (e.g., Method, Results, Discussion, Experiment 1, Experiment 2, References), should be typed in upper and lower case and centered, as in the above centered heading: Labels and Headings.
Italicized Subheading

Use italicized subheadings, flush left, for the second level of headings; these often include: Participants, Measures, Apparatus, Materials, Research Design, Procedure, Treatment, Statistical Analysis, etc.

Italicized paragraph heading.—Capitalize only first words or proper nouns, follow with a period and an em dash (.—), and continue in paragraph form.

Headings in Papers Requiring Five Levels:

Although the lowest three levels shown below are usually sufficient, occasionally a lengthy or detailed paper may require four or five levels of headings. A five-level manuscript will use all of the headings listed below, while a four-level paper will use only the lowest four headings.

CAPITALIZED, CENTERED HEADING

Centered, Italicized, Uppercase and Lowercase Heading

Centered Uppercase and Lowercase Heading

Italicized Subheading

Italicized paragraph heading.—

Use of Abbreviations in the Text

The style of these Journals varies slightly from the APA’s Publication Manual (American Psychological Association, 2001) in regard to abbreviations, which are not limited to
parenthetical use. These differences are mentioned below. For all other questions regarding use of abbreviations, please consult the APA Publication Manual.

Latin Abbreviations for English Terms

In these Journals, the following abbreviations are preferred in the text and are not limited to parenthetical use.

- for example, e.g.,
- and so forth, etc.
- that is, i.e.,
- versus, vs

Abbreviations for Units of Time Used with a Numeric Value

The following abbreviations for units of time are preferred in the text when accompanied by numeric values: month = mo., week = wk., hour = hr., minute = min., second = sec., millisecond = msec., etc.

Appropriate use of abbreviations of units of time:

“Instructors studied 25 girls over a 2-wk. baseline phase and a 10-wk. intervention period.”
“This test was given to 6- to 8-yr.-old children during a 2-hr. after-school training session.”
“Times of 120 to 205 msec. were recorded for amplitudes between 50 and 90 mm while sitting.”

Reference Format

APA style is appropriate for basic reference format with a few exceptions: (a) following the date (which is inside parentheses) there should be no period, (b) the volume number of a journal should be in roman type (not italicized).

APA style is also appropriate for abbreviations in reference lists, except for the following terms, which should be abbreviated as shown here:

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Video Game Addiction among High School Students in Hordaland; Prevalence and Correlates

HOVEDOPPGAVE

profesjonsstudiet i psykologi

Sunniva Alsvik Bjordal, Toril Skumsnes og Anette Ørland Wathne

Vår 2011
Veileder: Ståle Pallesen

Biveileder: Helge Molde
VIDEO GAME ADDICTION AMONG HIGH SCHOOL STUDENTS IN HORDALAND; PREVALENCE AND CORRELATES

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Summary.—The aim of this study was to estimate the prevalence and correlates of video game addiction among high school students (N = 531) in Hordaland county, Norway. Video game addiction measured by the Game Addiction Scale for Adolescents was estimated both by a monothetic and a polythetic format. The prevalence was found to be 2.5% and 12.5%, respectively. Regression analyses were conducted where video game addiction comprised the dependent variable. Demographic variables, depression, anxiety, loneliness, aggression, smoking, and alcohol consumption comprised the independent variables. Video game addiction was positively associated with male gender, depression, anxiety, loneliness, aggression and smoking, and negatively associated with both higher paternal education and alcohol consumption. Little research has been conducted on video game addiction and there is no consensus concerning its operationalization. Still, the results of our study are fairly consistent with previous findings and contribute to the construct validity of video game addiction.
Sammendrag.—Formålet med denne studien var å estimere prevalens av, og korrelere til dataspillavhengighet blant elever på videregående skole (N=531) i Hordaland, Norge. Dataspillavhengighet, målt med Game Addiction Scale for Adolescents, ble estimert både med et monotetisk og et polytetisk format som gav prevalensestimater på henholdsvis 2.5 % og 12.5 %. Regresjonsanalyser ble utført med dataspillavhengighet som avhengig variabel, og hvor kjønn, alder, foreldres utdannelse, bosted, depresjon, angst, ensomhet, aggresjon, røyking og alkoholforsbruk utgjorde de uavhengige variablene. Resultatene viste positive sammenhenger mellom dataspillavhengighet og mannlig kjønn, depresjon, angst, ensomhet, aggresjon og røyking. Negative sammenhenger ble funnet mellom dataspillavhengighet og fars høyere utdannelse, og med alkoholforsbruk. Det er foreløpig gjort lite forskning på feltet og der foreligger ikke konsensus når det gjelder operasjonalisering av dataspillavhengighet. Resultatene av studien er i hovedsak konsistente med tidligere funn, og bidrar på denne måten til begrepsvaliditeten av dataspillavhengighet.
Major technological development has taken place in recent decades. Various types of video games have been a part of this development, and video game playing is a popular activity among young people. Between 75% and 90% of children and young people report that they play video games (Wallenius, Rimpela, Punamaki & Lintonen, 2009).

Some individuals display excessive use of video games. It has been argued that this is addictive behavior, and it has also been argued that video game addiction should be included as a diagnosis in the DSM-V (Lemmens, Valkenburg & Peter, 2009). According to Mendelson and Mello (1986), addictive behavior is excessive, compulsive and uncontrollable behavior that can lead to harmful consequences, both psychologically and physically. Like pathological gambling, video game addiction is considered to be a behavior-based or non-chemical dependency (Gentile, Choo, Liau, Sim, Li, Fung et al., 2011). Griffiths (2005) and Johansson and Götestam (2004) argue that gambling and video game addiction seem to share common features. Lemmens et al. (2009) define video game addiction as excessive and obsessive video game playing resulting in social or emotional problems, while the player is unable to control his/her use.

According to Salguero and Morán (2002), it is a problem in many studies in this field that video game addiction is not rooted in official diagnostic manuals. Thus, validated diagnostic criteria do not exist. Several instruments have been developed to define and measure video game addiction, and these are mainly based on the criteria for pathological gambling taken from different editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; DSM-IV, American Psychiatric Association, 1987; 1994) (Wenzel, Bakken, Johansson, Götestam & Øren, 2009). Griffiths (1991) and Fisher (1994), among others, developed instruments measuring video game addiction based on the criteria for gambling addiction found in the DSM-III-R (American Psychiatric Association, 1987) and DSM-IV (American Psychiatric Association, 1994), respectively. Other researchers have
developed instruments based on the criteria for pathological gambling in the International Classification of Disorders (ICD, World Health Organization, 1992), or based on other criteria for defining the term (Lemmens et al. 2009). As a result, there is no consensus on the definition of video game addiction (Wenzel et al., 2009).

Lemmens et al. (2009) have recently developed a 21-item instrument for measuring video game addiction, the Game Addiction Scale for Adolescents (GASA). This instrument, and a shortened corresponding seven-item version, displayed good reliability and validity. The two versions were found to be coherent in terms of correlations regarding measures of loneliness, life satisfaction, social competence, and aggression. The 21 items are based on seven underlying criteria: salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems, which are regarded as common elements of all kinds of addiction (Brown, 1993; Griffiths, 1996).

In the field of addiction research in general, there has been a tradition of using a categorical diagnostic approach. In contrast, addiction, including video game addiction, can also be considered along a continuum (Lemmens, Valkenburg & Peter, 2011). The estimation of prevalence is influenced by whether game addiction is perceived as a dichotomous or continuous variable. Choosing a dichotomous or continuous variable also affects the degree of coherence with other relevant variables, such as measures of mental health.

Previously, different prevalence estimates of video game addiction have been found to vary from 1.9% to 19.9% (Skouverøe, Berntsen, Mentzoni, Brunborg, Molde, Myrseth, Bjorvatn & Pallesen, submitted). This variation could be due to differences in measuring, e.g. different instruments and samples. Mentzoni, Brunborg, Molde, Myrseth, Skouveroe, and Pallesen (in press) examined video game addiction among Norwegians aged 16 to 40 years. The estimated prevalence was 0.6% and 4.1%, depending on the operationalization. Age and gender predicted video game addiction and younger boys were the most vulnerable group. In
general, research shows that boys play both more often and for longer periods of time than
girls do (Buchman & Funk, 1996).

Several studies find correlations between video game addiction and impaired mental
and physical health, such as positive correlations between video game addiction and anxiety
and depression (Mentzoni et al., in press), physical complaints (Wallenius et al., 2009),
loneliness, and aggression (Lemmens et al., 2009). Wenzel et al. (2009) found that video
game addiction was positively correlated with sleep problems, suicidal thoughts, obsessions,
compulsions and alcohol and drug abuse. A positive correlation has also been found between
video game addiction and smoking (Desay, Krishnan-Sarin, Cavallo & Potenza, 2010).
Negative correlations have been found between video game addiction and social competence
(Lemmens et al., 2009), school achievement (Gentile, 2009), life satisfaction, and other health
indicators (Mentzoni et al., in press).

A recent meta-study concluded that exposure to violent video games was significantly
positively related to aggressive behavior and aggressive cognition, and that playing violent
video games over time may be a risk factor in relation to increasing aggressive thinking.
Playing violent video games was found to predict increased aggressive affect, and to be
associated with reduced prosocial behavior. Both of these effects appeared to be stronger in
experimental studies than in longitudinal studies. Exposure to violent video games was also
found significantly related to less empathy (Anderson, Shibuya, Ihori, Swing, Bushman,
Sakamoto et al., 2010). Gackenbach (2006), however, argues that different cognitive skills
can be improved by the use of video games.

At present, there is a lack of studies concerning prevalence and correlates of video
game addiction in Norway. Such studies are therefore needed, ideally studies that make use of
a validated measurement instrument. The purpose of our study was to examine the prevalence
of video game addiction among students aged 16 to 19 years in Hordaland county, Norway.
Moreover, we aimed to investigate whether video game addiction is related to the following demographic variables: gender, age, urban or rural areas of living, parental education, and the following psychosocial variables: anxiety, depression, loneliness, physical and verbal aggression, smoking, and alcohol consumption. Based on previous research, we expected to find that video game addiction is higher among boys, and that video game addiction is positively associated with all of the psychosocial variables mentioned above.

Method

Participants

The original sample included students from a total of 208 randomly chosen classes (from 36 of 44 high schools) in Hordaland. A cluster sample procedure was used. As several schools and classes could not participate the survey sample was reduced to 824 students (58 classes, 22 high schools). In all, 293 respondents were excluded due to incomplete answers. The final sample consisted of 531 students aged from 16 to 19 years: 215 aged 16, 183 aged 17, 93 aged 18, and 40 respondents aged 19 years. The response rate was 64.4%. The mean age was 16.9 years (SD = 0.94). The sample included 290 boys and 241 girls. The survey was carried out in spring 2010.

Measures

Demographics.— The demographic questions included gender, age, urban or rural area of living and parental education (primary, vocational, secondary, or higher education).

Video game addiction.— The seven-item version of GASA (Lemmens et al., 2009) was used to measure video game addiction. This version consists of seven questions based on key symptoms of video game addiction present during the last six months. The items are scored on a five-point scale with the following response options: “never (1)”, “rarely (2)”, “sometimes (3)”, “often (4)” and “very often (5)”. The Norwegian version was based on a standard-translation-back translation procedure (Beaton, Bombardier, Guillemin & Ferraz,
Video game addiction was operationalized according to both a monothetic and a polythetic format. Using a monothetic format, all items must be rated above 3 in order to meet the criteria for video game addiction, while, in a polythetic format, at least four of the seven items must be rated above 3. In our study, the Cronbach's alpha for GASA was .85. In addition, the questionnaire included a question on how many hours the respondent spent on video games during the week and on weekends.

Anxiety and depression.— Anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS: Zigmond & Snaith, 1983). HADS consists of two subscales, each consisting of seven items, measuring the symptoms of anxiety and depression, respectively. The items are rated from 0 to 3. In our study, the Cronbach's alphas for the subscales of anxiety and depression were .80 and .74, respectively.

Loneliness.— Loneliness was measured using the Revised UCLA Loneliness Scale (RULS-8; Roberts, Lewinsohn & Seeley, 1993). The scale consists of eight items rated from never (0) to often (3). The third item of the RULS-8 was removed from the final analyses due to double negation in the wording of the question, leading to inconsistent responses (corrected item-total correlation < 0.1). The Cronbach's alphas in our study were .72 and .80 before and after the item exclusion, respectively.

Aggression.— The Short-Form Buss-Perry Aggression Questionnaire (BAPQ-SF) subscales of verbal (three items), and physical aggression (four items) were used. The items were rated from “extremely uncharacteristic of me (1)” to “extremely characteristic of me (5)” (Bryant & Smith, 2001; Diamond & Magaletta, 2006). The Cronbach's alphas for verbal and physical aggression in our study were .77 and .83, respectively.

Smoking and alcohol consumption.— Smoking was assessed by the question “do you smoke?” The options “never” and “occasional or party smoking” were scored as a non-smoker, while “every day” was scored as a smoker.
Alcohol consumption was measured using Alcohol Use Disorders Identification Test - Consumption (AUDIT-C) (Saunders, Aasland, Babor, De La Fuente & Grant, 1993). AUDIT was developed by the World Health Organization to enable screening for problematic alcohol consumption. AUDIT-C is argued to be a valid screening instrument measuring excessive alcohol consumption and dependence (Bush, Kivlahan, McDonell, Fihn & Bradley, 1998). The instrument includes three questions: "How often do you consume alcohol?" rated from 1 "never" to 5 "four times a week or more"; "How many units of alcohol do you consume on a ‘typical’ day of drinking? ” rated from 1 "1-2" to 5 "10 or more"; and "How often do you consume six or more units of alcohol?" rated from 1 "never" to 5 "daily or almost daily ". The Cronbach's alpha for AUDIT-C in our study was .85.

**Procedure**

The students gave online informed consent to participation. Parental consent was not obtained due to the respondents being 16 years or older, and because the questions were not considered to be sensitive. The principals, teachers and students involved, received an orientation of the purpose and scope of the study via e-mail prior to participation.

The survey was conducted online, using SurveyXact. Each student received an e-mail containing a link to the questionnaire. De-identification of the data was achieved by numbering each e-mail address in SurveyXact. The link between students’ e-mail addresses and the corresponding numbers was kept under high security conditions, and separated from the file containing the respondents’ answers. The data are thus de-identified. The link between the respondent number and e-mail address was used to send reminders about unanswered requests. The project was approved by the Regional Committee for Medical Research Ethics, Helse Vest.

**Analysis**

To calculate prevalence estimates, correlations and regressions, Stata Statistical
Software was used (StataCorp., 2003). Stata was the preferred software for analyzing the data, as it allows controlling for the design effect, i.e. the problem of responses potentially correlating within clusters/classes (Kish, 1987).

Pearson product-moment correlation analysis was used to calculate correlations between the continuous variables of age, depression, anxiety, loneliness, physical and verbal aggression and alcohol consumption.

Video game addiction as a continuous dependent variable was analyzed using hierarchical multiple regression analysis with two blocks. Block 1 consisted of the predictor variables: gender, age, urban or rural area of living, and maternal and paternal education. Block 2 consisted of the predictor variables: depression, anxiety, loneliness, physical and verbal aggression, smoking, and alcohol consumption.

Video game addiction as a categorical dependent variable was analyzed using bivariate and multivariate logistic regression analysis. Both the monothetic and the polythetic operationalizations of video game addiction were used as dependent variables in these analyses.

Results

Descriptive analysis

Of the 531 respondents, 415 report to play video games. On average, the respondents play 1.86 (SD = 2.56) hours on weekdays, and 2.89 (SD = 3.84) daily hours in weekends. A total of 2.5% (95% CI = 1.13 - 3.77) of the 531 respondents can be characterized as video game addicted using the monothetic format. A total of 12.5% (95% CI = 9.63 to 15.27) of the respondents can be characterized as video game addicted using the polythetic format.

Correlation Analysis

Table 1 presents the Pearson product-moment correlation coefficients of the continuous variables of age, depression, anxiety, loneliness, physical and verbal aggression,
and alcohol (insert Table 1 here). Depression, anxiety, loneliness, and physical and verbal
aggression are all significantly and positively interrelated. In addition, age is significantly and
negatively correlated with depression and loneliness, and significantly and positively
correlated with alcohol use. Furthermore, alcohol is significantly and positively correlated
with physical and verbal aggression.

T-test

Table 2 and 3 presents the differences in the number of hours spent on video games
between the group that meets the criteria for video game addiction and the group that does not
(insert Table 2 and 3 here). The groups that meet the criteria for video game addiction with
either the monothetic or polythetic format show a significantly higher number of hours spent
on video games on weekdays and weekends than the non-video game addiction group.

Regression Analysis

Hierarchical regression analysis.— Table 4 presents the results of the hierarchical
regression analysis, with the continuous score on GASA as the dependent variable (insert
Table 4 here). Block 1 explains 17% of the variance. Block 2 explains an additional 15% of
the variance. In total, the two blocks explain 32% of the variance, $F (18, 40) = 23.5$.

The hierarchical regression analysis shows that gender, paternal university or college
education, depression, anxiety, loneliness, and alcohol consumption are significant predictors
of video game addiction. Compared to girls, boys are more likely to meet the criteria for video
game addiction. Paternal university or college education is negatively related to video game
addiction, and may thus be a protective factor in relation to the development of video game
addiction. In addition, alcohol consumption is negatively related to video game addiction,
while depression, anxiety, and loneliness are positively related to video game addiction.

Logistic regression analysis.— Table 5 presents the bivariate and multivariate
analyses of the monothetic operationalization of video game addiction (insert Table 5 here).
Physical aggression is a significant predictor of video game addiction in the multivariate analysis. Depression, anxiety, loneliness, physical and verbal aggression, and smoking are significant predictors of video game addiction in the bivariate analyses.

Table 6 presents the bivariate and multivariate analyses for the polythetic operationalization (insert Table 6 here). Male gender and verbal aggression are significant predictors of video game addiction in the multivariate analysis. Male gender, depression, anxiety, loneliness, physical and verbal aggression, and smoking are significant predictors of video game addiction in the bivariate analyses.

**Discussion**

Individuals classified as video game addicts in our study, were found to spend significantly more time playing, both in weekends and weekdays, compared to non-addicted. These findings attest to the convergent validity of the GASA (Lemmens et al., 2009).

**Prevalence**

The estimates of prevalence of video game addiction of 2.5% and 12.5% that we found, lie within the range of 1.9% -19.9% that has previously been found across studies (Skouverøe et al., submitted). The large variation in estimations reported in previous studies could partly be due to the use of various approaches in relation to operationalization, measurement and sample selection. The year of publication combined with the technical advances made during recent decades may also add to our understanding of differences in the prevalence of video game addiction.

Previous studies of video game addiction among teenage samples that include the age group 16-19 years have found prevalence estimates of 8.5% (Gentile, 2009), 1.9% (monothetic) and 9.4% (polythetic) (Lemmens et al., 2009), 11.9 % (Grüsser, Thaleman & Griffiths, 2007), and, in Norway, 2.7% (Johansson & Götestam, 2004). Our results are comparable with the estimates of 1.9% and 9.4% found by Lemmens et al. (2009), as we used
the same operationalizations. The prevalence of video game addiction appears to be somewhat higher in Norway than in the Netherlands. However, the Dutch sample, which was aged 12-18 years, represents a somewhat broader and younger age group than our sample. Gentile (2009) used an even broader age group of 8-18 years. Overall, this could indicate that young people aged 16-19 years have a higher prevalence of video game addiction than younger adolescents. The fact that we used such a narrow age group may explain why age was not a significant predictor in our study. The differences could also reflect differences in culture between Norway, the Netherlands and the USA. It should also be noted that different results across cultures may reflect inadequacies in the adaptation/translation process of the assessment instruments such as lack of conceptual equivalence, linguistic equivalence and measurement unit equivalence (Lonner & Ibrahim, 2008).

The prevalence estimate of 11.9% (Grüsser et al., 2007) is close to our finding of 12.5% (polythetic format). However, the sample selection of Grüsser et al. (2007) was based on an online gaming magazine, thus representing a population likely to have a higher prevalence of video game addiction than the general population. Johansson and Götestam (2004) estimated the prevalence of video game addiction among Norwegian teenagers aged 12-18 years to be 2.7%. This is close to our estimate of 2.5% (monothetic format), despite the fact that their estimate was based on Young's (1998) Diagnostic Questionnaire for Internet Addiction. This instrument is based on the criteria for pathological gambling in DSM-IV and measures internet addiction. Since the DSM-IV (American Psychiatric Association, 1994) uses a polythetic approach, we might expect that studies with operationalizations based on criteria from the DSM would result in estimates closer to our estimate in polythetic format than in monothetic format, which however does not seem to be the case in the study of Johansson and Götestam (2004).
Among younger age groups (ranging from 8-16 years), prevalence estimates of 7.6% - 9.9% (Gentile et al., 2011), 5.7% (Phillips, Rolls, Rouse & Griffiths, 1995), and 19.9% (Griffiths & Hunt, 1998) have been found. The first two studies suggest that these age groups have a lower prevalence than the age group in our sample (with use of a polythetic format), with an apparent increase in prevalence from 1995 to 2011. The estimate of 19.9% deviates strongly from the other findings. It is based on a sample aged 12-16 years, using a customized version of the criteria for pathological gambling by DSM-III-R (American Psychiatric Association, 1987).

Studies investigating video game addiction among young adults (20-30 years) have found prevalence estimates of 8% (Griffiths & Dancaster, 1995; Porter, Starcevic, Berle & Fenech, 2010), both among British psychology students and in an international sample of mostly Western men younger than 30 years old. These estimates are somewhat lower than our estimate in polythetic format. These findings combined further supports the hypothesis that young people aged 16-19 years are a particularly vulnerable group in relation to video game addiction, with a higher prevalence than both younger and older age groups. This is also in accordance with previous findings that the age group 16-21 years had higher levels of video game addiction than older age groups (Mentzoni et al., in press).

Video game addiction has also been investigated among broader age groups in Norway. For video game addiction operationalized as playing video games for four hours or more per day, Wenzel et al. (2009) found prevalence estimates of 2.2% among Norwegian 16-74-year-olds (2009). Prevalence estimates of 0.6% (monothetic format) and 4.1% (polythetic format) were found among 16-40-year-olds in a recent Norwegian study (Mentzoni et al., in press). This study used the same operationalization as in our study, and showed a lower prevalence in a sample consisting of a broader age group. Overall, this supports the hypothesis that the prevalence of video game addiction is significantly lower.
among broader age groups (16-40, 16-74) that include people of higher age than in our sample.

The prevalence studies mentioned above used various instruments for operationalization and measurement, e.g. based on the criteria for pathological gambling in DSM-III-R (American Psychiatric Association, 1987), or DSM-IV (American Psychiatric Association, 1994). This makes it difficult to compare prevalence estimates across studies.

Consensus on operationalization is of great importance if we are to expand our knowledge of the concept of video game addiction. Like Lemmens et al. (2009), and Mentzoni et al. (in press), we used GASA, with a cut-off of 3, and we used both a polythetic and monothetic format. Mentzoni et al. (in press) chose a monothetic format for the operationalization of video game addiction, while a polythetic format was used for the operationalization of problematic use of video games. Lemmens et al. (2009) argue that video game addiction should be operationalized using a monothetic format, which means that all criteria must be met, even though the DSM-IV diagnostic manual presents a polythetic format for diagnosing gambling addiction. According to Lemmens et al. (2009), several researchers advocate the use of a monothetic format as the preferred operationalization of video game addiction. It is argued that a monothetic format helps to avoid overestimation of video game addiction, as well as assuring the presence of the criterion of negative life consequences, a criterion considered to be essential in video game addiction (Lemmens et al., 2009).

Demographic variables

In line with previous research (Wenzel et al., 2009), we found that it is primarily boys who are affected by video game addiction. This trend has been found in numerous studies, e.g., Buchman & Funk (1996). However, the effect of gender was not significant in the logistic regression analysis in the monothetic format. This exception may be due to the low
number of individuals classified as video game addicted, which reduces the statistical power in this analysis.

One can imagine several reasons for the effect of gender. Several studies have found that men have a higher risk of developing other types of addiction, such as alcohol dependence and pathological gambling. Kringlen, Torgersen and Cramer (2001) found that men are about twice as likely to develop both alcohol and drug addiction in a lifetime perspective. Blanco, Hasin, Petry, Stinson and Grant (2006) found that whereas men had a lifetime prevalence rate of 0.64% (95% CI 0.50-0.78) for pathological gambling as defined in DSM-IV, the lifetime prevalence rate for women was 0.23% (95% CI 0.17-0.29). Based on findings like this, it is possible to envisage an underlying vulnerability among boys to developing different kinds of addictions, both chemical and non-chemical.

Greenberg, Sherry, Lachlan, Lucas and Holmstrom (2010) argue that most video games today are aimed at male users and designed by men, and that these may be reasons for the gender differences in video game playing. Furthermore, they found that, to a greater extent than girls, boys use video games to achieve activation and social interaction. Phillips et al. (1995) found that boys more often report feeling better after playing than girls do. This may indicate that video game playing has a different function for boys than it has for girls, and it is conceivable that girls meet needs, such as social needs, in different ways, e.g., it was found that girls spent more time talking on the phone (Hunley, Evans, Delgado-Hachey, Krise, Rich & Schell, 2005). It is also possible that boys achieve feelings of mastery when playing video games, while girls to a greater extent achieve this through other activities, e.g., Augner and Hacker (in press) found that girls are more likely to develop mobile phone addiction than boys.

We found that higher paternal education may be a protective factor in relation to video game addiction as a continuous variable. To our knowledge, our study is the first to look at
the relationship between video game addiction and socio-economic status. This finding is interesting considering the previously found association between low socio-economic status and other forms of addiction, such as alcohol addiction (Bränström & Andréasson, 2008).

Thus, low socio-economic status might represent a vulnerability also to developing video game addiction.

Psychosocial Variables

Overall, we found positive associations between video game addiction and anxiety, depression, loneliness, physical and verbal aggression, and smoking, and a negative association between video game addiction and alcohol consumption. These findings correspond to previous findings that video game addiction is positively correlated with depression (Mentzoni et al., in press), loneliness (Lemmens et al., 2009), aggression (Anderson et al., 2010), anxiety, (Wenzel et al., 2009), and smoking (Desay et al., 2010).

However, in contrast to our findings, Wenzel et al. (2009) found a positive correlation between video game addiction and alcohol. Video game addiction is also found to correlate with other psychosocial variables that are not examined in our study. They include ADHD (Bioulac, Arfi & Bouvard, 2008), sleep problems, obsessions, compulsions, and drug use (Wenzel et al., 2009). In addition, the personality traits of impulsivity, poor social competence, low levels of empathy, and poor emotional regulation are found to increase the risk of developing video game addiction (Gentile et al. 2011). In other words, video game addiction appears to be related to a variety of mental disorders.

Anxiety, depression and loneliness.— Anxiety and depression were found to be significant predictors of video game addiction, both as a continuous variable, and with both monothetic and polythetic operationalization. Wenzel et al. (2009) found that the prevalence of self-reported anxiety and depression was positively correlated with time spent on video game playing among Norwegians aged 16 to 74 years. Mentzoni et al. (in press) found that
players who met the criteria for video game addiction in the polythetic format scored higher on anxiety and depression measured using HADS, compared to both players and non-players. The fact that our findings are consistent with previous Norwegian studies strengthens the assumption that anxiety and depression are related to video game addiction in Norway.

We also found that loneliness is a significant predictor of video game addiction, both as a continuous variable and with monothetic and polythetic operationalization. Lemmens et al. (2009) found that the respondent's average score on GASA was positively correlated with scores on a sample of questions from the UCLA loneliness scale, and the relationship between video game addiction and loneliness was confirmed in two different samples. It was also investigated whether the time spent playing video games was positively correlated with loneliness. In one of the two samples, a low but positive correlation was found, while, in the second sample, time spent playing video games was not significantly correlated with loneliness (Lemmens et al., 2009). It seems that video game addiction is more strongly related to loneliness than the amount of video game playing per se. This finding is relevant to the debate on video game addiction as a mental disorder and on whether one can identify general characteristics across different addictions.

Few studies have examined whether video game addiction leads to depression, anxiety, and loneliness, or whether the opposite is true. Excessive video game playing could possibly lead to social isolation, which in turn can give rise to symptoms of depression, anxiety, and loneliness. Moreover, it is conceivable that symptoms of depression, anxiety and loneliness increase the probability of choosing indoor activities, including video game playing, and avoiding or missing out on more traditional social interaction. A number of other causal relationships can be envisaged, and video game playing could also be seen as a mediating factor, as a coping strategy for anxiety, depression and loneliness, or as a maintaining factor.
A longitudinal study of video game addiction was recently conducted and it indicated that video game addiction seems to contribute to development of other psychological problems, and thus cannot solely be regarded as a symptom of underlying difficulties. It was also found that anxiety, depression, and social phobia improved if video game addiction ceased, and that these disorders, as well as impulsivity, were aggravated if video game addiction developed (Gentile et al., 2011). According to Gentile et al. (2011), a clinical perspective on video game playing conceive of it as a coping strategy for young people suffering from depression or anxiety. Wurmser (1987) regarded addiction as a way of self-medicating, and of escaping from problems. Freud and Ferenczi viewed alcohol addiction as a way of escaping into a form of narcosis (Brabant, Falzeder & Giampieri-Deutsch, 1993). A possible motive for video game playing could be the need to escape other activities, concerns and negative emotions (Wallenius et al., 2009). In line with this it was recently found that some video game players are motivated by the need to escape everyday problems (Stetina, Kothgassner, Lehenbauer and Kryspin-Exner, 2010). Video game playing is also described as a form of "self-treatment" or coping strategy in relation to ADHD (Han, Lee, Na, Ahn, Chung, Daniels, et al., 2009).

Even though players seem to use video game playing as a coping strategy when experiencing psychological difficulties, Gentile et al. (2011) argue that video game playing cannot be regarded solely as a symptom of other psychological difficulties. Their longitudinal study shows that video game addiction is not just correlated with other psychological problems, but can even predict them. The authors assume that there is a reciprocal relationship between video game addiction and other mental disorders (Gentile et al., 2011).

**Physical and verbal aggression.**— We found a positive correlation between video game addiction and physical and verbal aggression, such as threatening others and getting into fights. Previously, it has been argued both for and against a causal link between violent video
games and aggressive behavior. There have been major technological developments in recent years. This has led to both easier access to and a larger selection of video games with better graphics (Gentile and Anderson, 2006). Thus, video games are assumed to be more realistic, which in turn makes it easier to engage and identify with the characters. It seems reasonable to assume that a stronger identification with the characters and involvement in the game in general will lead to an increased influence on and higher risk of aggressive behavior. Albert Bandura's social learning theory of aggression (1978), postulates that aggressive models in the media can be both a source of, and a tutor of aggressive behavior. A stronger identification could potentially increase this effect of model learning. Furthermore, it is conceivable that increased exposure to aggressive behavior over time can contribute to a change in norms, as well as a risk of becoming desensitized in relation to aggressive behavior.

Innovations in the video game industry have also led to increased awareness about the possible effects of violent video games. Several studies show that there is an association between the use of violent video games and aggression (Gentile and Anderson, 2006). Hauge and Gentile (2003) found that adolescents with video game addiction were more involved in aggressive behavior such as arguing and fighting, and reported higher levels of hostile attribution than adolescents not suffering from video game addiction. Neither Hauge and Gentile’s (2003) study nor ours distinguishes between type of game. It would be interesting, therefore, to investigate whether video game addiction is related to aggression per se, or whether it is the violent and aggressive content of the games that can explain the relationship between video game addiction and physical and verbal aggression. Experimental and longitudinal studies indicate a causal relationship in which exposure to violent video games leads to higher levels of aggressive behavior, aggressive cognition, and aggressive affect (Anderson et al., 2010). Our findings are consistent with these findings. However, due to the research design, we cannot say anything about causality.
Video Game Addiction

Smoking and alcohol consumption. — Our results show a positive correlation between video game addiction and smoking. Previous findings indicate that boys who play video games are less likely to be smokers, while boys with a video game addiction are more likely to be smokers, compared to boys who do not play video games (Desay et al., 2010). It is not known whether this is due to an underlying general vulnerability to addiction. Weinstein (2010) has found that playing video games can have a long-lasting effect on the brain's reward system in the same way as drug use.

Contrary to what we expected, a negative relationship between video game addiction and alcohol consumption was found. Alcohol is often used in a social context in the age group in our study, such as at parties, while video game playing is often seen as being a less social activity. Alcohol may have a social function, while video game addiction is found to relate to loneliness. This was also the case in our study. This may explain the negative relationship between alcohol consumption and video game addiction in our study. Although smoking can take place in social settings as well, smoking in our study is operationalized as daily smoking, which most likely includes smoking outside social contexts. Consequently, in our study, smoking is assumed to be an activity characterized more by loneliness and addiction than alcohol use. It is uncertain however, whether a measure of alcohol addiction would be positively or negatively related to video game addiction.

Strengths and Limitations

A response rate of 64.4% is acceptable, and it can be considered to be an asset of the study and increase the generalizability of the results.

A second strength of the study is the sampling process. The sample consisted of randomly selected classes from randomly selected schools. Previously, several prevalence studies have been based on populations of players (Grüsser et al. 2007; Porter et al., 2010) or other non-representative samples (Griffiths & Dancaster, 1995). However, using randomly
selected schools allows us to estimate the prevalence among high school students in general. The same, using randomly selected samples, also applies to the studies by Wenzel et al. (2009) and Mentzoni et al. (in press), which increases the possibility of making relevant comparisons with these studies.

Moreover, the sample represents an age group previously found to have a high prevalence of computer game addiction, and it is thus a relevant population (Mentzoni et al., in press). To the best of our knowledge, our study is the first to examine video game addiction among a sample limited to 16 to 19-year-olds. A thorough examination of the relationship between video game addiction and correlates such as anxiety, depression, loneliness, and aggression could presumably be facilitated by the fact that our sample is thought to involve a higher proportion of people with video game addiction than the general population of Norway. Overall, the high response rate, the use of random sampling, as well as a relevant and specific age group, are factors thought to increase the generalizability of the results to other high schools in Norway.

The psychometric properties of the instruments used in our study are found to be good (GASA; Lemmens et al. 2009; HADS: Zigmond & Snaith, 1983; RULS-8: Roberts, et al. 1993; BAPQ-SF; Diamond & Magaletta, 2006; AUDIT-C, Reinert & Allen, 2007). To our knowledge, our study of video game addiction prevalence is the second in Norway to use GASA as a measuring device. Currently, there is no consensus on the operationalization of video game addiction. By using the operationalization recommended by Lemmens et al. (2009), this study contributes to generating knowledge about video game addiction and a shared understanding of the phenomenon. Such a shared understanding could enable comparison across prevalence studies.

Due to the fact that our study is of cross-sectional design, we cannot draw any conclusions about the causal relationships underlying the various correlates in our study.
Several possible causal explanations exist. There is thus a need for studies in this field that address causality.

There is a difference between the logistic and hierarchical regression analyses, as some findings are constrained to the hierarchical analysis only. This may be due to the use of video game addiction as a continuous variable in the latter analysis, and that the results from the hierarchical analyses to a higher degree reflect variance within the normal range concerning video game activity.

Our study is based exclusively on self-reporting and subjective experience, which could potentially give rise to common method variance. In common method variance, the variance is due to covariance between variables caused by the measurement method, and is not related to the constructs one wishes to measure (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). It can be difficult to separate the variance of the phenomenon one wishes to investigate from the qualities of the measuring instrument. By exclusively using instruments based on self-reporting, it is probable that the results may not necessarily reflect reality. Social desirability, mood at the time of completion, context effects from items, and demand characteristics are examples of factors that can affect the respondents’ responses (Podsakoff et al., 2003).

Further Research

The American Psychiatric Association has considered incorporating video game addiction into the DSM system, but it concluded that there is insufficient research on this phenomenon (Gentile et al., 2011). Gentile et al. (2011) presents some issues in the field to be addressed. These are questions such as: What is the etiology of video game addiction? What risk and protective factors exist? What patterns of comorbidity exist? How does the problem evolve? What is the expected outcome? How can these difficulties be overcome?

Longitudinal, experimental and treatment studies are required in order to gain an
understanding of these issues. There are few longitudinal studies on video game addiction at present, and it is longitudinal studies in particular that can contribute to answering the many questions about video game addiction and causality. There is a need for large surveys of these types. Potential causal mechanisms could be examined, such as whether different personality traits can predict the risk of developing video game addiction, whether mental illness exists prior to the development of addiction, or whether video game addiction is a risk factor in relation to the development of other mental disorders. The study conducted by Gentile et al. (2011) has contributed to some understanding of these relationships. Longitudinal studies can also be used as a tool in research on how video game addiction evolves over time.

To our knowledge, few experimental studies have been conducted of video game addiction. There is a need for experimental studies if we are to achieve a more detailed understanding of the phenomenon, e.g., an experimental design could be used to explore the physiological manifestations of addiction by examining whether there are any differences in physiological measures in boys and girls who play video games. Alternatively, one could investigate the differences in physiological measurements between players and individuals displaying an addiction to video games.

Individuals with an alcohol addiction have been tested using the Stroop paradigm. Alcohol stimuli were found to significantly increase distraction during testing among individuals with an alcohol addiction in whom treatment proved not to be successful (Cox, Hogan, Kristian and Race, 2002). Similarly, future studies could examine whether video game addicts have attention bias to game relevant stimuli. Knowledge about this is important as such biases have been related to treatment outcome and relapse in other kinds of addicts (Marissen, Franken, Waters, Blanken, van den Brink & Hendriks, 2006; Waters, Shiffman, Sayette, Paty, Gwaltney & Balabanis, 2003).

Treatment studies are also needed in this area (Griffiths & Meredith, 2009). As far as
we know, no treatment studies on video game addiction have yet been conducted. However, randomized clinical treatment studies of other forms of addiction exist, such as alcohol addiction (Cox et al. 2002), and these could give some indications of important factors in the successful treatment of video game addiction.

Finally, more studies are needed that investigate video game addiction in relation to prevalence and correlates in order to further support video game addiction as an evidence-based concept.

Conclusions

Although there is still a lack of consensus on how to assess video game addiction there seems to be a growing consensus regarding the construct validity of the phenomenon, e.g., variables that seem to co-occur with addiction in general, such as poorer school performance, a higher degree of hostility, and comorbid conditions such as depression have consistently been found to co-occur in a similar manner with video game addiction (Gentile et al., 2011).
References


### Tables

**TABLE 1**

**CORRELATION COEFFICIENTS BETWEEN THE INDEPENDENT INTERVAL/RATIO VARIABLES**

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Depression</th>
<th>Anxiety</th>
<th>Loneliness</th>
<th>Physical</th>
<th>Verbal</th>
<th>Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Depression</td>
<td>-.10*</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.03</td>
<td>.53**</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Loneliness</td>
<td>-.10*</td>
<td>.57**</td>
<td>.49**</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Physical Aggression</td>
<td>-.05</td>
<td>.39**</td>
<td>.34**</td>
<td>.26**</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Verbal Aggression</td>
<td>.01</td>
<td>.34**</td>
<td>.40**</td>
<td>.31**</td>
<td>.67**</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Alcohol Consumption</td>
<td>.21**</td>
<td>.06</td>
<td>.07</td>
<td>-.08</td>
<td>.28**</td>
<td>.17**</td>
<td>—</td>
</tr>
</tbody>
</table>

* * p < .05. ** p < .01.

**TABLE 2**

**DIFFERENCES BETWEEN GROUPS WITH AND WITHOUT VIDEO GAME ADDICTION, MONOTHETIC FORMAT**

<table>
<thead>
<tr>
<th>Daily Playing Hours</th>
<th>Video Game Addiction</th>
<th>No Addiction</th>
<th>t (530)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekdays</td>
<td>M = 5.77, SD = 4.21</td>
<td>M = 1.76, SD = 2.44</td>
<td>t (530) = -5.73</td>
<td>p = .00</td>
</tr>
<tr>
<td>Weekend</td>
<td>M = 10.77, SD = 6.75</td>
<td>M = 2.69, SD = 3.54</td>
<td>t (530) = -7.90</td>
<td>p = .00</td>
</tr>
</tbody>
</table>

**TABLE 3**

**DIFFERENCES BETWEEN GROUPS WITH AND WITHOUT VIDEO GAME ADDICTION, POLYTHETIC FORMAT**

<table>
<thead>
<tr>
<th>Daily Playing Hours</th>
<th>Video Game Addiction</th>
<th>No Addiction</th>
<th>t (530)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekdays</td>
<td>M = 4.76, SD = 4.41</td>
<td>M = 1.45, SD = 1.85</td>
<td>t (530) = -10.83</td>
<td>p = .00</td>
</tr>
<tr>
<td>Weekend</td>
<td>M = 7.71, SD = 5.92</td>
<td>M = 2.21, SD = 2.87</td>
<td>t (530) = -12.33</td>
<td>p = .00</td>
</tr>
</tbody>
</table>
### TABLE 4

HIERARCHICAL REGRESSION ANALYSIS SUMMARY FOR VARIABLES PREDICTING VIDEO GAME ADDICTION IN HIGH SCHOOL CLASSES (N=58)

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>$R^2 / \Delta R^2$</th>
<th>$\beta$</th>
</tr>
</thead>
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<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
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<td>-.38***</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>-.08*</td>
</tr>
<tr>
<td>Urban/Rural</td>
<td></td>
<td>-.04</td>
</tr>
<tr>
<td>Maternal Education*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Vocational Education</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>College/University</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Paternal Education*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Vocational Education</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>-.08</td>
<td></td>
</tr>
<tr>
<td>College/University</td>
<td>-.12*</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>.32 .15</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>-.40***</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>-.04</td>
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<tr>
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<td></td>
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<tr>
<td>Elementary School</td>
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<td></td>
</tr>
<tr>
<td>Vocational Education</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>High School</td>
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<tr>
<td>College/University</td>
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</tr>
<tr>
<td>Paternal Education*</td>
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<tr>
<td>Elementary School</td>
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<tr>
<td>Vocational Education</td>
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</tr>
<tr>
<td>High School</td>
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</tr>
<tr>
<td>College/University</td>
<td>-.10*</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
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<tr>
<td>Loneliness</td>
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<tr>
<td>Physical Aggression</td>
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<tr>
<td>Verbal Aggression</td>
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<td></td>
</tr>
<tr>
<td>Smoking</td>
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<td></td>
</tr>
<tr>
<td>Alcohol Consumption</td>
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<td></td>
</tr>
</tbody>
</table>

*“Unknown” was used as the reference group. *$p < .05$. **$p < .01$. ***$p < .001$. 
### TABLE 5

LOGISTIC REGRESSION ANALYSIS PREDICTING VIDEO GAME ADDICTION, MONOTHEISTIC FORMAT

<table>
<thead>
<tr>
<th></th>
<th>Bivariate OR</th>
<th>95 % CI</th>
<th>Multivariate OR</th>
<th>95 % CI</th>
</tr>
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<tr>
<td>Male</td>
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<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.74 (0.19-2.89)</td>
<td>1.06 (0.13-8.72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.66 (0.31-1.43)</td>
<td>0.49 (0.11-2.27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1.08 (0.34-3.39)</td>
<td>0.67 (0.13-3.35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>0.88 (0.85-9.10)</td>
<td>0.36 (0.01-16.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational Education</td>
<td>0.75 (0.13-4.48)</td>
<td>1.27 (0.08-20.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>0.45 (0.07-2.80)</td>
<td>0.29 (0.00-21.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College/University</td>
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<td>1.29 (0.11-15.1)</td>
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<td>Paternal Education</td>
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<tr>
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<td>10.1 (0.26-386)</td>
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<tr>
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<td>0.78 (0.07-8.68)</td>
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<tr>
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<td>1.34 (0.14-12.9)</td>
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<td>1.27 (0.09-18.9)</td>
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<tr>
<td>Depression</td>
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<td>0.97 (0.79-1.19)</td>
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<tr>
<td>Anxiety</td>
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<td>1.05 (0.83-1.34)</td>
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<tr>
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<td>1.13 (0.86-1.48)</td>
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<tr>
<td>Physical Aggression</td>
<td>1.42 (1.21-1.68)</td>
<td>1.27 (1.05-1.54)</td>
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</tr>
<tr>
<td>Verbal Aggression</td>
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<td>1.21 (0.88-1.66)</td>
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<td>Non-Smoking</td>
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<td>1.00</td>
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</tr>
<tr>
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<td>1.81 (0.35-9.40)</td>
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<tr>
<td>Alcohol Consumption</td>
<td>1.15 (0.90-1.46)</td>
<td>0.91 (0.69-1.20)</td>
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</table>

*Note. CI = confidence interval for odds ratio (OR).*
### TABLE 6
LOGISTIC REGRESSION ANALYSIS PREDICTING VIDEO GAME ADDICTION, POLYTHETIC FORMAT

<table>
<thead>
<tr>
<th></th>
<th>Bivariate OR</th>
<th>95 % CI</th>
<th>Multivariate OR</th>
<th>95 % CI</th>
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<tr>
<td>Female</td>
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<td>0.22 (0.10-0.49)</td>
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<td>Age</td>
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<td>0.83 (0.45-1.52)</td>
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<td>Maternal Education</td>
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<td>1.01 (0.30-3.38)</td>
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<td>1.82 (0.67-4.92)</td>
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<td>1.04 (0.43-2.55)</td>
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<tr>
<td>Paternal Education</td>
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<td>1.00</td>
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<td>1.49 (0.44-5.03)</td>
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<td>1.04 (0.48-2.25)</td>
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<td>High School</td>
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<td>0.88 (0.22-3.43)</td>
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<tr>
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<td>1.10 (0.99-1.21)</td>
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<td>Anxiety</td>
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<td>1.06 (0.96-1.18)</td>
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<td>1.05 (0.96-1.13)</td>
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<td>Physical Aggression</td>
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<td>1.16 (1.04-1.30)</td>
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<td>Non-Smoking</td>
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<td>Alcohol Consumption</td>
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<td>0.93 (0.84-1.04)</td>
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</tbody>
</table>

*Note.* CI = confidence interval for odds ratio (OR).