



ELSEVIER

---



---

 JOURNAL OF  
 ADOLESCENT  
 HEALTH
 

---



---

www.jahonline.org

Original article

## Physiological Indicators of Pathologic Video Game Use in Adolescence


 Sarah M. Coyne, Ph.D.<sup>a,\*</sup>, W. Justin Dyer, Ph.D.<sup>a</sup>, Rebecca Densley<sup>a</sup>, Nathan M. Money<sup>b</sup>,  
 Randal D. Day, Ph.D.<sup>a</sup>, and James M. Harper, Ph.D.<sup>a</sup>
<sup>a</sup>School of Family Life, Brigham Young University, Provo, Utah<sup>b</sup>Arizona College of Osteopathic Medicine, Midwestern University, Phoenix, Arizona

Article history: Received March 6, 2014; Accepted October 9, 2014

Keywords: Video game; Media; Physiology; Adolescence; Pathologic; Internet addiction; Computer game

---

 A B S T R A C T

**Purpose:** Pathologic video game use (PVGU) has been associated with a host of negative psychological, physical, and social outcomes during adolescence; however, little research has examined physiological predictors of such use. The purpose of the study was to examine physiological predictors of the development of PVGU across adolescence.

**Methods:** The article involves a 1-year longitudinal study across midadolescence. Participants were 374 adolescents and their parents from a large metropolitan area in the Northwest United States. PVGU was assessed via questionnaire, as were a number of control variables. A number of physiological indicators including respiratory sinus arrhythmia (RSA) and galvanic skin conductance (indices of parasympathetic and sympathetic nervous system activity, respectively) were measured during baseline, a cognitively stimulating task (Rubik's cube), and a family problem-solving task.

**Results:** Less RSA withdrawal to a cognitively stimulating task was related to greater pathologic video game symptoms, but less RSA withdrawal to a family problem-solving task was associated with the presence of pathologic video game symptoms ( $p < .05$ ). For girls only, galvanic skin conductance activation during the family problem solving was related to greater pathologic video game symptoms ( $p < .01$ ).

**Conclusions:** These findings suggest that adolescents who do not find cognitive tasks stimulating physiologically have a greater severity of PVGU. Additionally, adolescents who show physiological signs of stress in a family task were more likely to have PVGU symptoms and only girls have more severe PVGU levels. This study is the first to show that physiological indicators predict PVGU over time in adolescence and has important implications regarding the prevention and treatment of PVGU in adolescence.

© 2015 Society for Adolescent Health and Medicine. All rights reserved.

---

 IMPLICATIONS AND  
 CONTRIBUTION

This is the first study to show that physiological indicators predict change in pathologic video game use over the course of adolescence. This study has important implications for the detection and treatment of pathologic video game use during adolescence.

---

In the past few years, there has been a marked increase in video game playing among children and adolescents [1]. Research indicates that, depending on game content, playing

video games can have positive [2] or negative effects [3] on physical and mental health [4]. To date, most concerns about video games relate to aggression. However, in recent years, pathologic (or addictive) video game use (PVGU) has received increased research attention. Video game playing is termed "pathologic" when it "becomes dysfunctional, harming the individual's social, occupational, family, school, or psychological functioning" [5]. Social scientists are beginning to examine the

**Conflicts of Interest:** The authors report no conflicts of interest.

\* Address correspondence to: Sarah M. Coyne, Ph.D., School of Family Life, Brigham Young University, JFSB 2087, Provo, UT 84602.

E-mail address: smcoyne@byu.edu (S.M. Coyne).

possibility that PVGU could lead to dangerous psychological and physiological dependence similar to other types of addiction [5]. Although there are a number of studies examining predictors of PVGU, research has not yet examined whether physiology plays a role in the development of such use over time. Accordingly, the present study examines how physiological indicators predict PVGU.

The Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-V) has not yet declared PVGU a form of addiction [6], although it does list “internet gaming disorder” in the appendices as a condition worthy of more research. However, research has shown that physical and mental outcomes of PVGU show marked similarities to those of drug addicts [5–7]. For example, individuals showing PVGU report that video games dominate their life and playing video games results in a feeling of “high”, feeling withdrawal symptoms when attempting to stop playing, feelings of tolerance, and showing conflict with family and friends, all characteristics of chemical addictions [5]. Concerning game play habits and daily life impact, 8.5%–11.9% [1,8] of video gamers exhibit congruence with addiction diagnostics [9]. PVGU has also been associated with aggression; impulsiveness; attention problems; depression; anxiety; social phobias; and disruptions in school, work, and social relationships [8,10,11]. In sum, these findings indicate that PVGU is problematic to overall physical and psychological health.

#### *Physiology and pathologic video game use*

Although studies have uncovered important antecedents of PVGU, there are some key deficiencies in the literature. The present study extends this research by examining the connection between adolescent physiology and PVGU, as certain physiological indicators regarding the autonomic nervous system can be reflective of many variables that may increase the likelihood of PVGU. Specifically, in this study, we examine the neurophysiology of the individual. Aspects of a person’s neurophysiologic activity may be viewed as a foundational component of emotion, impulsivity, stress, cognition, self-regulation, and more. Problems with each of these have been viewed as risk factors of PVGU [7,8,12,13]; accordingly, an understanding of individual differences in neurophysiology may help us understand why PVGU develops among some individuals who play video games, but not the majority. Although this has received little attention in video game pathology literature, neurophysiology has explained various other problem behaviors in children and adolescents, such as externalizing behaviors, drug use, pathologic gambling, and sex addictions [14–18]. Additionally, research also shows that gender can moderate associations between neurophysiology and behavior, such as aggression, depression, and anxiety [19]. PVGU also tends to be much more common in boys than girls [8]. Accordingly, we extend the work of biological influences on PVGU by examining the neurophysiologic links and specifically examine gender as a moderator in these relationships.

An individual’s nervous system consists of the brain, spinal cord, and peripheral nerves and has several branches, each with unique functions. One branch, the autonomic nervous system (ANS), controls the involuntary actions of the body and consists of two branches—the parasympathetic nervous system (PNS) and sympathetic nervous system (SNS). Specifically, in this study, we examine PNS and SNS activity as they relate to the development of video game pathologies in a normative sample of adolescents. PNS activity increases the “rest-and-digest” state of the

body and facilitates social engagement [16,18], whereas the SNS controls the “fight or flight” and inhibitory response, mobilizing the body to protect itself from danger [16].

One common measure of PNS activity is *vagal tone* or the activity of the vagus nerve. Vagal tone is measured by respiratory sinus arrhythmia (RSA) or spontaneous breathing which is controlled only by the PNS [15–20]. RSA is a well-validated and commonly used measure of vagal tone. According to polyvagal theory, the measurement of vagal tone gives valuable information regarding many psychosocial behaviors including emotion and stress regulation, which are common predictors of PVGU [20]. High resting levels of vagal tone indicate positive psychological health outcomes, whereas low baseline vagal tone typically shows the opposite [21]. When a person faces a novel task, moderate vagal withdrawal is expected and adaptive to orient the individual to the new task [22,23]. A number of studies suggest that blunted vagal withdrawal is related to substance use addiction [21,24], indicating that vagal tone may be a good predictor of PVGU as well.

Individual differences in SNS are also predictive of the development of psychopathologies. One of the most common measures of SNS activity is galvanic skin conductance (SC) [16,19]. Electrodes are placed on the hands, and the electrical conductance of the skin is measured. This conductance varies with the production of sweat which is only controlled by the SNS. Thus, SC has been validated and used frequently as a measure of SNS activity. Research literature shows that abnormally high SNS activity, measured by SC levels and higher SC reactivity to stress, is indicative of high anxiety and fear, as well as low emotion regulation [15,25,26], but abnormally high SNS activity has not yet been used as an indicator for possible PVGU. A number of studies find that higher levels of SC are related to substance use addiction [27] and gambling addiction [28]. Accordingly, we would expect high SC to also predict higher levels of PVGU across adolescence.

#### *Hypotheses*

On the basis of previous behavioral addiction literature, we predict that individual neurophysiology will predict the development of PVGU over time. Specifically, two hypotheses are predicted:

- (1) Low baseline RSA levels and less vagal withdrawal will predict higher levels of PVGU over time.
- (2) High SC levels at baseline and high SC reactivity will predict increased PVGU over time.

Importantly, we hypothesize these relationships after controlling for a number of key variables associated with PVGU, such as anxiety, self-esteem, externalizing behaviors, self-regulation, and demographic variables [5,8]. We also explore the possibility that these relationships are moderated by gender. Furthermore, we examine these predictors in both cognitive and socially challenging tasks, as described in the following. With no previous research in this area, we do not make specific hypotheses but examine moderators in an exploratory way.

#### **Methods**

##### *Participants*

Participant families for the Flourishing Families Study were selected from a city in the Northwestern United States and were

Download English Version:

<https://daneshyari.com/en/article/1077981>

Download Persian Version:

<https://daneshyari.com/article/1077981>

[Daneshyari.com](https://daneshyari.com)