


Problematic Use of Video Games in Schools in Northern Benin (2023)

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How to cite this paper: Ataigba, I.N.E., Koivogui, D.S., Wenkourama, D., Tohou, M., Djossou, E.E., Djidonou, A., Tognon Tchegnonsi, F., Gandaho, P. and Ezin Hougbe, J. (2024) Problematic Use of Video Games in Schools in Northern Benin (2023). *Open Journal of Psychiatry*, 14, 120-141.

<https://doi.org/10.4236/ojpsych.2024.142008>

Received: August 25, 2023

Accepted: February 26, 2024

Published: February 29, 2024

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Abstract

Objective: To study the problematic use of video games among secondary school students in the city of Parakou in 2023. **Methods:** Descriptive cross-sectional study conducted in the commune of Parakou from December 2022 to July 2023. The study population consisted of students regularly enrolled in public and private secondary schools in the city of Parakou for the 2022-2023 academic year. A two-stage non-proportional stratified sampling technique combined with simple random sampling was adopted. The Problem Video Game Playing (PVP) scale was used to assess problem gambling in the study population, while anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS). **Results:** A total of 1030 students were included. The mean age of the pupils surveyed was 15.06 ± 2.68 years, with extremes of 10 and 28 years. The [13 - 18] age group was the most represented, with a proportion of 59.6% (614) in the general population. Females predominated, at 52.8% (544), with a sex ratio of 0.89. The prevalence of problematic video game use was 24.9%, measured using the Video Game Playing scale. Associated factors were male gender ($p = 0.005$), pocket money under 10,000 cfa ($p = 0.001$) and between 20,000 - 90,000 cfa ($p = 0.030$), addictive family behavior ($p < 0.001$), monogamous family ($p = 0.023$), good relationship with father ($p = 0.020$), organization of video game competitions ($p = 0.001$) and definite anxiety ($p < 0.001$). **Conclusion:** Substance-free addiction is struggling to attract the attention it deserves, as it did in its infancy every-

where else. This study complements existing data and serves as a reminder of the need to focus on this group of addictions, whose problematic use of video games remains the most frequent due to its accessibility and social tolerance. Preventive action combined with curative measures remains the most effective means of combating the problem at national level.

Keywords

Gaming Problem, Video Games, Benin, 2023

1. Introduction

A video game is a computer program, usually installed on an electronic console or a microcomputer, which enables playful activity [1]. The video game industry experienced a meteoric rise from the 2000s onwards, with the advent of online games and the appearance of new types of games [1]. However, the exponential growth of video games has also given rise to concern about their problematic use. Pathological or problematic gaming is a prolonged, excessive gaming modality that causes a range of cognitive and behavioral symptoms, including a progressive loss of control over gaming, addiction and withdrawal symptoms, analogous to the symptoms of substance use disorders. This condition differs from Internet gambling in that no money is involved [2]. Pathological gambling on the Internet most often involves specific Internet games, but can also involve non-Internet computer games, although these have been less studied [2]. Video games are a popular pastime for teenagers, but for some authors, they are a cause for concern because of their potentially addictive nature.

Indeed, in Germany, 1.7% of ninth-graders were addicted to video games in 2008 [3]. Among students in La Réunion in 2010, problematic video game use concerned 8% of students [4]. In Belgium, according to a 2014 study, 11.4% of medical students were gamers with problems [5]. In a 2016 study in the Bouches-du-Rhône department in France, almost one in ten adolescents (9.6%) had concomitant scores for problematic use of video games and social networks [6]. In Bamako, in 2022, 14.4% of students had a problematic use of video games [7].

The pathological use of video games can have negative consequences on different areas of users' lives. It can lead to academic failure, loss of employment or marital breakdown [2]. Habitual obligations, such as school or work, or family obligations are neglected [2]. Financially, debts, mortgages, loans, use of retirement funds and savings are common and frequently lead to divorce [7]. Emotionally, the partner often feels anger or guilt towards the gamer [7]. Among the children of pathological gamers, there is a high prevalence of risky behavior (smoking, alcoholism, drug use...), hyperphagia, mood disorders and difficulties with school and social adaptation [7]. Video game addicts show physical signs such as dry eyes, headaches, back pain, carpal tunnel syndrome, dehydration, malnutrition or overweight, poor personal hygiene, insomnia or circadian rhythm disorders [7].

If they are prevented from using a computer and returning to play, they become restless and irritated. They often go long periods without eating or sleeping [7]. In 2010, on the island of La Réunion, almost 40% of gamers had already neglected their school or work activities or personal relationships because of video games, and more than a quarter of them played more often when they weren't feeling well [4]. While recognizing the use of video games as a complex phenomenon with innovative and adaptive potential, this study focuses on the problematic side of this medium, which will be referred to using the term "problematic video game use". Bearing in mind the above data, it seems entirely legitimate to take a look at the problematic use of video games within a community of secondary school pupils in the town of Parakou, in north-east Benin.

2. Study Framework and Methods

2.1. Population and Procedures

A descriptive cross-sectional study was conducted in the commune of Parakou from December 2022 to July 2023. The study population consisted of students regularly enrolled in public and private colleges in the city of Parakou for the academic year 2022-2023. The sample size was obtained using Schwartz's formula based on Awa Karim Diarra's 2020 study in Mali on behavioral addictions among students at the Faculty of Medicine and Odontostomatology of the University of Technical Sciences and Technology in Bamako, with a prevalence of problematic video game use of 14.4% [7]. The minimum sample size required was 869 students. A two-stage non-proportional stratified sampling technique combined with simple random sampling was adopted.

1st level: Random selection of schools. Here, two strata were created: public schools and private schools. In each stratum, a random selection of 5 units was made.

2nd level: Class selection. At this level, each level of classes from Secondary 1 to Secondary 7 constituted a stratum, for a total of 7 strata. Within each stratum, a single class was selected at random. Within the classes drawn, a basket containing 15 white plastic balls and 40 balls of other colors was presented to the students for drawing. Students who drew the red balls were placed on a list and given consent forms.

2.2. Measurements

Data were collected using a questionnaire that included sociodemographic, behavioral, personal medical and psychiatric history and biographical variables. A pretest was carried out to correct any errors and clarify ambiguous questions.

The Problem Video Game Playing (PVP) scale [8] integrated into the questionnaire was used to assess problem gambling in the study population.

It is a self-administered questionnaire designed by Ricardo A. Tejeiro Salguero *et al.* in 2002 to measure problems associated with video games [8]. The PVP is an instrument based on DSM-IV criteria but capable of assessing the majority of DSM-5 Internet Gaming Disorder criteria. The first validated scale to measure

problematic video game use. Developed to detect video game abusers [9], this 9-item questionnaire incorporates the following dimensions: preoccupation, tolerance, loss of control, pursuit, craving, escape, lying, illegal acts, family and/or school disruption. The 9 items are scored on a dichotomous scale: 1 “yes”, 0 “no”. The total score ranges from 0 to 9. The French translation used in this study has satisfactory psychometric qualities [9] [10] [11]. Students with a score of 5 or more were considered “problem gamers”, while those with a score of less than 5 were considered “social gamers”. Indeed, according to several authors, a score of 5 or more is the minimum required to classify users as addicts [12]. This tool was chosen to measure the dependent variable in this study because, unlike the Internet Gaming Disorder scale (IGD-20), it unambiguously assesses non-Internet video gaming.

To assess anxiety and depression, the Hospital Anxiety and Depression Scale (HADS) was used [13]. The HADS scale [13] is a screening instrument for anxiety and depressive disorders. It comprises 14 items rated from 0 to 3. Seven questions relate to anxiety (total A) and seven to depression (total D), giving two scores (maximum score for each = 21).

To screen for anxiety and depressive symptoms, the following interpretation can be proposed for each of the scores (A and D):

- 7 or less: No symptoms;
- 8 to 10: Doubtful symptomatology;
- 11 or more: Definite symptomatology.

2.3. Analysis

Data analysis was performed using SPSS version 25 software. In addition, the Chi-square test (χ^2) was used to establish the association between the dependent variable (post-traumatic stress disorder) and the study’s independent variables. The results are considered significant at the 5% confidence level ($p < 0.05$). The logistic regression model was also performed at the multivariate level to assess the influence of the various independent variables in relation to the dependent variable.

3. Ethical Considerations

After a favorable opinion from the ethics committee, an authorization to investigate was obtained from the dean’s office at the University of Parakou. In a second phase, authorization was obtained from the departmental health directorate, the Parakou—N’Dali health zone office and the various promoters of the private clinics concerned in the town of Parakou.

4. Results

A total of 1030 students were included.

4.1. Socio-Demographic Characteristics

Within the study population, the majority of women surveyed were aged 30 or

under the average age of respondents was 15.06 ± 2.68 years, with extremes of 10 and 28 years. The [13 - 18] age group was the most represented, with a proportion of 59.6% (614) in the general population. Females predominated, at 52.8% (544), with a sex ratio of 0.89. The majority (77.6%, 799) lived in urban areas. There were 527 (51.2%) pupils enrolled in public schools, compared with 503 (48.8%) in private schools. Students in 5th grade accounted for 18.1% (186). On average, adolescents received CFA 5346.80 ± 567.44 in monthly pocket money, ranging from CFA 0 to 90,000 (\$141.12; €133.38). The majority of students, 77.6% (799), took less than CFA 10,000 (\$15.68; €14.82).

In the population of gamers with problem, the average age was 15.19 ± 2.6 , with a predominance of the [13 - 18] age group, *i.e.* 57.8% (148). The majority, 73.8% (189) were male and 76.6% (196) lived in urban areas. More than half (52.2%) were enrolled in private schools, and students in the 2nd grade were in the majority, with a proportion of 17.6% (45). The majority (68%) of students received less than CFA 10,000 (\$15.68; €14.82) as pocket money (**Table 1**).

4.2. Personal History Characteristics

The most common medical history was asthma (4.3% (44)). Psychiatric antecedents were found in 7 (0.7%) students, surgical antecedents in 18 (1.7%) students, and judicial antecedents in 4 (0.3%) students. With regard to the use of psychoactive substances, 231 (22.4%) consumed alcohol, while 24 (2.3%) used unspecified drugs.

Among gamers with problem, asthma was also the most common medical condition, accounting for 7.8% (20). Three (1.2%) students had psychiatric histories, 6 (2.3%) had surgical histories and 4 (1.6%) had criminal histories. Of the 256 gamers with problem, 74 (82.9%) consumed alcohol and 12 (4.7%) used drugs (**Table 2**).

4.3. Characteristics Relating to Biography, Family History, Family Addictive Behavior and Social Investigation

Among the subjects surveyed, 60.6% (624) came from a monogamous family, 72.1% (743) had parents who lived together, and 63.1% (650) had parents who were neither violent nor lax towards them. In terms of parental education, 39.3% (405) had fathers with secondary education, and 32.8% (338) had mothers with secondary education. The majority of these adolescents (50.2%, 517) were cadets in their families. Within this population, 14.9% (153) were sexually active and 62.1% (640) lived with their parents. In terms of relationships with parents, 97.3% (1002) got on well with their mothers, 93.2% (960) with their fathers, 95.1% (980) with their brothers and sisters, and 93.1% (959) got on well with their classmates. As for their favorite pastimes, 46.9% (145) of respondents preferred sport and dance. Also 52.9% (545) of students had already had to repeat a grade.

As for gamers with problem, 54.7% (140) came from a monogamous family, 68.8% (176) had parents who lived together, and 58.2% (149) had parents who

were neither violent nor lax towards them. In terms of parental education, 40.6% (104) had fathers with secondary education, and 39.1% (100) had mothers with secondary education. 17.2% (44) were sexually active and 59.0% (151) lived in the family home. In terms of relationships with their parents, 97.3% (249) got on well with their mothers, 90.2% (231) with their fathers, 93.4% (239) with their siblings and classmates. It was also found that 50.4% (129) of gamers with problem had already failed at school (**Table 3**).

Table 1. Distribution of students surveyed by socio-demographic and economic characteristics (Parakou, 2023).

| | Sample (N = 1030) | Social gamers (n = 309) | Problematic gamers (n = 256) |
|------------------------------------|----------------------|----------------------------|---------------------------------|
| Age | | | |
| [8 - 13[| 214 (20.8%) | 70 (22.6%) | 53 (20.7%) |
| [13 - 18[| 614 (59.6%) | 184 (59.6%) | 148 (57.8%) |
| [18 - 28[| 202 (19.6%) | 55 (17.8%) | 55 (21.5%) |
| Gender | | | |
| Male | 486 (47.2%) | 194 (62.8%) | 189 (73.8%) |
| Female | 544 (52.8%) | 115 (37.2%) | 67 (26.2%) |
| Place of residence | | | |
| Urban | 799 (77.6%) | 243 (78.6%) | 196 (76.6%) |
| Rural | 231 (22.4%) | 66 (21.4%) | 60 (23.4%) |
| Monthly pocket money (FCFA) | | | |
| None | 115 (11.2%) | 23 (7.4%) | 44 (17.2%) |
| <10,000 | 799 (77.6%) | 242 (78.3%) | 174 (68.0%) |
| [10,000 - 20,000[| 94 (9.1%) | 33 (10.7%) | 31 (12.1%) |
| [20,000 - 90,000[| 22 (2.1%) | 11 (3.6%) | 7 (2.7%) |
| Current class | | | |
| Secondary 1 | 171 (16.6%) | 48 (15.5%) | 38 (14.8%) |
| Secondary 2 | 186 (18.1%) | 61 (19.7%) | 39 (15.2%) |
| Secondary 3 | 150 (14.6%) | 42 (13.6%) | 41 (16.0%) |
| Secondary 4 | 160 (15.5%) | 53 (17.2%) | 27 (10.5%) |
| Secondary 5 | 117 (11.4%) | 33 (10.7%) | 45 (17.6%) |
| Secondary 6 | 150 (14.6%) | 46 (14.9%) | 44 (17.2%) |
| Secondary 7 | 96 (9.3%) | 26 (8.4%) | 22 (8.6%) |
| School attended | | | |
| Public | 527 (51.2%) | 140 (45.3%) | 122 (47.7%) |
| Private | 503 (48.8%) | 169 (54.7%) | 134 (52.3%) |

Table 2. Distribution of students surveyed by personal background (Parakou, 2023)

| | Sample (N = 1030) | Social gamers (n = 309) | Problematic gamers (n = 256) |
|----------------------------|----------------------|----------------------------|---------------------------------|
| Medical history | | | |
| Sickle cell disease | 20 (1.9%) | 4 (1.3%) | 4 (1.6%) |
| Diabetes | 7 (0.7%) | 2 (0.6%) | 2 (0.8%) |
| Asthma | 44 (4.3%) | 15 (4.9%) | 20 (7.8%) |
| None | 959 (93.1%) | 288 (92.9%) | 230 (89.5%) |
| Psychiatric history | | | |
| No | 1023 (99.3%) | 307 (99.4%) | 253 (98.8%) |
| Yes | 7 (0.7%) | 2 (0.6%) | 3 (1.2%) |
| Surgical history | | | |
| No | 1012 (98.3%) | 297 (96.1%) | 250 (97.7%) |
| Yes | 18 (1.7%) | 12 (3.9%) | 6 (2.3%) |
| Judicial history | | | |
| No | 1026 (99.6%) | 309 (100%) | 252 (98.4%) |
| Yes | 4 (0.4%) | - | 4 (1.6%) |
| Alcohol consumption | | | |
| No | 799 (77.6%) | 235 (76.1%) | 182 (71.1%) |
| Yes | 231 (22.4%) | 74 (23.9%) | 74 (28.9%) |
| Drug use | | | |
| No | 1006 (97.7%) | 304 (98.4%) | 244 (95.3%) |
| Yes | 24 (2.3%) | 5 (1.6%) | 12 (4.7%) |

Table 3. Distribution of students surveyed according to biographical, family history and social survey data (Parakou, 2023)

| | Sample (N = 1030) | Social gamers (n = 309) | Problematic gamers (n = 256) |
|--------------------------------------|----------------------|----------------------------|---------------------------------|
| Chronic pathology in father | | | |
| No | 859 (83.4%) | 47 (15.2%) | 205 (80.1%) |
| Yes | 171 (16.6%) | 262 (84.8%) | 51 (19.9%) |
| Chronic pathology in mother | | | |
| No | 808 (78.4%) | 254 (82.2%) | 188 (73.4%) |
| Yes | 222 (21.6%) | 55 (17.8%) | 68 (26.6%) |
| Chronic pathology in siblings | | | |
| No | 915 (88.8%) | 258 (83.5%) | 230 (89.8%) |
| Yes | 115 (11.2%) | 51 (16.5%) | 26 (10.2%) |

Continued**Addictive behavior in the family**

| | | | |
|-----|-------------|-------------|-------------|
| No | 940 (91.3%) | 280 (90.6%) | 195 (76.2%) |
| Yes | 90 (8.7%) | 29 (9.4%) | 61 (23.8%) |

Family type

| | | | |
|------------|-------------|-------------|-------------|
| Monogamous | 624 (60.6%) | 207 (67.0%) | 140 (54.7%) |
| Polygamous | 406 (39.4%) | 102 (33.0%) | 116 (45.3%) |

Parents' behavior

| | | | |
|---------|-------------|-------------|-------------|
| Violent | 47 (4.6%) | 8 (2.6%) | 17 (6.6%) |
| Lax | 333 (32.3%) | 96 (31.1%) | 90 (35.2%) |
| Neither | 650 (63.1%) | 205 (66.3%) | 149 (58.2%) |

Father's level of education

| | | | |
|-----------|-------------|-------------|-------------|
| None | 130 (12.6%) | 35 (11.3%) | 23 (9.0%) |
| Primary | 160 (15.5%) | 48 (15.5%) | 40 (15.6%) |
| Secondary | 405 (39.4%) | 107 (34.6%) | 104 (40.6%) |
| Higher | 335 (32.5%) | 119 (38.5%) | 89 (34.8%) |

Mother's level of education

| | | | |
|-----------|-------------|-------------|-------------|
| None | 291 (28.3%) | 72 (23.3%) | 67 (26.2%) |
| Primary | 237 (23.0%) | 65 (21.0%) | 53 (20.7%) |
| Secondary | 338 (32.8%) | 105 (34.0%) | 100 (39.1%) |
| Higher | 164 (15.9%) | 67 (21.7%) | 36 (14.1%) |

Rank in consanguineous siblings

| | | | |
|----------|-------------|-------------|-------------|
| Eldest | 338 (32.8%) | 108 (35.0%) | 88 (34.4%) |
| Cadet | 517 (50.2%) | 149 (48.2%) | 125 (48.8%) |
| Benjamin | 175 (17.0%) | 52 (16.8%) | 43 (16.8%) |

Uterine sibling rank

| | | | |
|----------|-------------|-------------|-------------|
| Eldest | 368 (35.7%) | 123 (39.8%) | 91 (35.5%) |
| Cadet | 479 (46.5%) | 131 (42.4%) | 122 (47.7%) |
| Benjamin | 183 (17.8%) | 55 (17.8%) | 43 (16.8%) |

Sexual activity

| | | | |
|-----|-------------|-------------|-------------|
| No | 877 (85.1%) | 262 (84.8%) | 212 (82.8%) |
| Yes | 153 (14.9%) | 47 (15.2%) | 44 (17.2%) |

Family residence

| | | | |
|-----|-------------|-------------|-------------|
| No | 390 (37.9%) | 99 (32.0%) | 105 (41.0%) |
| Yes | 640 (62.1%) | 210 (68.0%) | 151 (59.0%) |

Continued**Good relationship with father**

| | | | |
|-----|-------------|-------------|-------------|
| No | 70 (6.8%) | 11 (3.6%) | 25 (9.8%) |
| Yes | 960 (93.2%) | 298 (96.4%) | 231 (90.2%) |

Good relationship with mother

| | | | |
|-----|--------------|-------------|-------------|
| No | 28 (2.7%) | 6 (1.9%) | 7 (20.7%) |
| Yes | 1002 (97.3%) | 303 (98.1%) | 249 (97.3%) |

Good relationship with siblings

| | | | |
|-----|-------------|-------------|-------------|
| No | 50 (4.9%) | 15 (4.9%) | 17 (6.6%) |
| Yes | 980 (95.1%) | 294 (95.1%) | 239 (93.4%) |

Good relationship with classmates

| | | | |
|-----|-------------|-------------|-------------|
| No | 71 (6.9%) | 21 (6.8%) | 17 (6.6%) |
| Yes | 959 (93.1%) | 288 (93.2%) | 239 (93.4%) |

School failure

| | | | |
|-----|-------------|-------------|-------------|
| No | 485 (47.1%) | 161 (52.1%) | 127 (49.6%) |
| Yes | 545 (52.9%) | 148 (47.9%) | 129 (50.4%) |

Favorite hobbies

| | | | |
|-------------------|-------------|-------------|-------------|
| Sport/dance | 145 (46.9%) | 135 (52.7%) | 145 (46.9%) |
| Movies/mangas | 88 (28.5%) | 55 (21.5%) | 88 (28.5%) |
| Social networking | 28 (9.1%) | 22 (8.6%) | 28 (9.1%) |
| Other | 48 (15.5%) | 44 (17.1%) | 48 (15.5%) |

4.4. Prevalence of Problematic Video Game Use

On the basis of the PVP (Problem Video Gaming Playing) scale, 256 of the 1030 secondary school students surveyed in Parakou had a score of 5 or above, the cut-off points for diagnosis of problem video game use. Thus, the prevalence of problematic video game use among secondary school pupils in the commune of Parakou in 2023 calculated in this study was 24.9%. The prevalence of social use among the population surveyed was 30.0% (Figure 1).

4.5. Video Game Features

Of all social gamers, 55.0% (170) had started playing between the ages of 10 and under 15, and 35.9% (111) had been playing for between 5 and under 10 years. For 82.2% (254) of these gamers, the main motivation for gambling was leisure, and 62 (20.7%) of them started in 6th grade.

As for gamers with problem, 55.9% (143) had started gambling between the ages of 10 and under 15. Another 46.9% (120) had been gambling for between 5 and less than 10 years. For 71.9% of these gamers, the main motivation for gambling was leisure, and for 19.9% (51) it generally began in the 6th grade (Table 4).

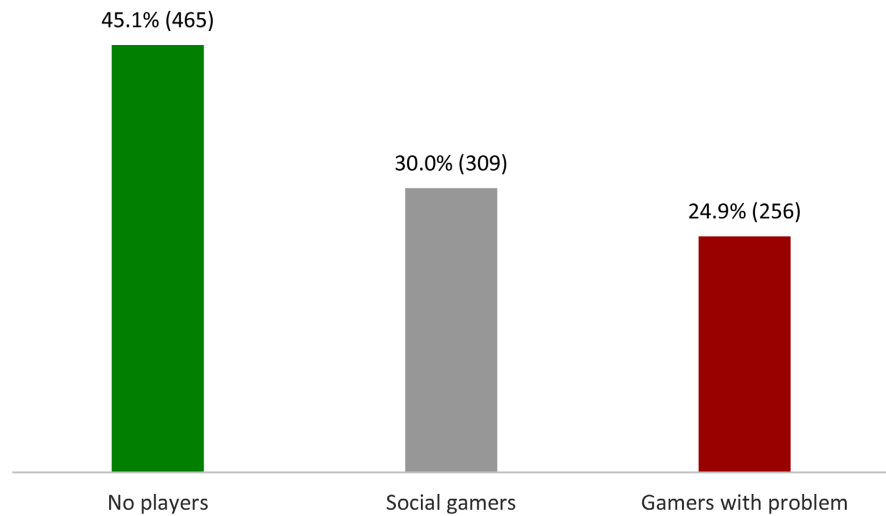


Figure 1. Distribution of students surveyed by video game status (Parakou, 2023).

Table 4. Distribution of players by game-related characteristics (Parakou, 2023).

| | Social gamers (n = 309) | Problematic gamers (n = 256) |
|---------------------------------------|----------------------------|---------------------------------|
| Age (year) of video game debut | | |
| [5 - 10[| 105 (33.9%) | 97 (37.9%) |
| [10 - 15[| 170 (55.0%) | 143 (55.8%) |
| [15 - 22[| 34 (11.0%) | 16 (6.3%) |
| Length of time playing (years) | | |
| 1 | 53 (17.2%) | 30 (11.7%) |
| [2 - 5[| 123 (39.8%) | 79 (30.9%) |
| [5 - 10[| 111 (35.9%) | 120 (46.9%) |
| ≥10 | 22 (7.1%) | 27 (10.5%) |
| Video game motivations | | |
| Leisure | 254 (82.2%) | 184 (71.9%) |
| Passion | 42 (13.6%) | 60 (23.4%) |
| Stress | 12 (3.9%) | 11 (4.3%) |
| Other | 1 (0.3%) | 1 (0.4%) |
| Starting classes | | |
| Primary 3 | 46 (14.9%) | 46 (18.0%) |
| Primary 4 | 27 (8.7%) | 28 (10.9%) |
| Primary 5 | 42 (13.6%) | 30 (11.7%) |
| Primary 6 | 50 (16.2%) | 48 (18.8%) |
| Secondary 1 | 64 (20.7%) | 51 (19.9%) |
| Secondary 2 | 29 (9.4%) | 23 (9.0%) |

Continued

| | | |
|---------------------------------------|-------------|-------------|
| Secondary 3 | 23 (7.4%) | 19 (7.4%) |
| Secondary 4 | 12 (3.9%) | 7 (2.7%) |
| Secondary 5 | 12 (3.9%) | 4 (1.6%) |
| Secondary 6 | 3 (1.0%) | - |
| Secondary 7 | 1 (0.3%) | - |
| Types of games played | | |
| Soccer games | | |
| No | 184 (59.6%) | 128 (50.0%) |
| Yes | 125 (40.4%) | 128 (50.0%) |
| Fighting games | | |
| No | 202 (65.4%) | 162 (63.3%) |
| Yes | 107 (34.6%) | 94 (36.7%) |
| Adventure games | | |
| No | 238 (77.0%) | 196 (76.6%) |
| Yes | 71 (23.0%) | 60 (23.4%) |
| Racing games | | |
| No | 205 (66.3%) | 170 (66.4%) |
| Yes | 104 (33.7%) | 86 (33.6%) |
| Scary games | | |
| No | 299 (96.8%) | 245 (95.7%) |
| Yes | 10 (3.2%) | 11 (4.3%) |
| Means used to play video games | | |
| Computer | | |
| No | 270 (87.4%) | 223 (87.1%) |
| Yes | 39 (12.6%) | 33 (12.9%) |
| Console | | |
| No | 171 (55.3%) | 122 (47.7%) |
| Yes | 138 (44.7%) | 134 (52.3%) |
| Smartphone | | |
| No | 111 (35.9%) | 98 (38.3%) |
| Yes | 198 (64.1%) | 158 (61.7%) |
| Usual video game setting | | |
| Home | | |
| No | 79 (25.6%) | 74 (28.9%) |
| Yes | 230 (74.4%) | 182 (71.1%) |

Continued**Playrooms**

| | | |
|-----|-------------|-------------|
| No | 200 (64.7%) | 135 (52.7%) |
| Yes | 109 (35.3%) | 121 (47.3%) |

Schools

| | | |
|-----|-------------|-------------|
| No | 304 (98.4%) | 247 (96.5%) |
| Yes | 5 (1.6%) | 9 (3.5%) |

Internet use

| | | |
|-----|-------------|-------------|
| No | 202 (65.4%) | 162 (63.3%) |
| Yes | 107 (34.6%) | 94 (36.7%) |

Participation in competitions

| | | |
|-----|-------------|-------------|
| No | 200 (64.7%) | 122 (47.7%) |
| Yes | 109 (35.3%) | 134 (52.3%) |

Playing time per day

| | | |
|---------|-------------|-------------|
| 1 - 3 h | 290 (93.9%) | 144 (56.3%) |
| 4 - 6 h | 18 (5.8%) | 77 (30.1%) |
| 7 - 9 h | 1 (0.3%) | 20 (7.8%) |
| ≥10 h | - | 15 (5.8%) |

Weekly expenditure on video games (FCFA)

| | | |
|---------------|-------------|-------------|
| <1000 | 122 (39.5%) | 62 (24.2%) |
| [1000 - 2500[| 171 (55.3%) | 134 (52.3%) |
| [2500 - 5000[| 14 (4.5%) | 57 (22.3%) |
| ≥5000 | 2 (0.6%) | 3 (1.2%) |

Parents playing video games

| | | |
|-----|-------------|-------------|
| No | 174 (56.3%) | 131 (51.2%) |
| Yes | 135 (43.7%) | 125 (48.8%) |

Friends who play video games

| | | |
|-----|-------------|-------------|
| No | 174 (56.3%) | 131 (51.2%) |
| Yes | 135 (43.7%) | 125 (48.8%) |

4.6. Characteristics Related to the Impact of Problematic Video Game Use

Among social gamers, 20 (6.5%) had gone into financial debt to gamble, 45 (14.6%) had family disagreements, 13 (4.2%) had stolen money to gamble, 92 (29.8%) had lied to family and friends to gamble, 45 (14.6%) had received bad grades because of video games, and only 22 (7.1%) were no longer motivated to continue their studies.

In the case of problem gamers, 49 (19.1%) had financial debts, 94 (36.7%) had family disagreements, 45 (17.6%) had stolen money to gamble, 157 (61.3%) had lied to friends and family to gamble, 119 (46.5%) had bad grades because of video games, and only 20 (7.8%) were no longer motivated to continue their studies (Table 5).

Table 5. Characteristics related to the impact of problematic video game use (Parakou, 2023).

| | Social gamers (n = 309) | Problematic gamers (n = 256) |
|---------------------------------------|----------------------------|---------------------------------|
| Financial debt | | |
| No | 289 (93.5%) | 207 (80.9%) |
| Yes | 20 (6.5%) | 49 (19.1%) |
| Family disagreements | | |
| No | 264 (85.4%) | 162 (63.3%) |
| Yes | 45 (14.6%) | 94 (36.7%) |
| Money theft | | |
| No | 296 (95.8%) | 211 (82.4%) |
| Yes | 13 (4.2%) | 45 (17.6%) |
| Lying about video games | | |
| No | 217 (70.2%) | 99 (38.7%) |
| Yes | 92 (29.8%) | 157 (61.3%) |
| School dropout | | |
| No | 264 (85.4%) | 137 (53.5%) |
| Yes | 45 (14.6%) | 119 (46.5%) |
| Motivation to continue studies | | |
| No | 22 (7.1%) | 20 (7.8%) |
| Yes | 287 (92.9%) | 236 (92.1%) |
| Suicidal thoughts | | |
| No | 305 (98.7%) | 236 (92.2%) |
| Yes | 4 (1.3%) | 20 (7.8%) |
| Anxiety disorders | | |
| No symptoms | 178 (57.6%) | 97 (37.9%) |
| Definite symptomatology | 46 (14.9%) | 89 (34.8%) |
| Doubtful symptomatology | 85 (27.5%) | 70 (27.3%) |
| Depressive disorders | | |
| No symptomatology | 266 (86.1%) | 214 (83.6%) |
| Definite symptomatology | 14 (4.5%) | 12 (4.7%) |
| Doubtful symptomatology | 29 (9.4%) | 30 (11.7%) |

4.7. Search for Statistically Significant Association with Problematic Video Game Use in Bivariate Analysis

Variables with a statistically significant association with problematic video game use were gender ($p < 0.001$), pocket money ($p < 0.001$), current school grade ($p = 0.001$), medical ($p = 0.022$) and legal ($p < 0.001$) history, mother's medical history ($p = 0.025$), family addictive behavior ($p < 0.001$), family type ($p = 0.026$), good relationship with father ($p = 0.029$), preferred distractions ($p = 0.014$), alcohol ($p = 0.004$) and drug use ($p = 0.004$), age at start of gambling ($p < 0.001$), class at start of gambling ($p < 0.001$), type of gambling (Foot ($p < 0.001$), Combat ($p < 0.001$), Racing ($p < 0.001$), Adventure ($p < 0.001$), Scary ($p = 0.003$)), means used (computer ($p < 0.001$), console ($p < 0.001$), smartphone ($p < 0.001$)), usual place to play (home ($p < 0.001$), playroom ($p < 0.001$) and school ($p = 0.001$)) video game competition ($p < 0.001$), parents playing video games ($p < 0.001$), friends playing video games ($p < 0.001$), length of time playing ($p = 0.008$), financial debt ($p < 0.001$), family disagreement ($p < 0.001$), suicidal ideation ($p < 0.001$), stealing money ($p < 0.001$), lying to others ($p < 0.001$), poor school grades ($p < 0.001$) and anxiety ($p < 0.001$).

4.8. Factors Associated with Multivariate Analysis

In multivariate analysis, there was a significant association between problematic video game use and the following variables: male gender (OR = 0.553; $p = 0.005$); pocket money under 10,000 fcfa (OR = 0.52; $p = 0.001$) or between 20,000 and 90,000 fcfa (OR = 0.273; $p = 0.030$); family addictive behavior (OR = 3.236; $p < 0.001$); monogamous family status (OR = 1.552; $p = 0.023$); good relationship with father (OR = 2.644; $p = 0.020$), participation in video game competitions (OR = 1.854; $p = 0.001$) and existence of definite anxiety (OR = 3.271; $p < 0.001$).

Gender was a risk factor, multiplying the risk of developing problematic video game use by 0.6. Male students were 0.55 times more likely to develop a video game addiction than female students.

Monthly pocket money was a protective factor. The more pocket money a student receives, the less likely he or she is to be a problem gamer.

Students with a family history of addictive behavior were 3.23 times more likely to develop problematic video game use than those whose parents had no addictions.

Polygamous fathers were 1.55 times more likely to develop problematic use than monogamous fathers.

Students who had a poor relationship with their father were 2.62 times more likely to become gamers with problem than those who had a good relationship with their father.

Participation in video-game competitions multiplies the risk of problematic video-game use by 1.8 among students with this habit, compared with those who are not involved.

Anxiety multiplies the risk of problematic video game use by 3.2 among stu-

dents with anxiety compared to those without.

When a student's gaming experience increases by one year, he or she runs a risk equal to 2.098 of becoming a gamer with problem (Table 6).

5. Discussion

5.1. Study Strengths and Limitations

To achieve these objectives, we carried out a descriptive cross-sectional study with an analytical focus, from December 2022 to October 2023. A two-stage non-proportional stratified sampling technique combined with simple random sampling was adopted. The sample size was obtained using Schwartz's formula, based on Awa Karim Diarra's 2020 study in Mali on behavioral addictions among students at the Faculty of Medicine and Odontostomatology of the University of Technical Sciences and Technology in Bamako, with a prevalence of problematic video game use of 14.4% [7]. The minimum sample size required

Table 6. Factors associated with problematic video game use in multivariate analysis (Parakou, 2023)

| | OR | 95%CI | p-value |
|--|-------|---------------|------------------|
| Gender (ref = Female) | | | |
| Male | 0.553 | 0.364 - 0.839 | 0.005 |
| Pocket money (ref = 0) | | | |
| [1 - 10,000[| 0.366 | 0.203 - 0.661 | 0.001 |
| [10,000 - 20,000[| 0.52 | 0.241 - 1.121 | 0.095 |
| [20,000 - 90,000[| 0.273 | 0.085 - 0.883 | 0.030 |
| Family addictive behavior (ref = No) | | | |
| Yes | 3.236 | 1.908 - 5.489 | <0.001 |
| Family type (ref = Polygamous) | | | |
| Monogamous | 1.552 | 1.063 - 2.266 | 0.023 |
| Gaming history (ref = 1) | | | |
| [2 - 5[| 1.012 | 0.565 - 1.812 | 0.969 |
| [5 - 10[| 1.627 | 0.923 - 2.87 | 0.093 |
| ≥10 | 2.098 | 0.94 - 4.684 | 0.071 |
| Good relationship with father (ref = No) | | | |
| Yes | 2.644 | 1.169 - 5.979 | 0.020 |
| Video game competitions (ref = No) | | | |
| Yes | 1.854 | 1.272 - 2.701 | 0.001 |
| Anxiety (ref = Absence of symptomatology) | | | |
| Questionable symptomatology | 1.325 | 0.855 - 2.053 | 0.209 |
| Definite symptomatology | 3.271 | 2.033 - 5.263 | <0.001 |

was 869 students, whereas the study finally included 1030 students. The survey team was made up of interviewers, mainly students. They had been briefed beforehand on how to carry out the interview and fill in the questionnaire before the data collection began. A digitized questionnaire including the Problem Video Game Playing (PVP) scale and the Hospital Anxiety and Depression (HAD) scale was used for data collection. The research protocol was submitted to the local ethics committee, and data collection was carried out in compliance with current ethical standards, following approval from the relevant authorities. Data confidentiality was respected. Data analysis was carried out using SPSS version 25 software.

Nevertheless, this study has certain limitations that should be noted. The data in this study are based on subjective statements. This raises the question of over- or under-estimation of the problem by certain targets, even if the detailed explanations provided helped to greatly reduce these biases. It should also be noted that the absence of a validation study of the scales used in the socio-cultural context of the study setting constitutes a bias in this work.

However, these limitations and biases in no way detract from the reliability of the results obtained, especially when compared with those of authors from other countries.

5.2. Socio-Demographic Characteristics

5.2.1. Age

In this study, the average age of gamers with problem was 15.19 ± 2.6 years, with a predominance of the [13 - 18] age group (148; 57.8%). This average age is approximately similar to the 14.66 ± 0.67 found by Esteve *et al.* [14] in 2022 in Spain, but lower than the 17.64 ± 3.02 found by Schmitt *et al.* in 2015 in France [15].

The predominance of the [13 - 18] age group in this study could be explained by the fact that this age group corresponds to the period of adolescence. Indeed, young teenagers are often a particularly vulnerable group when it comes to risky behavior, particularly addictive behavior. Their adaptability to new technologies and easy access to them would seem to make them particularly vulnerable to video game disorders. What is more, as the study was conducted in secondary school, it is clear that this age group predominates.

5.2.2. Type

In the present study, there was a predominance of males among students with problematic video game use (189 or 73.8%). This result corroborates those found by Esteve *et al.* [14] in 2022 in Spain (72.3%), Miezah *et al.* [16] in 2020 in Ghana (62.19%), Rehbein *et al.* [3] in 2010 in the USA (90%). However, in 2016 in France, Dany *et al.* [6] found a female predominance of 69.1% versus 30.9% for males.

5.2.3. School Attended

According to this study, 52.2% of pupils attended private schools. This result is

similar to that of Esteve *et al.* [14] in 2022 in Spain (40.0%). Although not significant, being enrolled in a private school is often indicative of belonging to a social class capable of offering greater accessibility to video games. Any parent able to offer a certain level of comfort to their child will have to ensure that the means made available to them do not become the cause of their loss.

5.3. Consumption of Psychoactive Substances

Alcohol consumption concerned 82.9% of players, while 4.7% used drugs in the present study. The proportion of alcohol users was similar to that found by Ricquebourg *et al.* [4] (80%) in France in 2013, in a study of 1119 Reunionese students aged 18 to 25. On the other hand, the same authors found a much higher frequency of drug users (30%) than in the present study. This could be explained by the fact that adolescents from developed countries have easier access to psychoactive substances than those from less developed countries.

5.4. Prevalence of Problematic Video Game Use

The prevalence of problematic video game use was estimated at 24.9% in this study. This value is approximately equal to that of Dany *et al.* [6] in France in 2016, who found a prevalence of 23.1% in a population of 1003 middle-school students. In contrast, Miezah *et al.* [16] in Ghana in 2020 found a prevalence of 31.2% in a population of 263 students. This difference could be explained by the fact that the sample size of their study was much smaller than that of the present study.

On the other hand, lower prevalences than in the present study have been reported by Esteve *et al.* [14] in 2022 in Spain (16.4%), Diarra [7] in 2020 in Mali (14.4%), Männikko *et al.* [17] in 2015 in Finland (9.1%), Givron *et al.* [5] in 2018 in France (11.4%), Batthyány *et al.* [18] in 2009 in Austria (12.3%) and Ricquebourg *et al.* [4] (8%) in France in 2013. These low prevalences could be explained by differences in the characteristics of the sample chosen (age, size), the mode of data collection and the screening scales used in these studies. For example, Esteve *et al.* in Spain limited the age of participants to the range 13 - 17 years, with a sample size of 397 students [14]. Unlike the current study, there was no restriction on the age of participants. Secondly, in 2014 in France, Givron *et al.* [5] used the sharing of a link to a self-questionnaire on a website offered to 1st-year medical students as a means of data collection. This procedure could limit the participation rate of students, and especially in the event of misunderstanding of questionnaire items, the absence of an interviewer to explain these queries could lead to bias.

5.5. Video Game Features

5.5.1. Playing Time

Among the population of gamers with problem the average playing time was 3.9 ± 2.65 hours, with extremes ranging from 1 to 16 hours. A majority proportion of 56.3% (144) played between 1 and 3 hours a day. However, 15 (5.8%) stu-

dents spent more than 10 hours playing. In Austria in 2009, Batthyány *et al.* [18], in a study of a population of 1231 schoolchildren, found that subjects in the problem gamers group spent an average of 12.62 ± 6.31 hours of their free time actively playing video games. This difference could be explained by the fact that students in developed countries have easier access to video games than those in developing countries.

5.5.2. Internet Use

In this study, 36.7% (94) of gamers with problem often used the Internet to play video games. The vast majority, 63.28%, used video games offline. This reinforces the DSM-5's position that gaming disorder does not only occur in online gamers [2].

5.5.3. Age of Onset

The present study revealed that 55.9% (143) of problem gamers had started playing video games between the ages of 10 and 15 years, not included. This is similar to the observations of Rahman *et al.* [19] in 2012 in a study of 1,624 Connecticut high school students, among whom 70% of gamers addicted to video games had started playing before the age of 12.

5.6. Consequences of Problematic Video Game Use

5.6.1. Academic Repetition

More than half of the problem gamers (50.4%) had already repeated a grade. This is considerably higher than the figure found by Esteve *et al.* [14] in Spain in 2022 (8.9%). This large difference could be explained by the widely differing educational conditions and assessment systems in these two countries.

5.6.2. Family Disagreements

According to the results of this research, 36.7% (94) of gamers with problem had relational difficulties with other family members as a result of their excessive video game playing. Attempts by parents to regulate their children's gaming habits were sometimes met with fierce opposition, leading to family conflicts.

5.7. Factors Associated with Problematic Video Game Use

After multivariate analysis, several of the factors investigated showed significant associations with problematic video game use: male gender (OR = 0.553; $p = 0.005$); pocket money less than 10,000fcfa (OR = 0.52; $p = 0.001$) or between 20,000 and 90,000fcfa (OR = 0.273; $p = 0.030$); family addictive behavior (OR = 3.236; $p < 0.001$); family monogamous status (OR = 1.552; $p = 0.023$); good relationship with father (OR = 2.644; $p = 0.020$), participation in video game competitions (OR = 1.854; $p = 0.001$) and existence of definite anxiety (OR = 3.271; $p < 0.001$).

5.7.1. Gender

Male gender was identified as a factor associated with problematic video game

use in the present study ($p = 0.005$; $OR = 0.553$). In fact, male students were more likely to become gamers with problems than female students. This result corroborates the findings of other authors, notably Ricquebourg *et al.* [4] in France in 2013 ($p = 0.004$ $OR = 2.8$), Batthyány *et al.* [18] ($p < 0.001$) in Austria in 2009, Mentzoni *et al.* [20] in Norway in 2011 ($p < 0.001$). This gender disparity could be explained by the fact that certain features of video games, such as physical violence and excessive competitiveness, are unattractive or even stressful for women.

5.7.2. Family Addictive Behavior

The presence of addictive family behavior could predispose a video game player to develop problematic video game use ($p = 0.000$; $OR = 3.236$; $95\%CI = [1.908 - 5.489]$).

5.7.3. Family Type

A father's monogamy multiplies the risk of problematic use by 1.55 for the students concerned, compared with those whose fathers are monogamous, according to the results of the present study ($p = 0.023$; $OR = 1.552$; $95\%CI = [1.063 - 2.266]$). Indeed, polygamy is often the source of numerous family conflicts, which could motivate children from such families to invest in video games as a means of escaping the various frustrations they experience. It is also hard for a polygamous father to ensure the strict upbringing of all his children, and mothers are often absent in search of the necessities to supplement the father's financial support.

5.7.4. A Good Relationship with the Father

Students with a poor relationship with their father were 2.62 times more likely to become gamers with problem than those with a good relationship with their father ($p = 0.020$; $OR = 2.644$; $95\%CI = [1.169 - 5.979]$). This suggests that a good relationship with the father is a protective factor against problematic video game use.

5.7.5. Monthly Pocket Money

Monthly pocket money was a protective factor for UPJV. The greater the amount of monthly pocket money a student received, the lower the risk of being a gamer with problem ($p = 0.007$; $OR = 0.366$; $95\%CI = [0.203 - 0.661]$).

5.7.6. Local Video Game Competition

Participation in local video game competitions multiplies by 1.8 the risk of problematic video game use among students with this habit compared with those without ($p = 0.001$; $OR = 1.854$; $95\%CI = [1.272 - 2.701]$). The competitive spirit of young adolescents involving excessive repetition of game play could explain this finding.

5.7.7. Anxiety

After multivariate analysis of the data from the present study, it emerged that

anxiety increased the risk of UPJV by a factor of 3.2 in respondents who suffered from it, compared with those who did not ($p = 0.000$; $OR = 3.271$; $95\%CI = [2.033 - 5.263]$). Work by Loton *et al.* [21] in Australia in 2016 also found an association between anxiety and video game addiction ($p < 0.01$). It is possible to explain this finding by the fact that video games could have a tranquilizing effect on young people going through anxiety-provoking situations. Thus, the frequent use of video games as a means of relaxation could increase the risk of problematic video game use.

6. Conclusion

Around a quarter of the secondary school students surveyed in the Parakou commune had problematic video game habits. Numerous consequences linked to problematic video game use were found, such as: financial indebtedness, suicidal ideation, stealing money, lying to play, academic decline, and family conflicts. Associated factors found were: gender, amount of monthly pocket money, presence of family addictive behavior, type of household, good relationship with father, participation in local video game competitions, and anxiety. For a long time, drug addictions have enjoyed great hegemony in the field of addictology, relegating behavioral addictions to the background. Parents and mental health professionals will need to invest more in preventing problematic video game use.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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