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Research Article

Heavy, phone, and light gamers: Adolescent gaming profiles in South Africa and their academic and psychosocial correlates

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ABSTRACT

The amount of time adolescents spend on video games has steadily increased over the past five decades. Recently, the role of gaming in adolescent wellbeing has received growing scholarly attention, particularly following the inclusion of Internet Gaming Disorder as a condition for further study in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). However, data from African contexts remain extremely limited, and little is known about South African adolescents' gaming behaviours and their effects. This study provides an important first step toward addressing this gap. Drawing on survey data from 960 high-school learners, we examine patterns of gaming behaviour, symptoms and prevalence of gaming addiction, and the interplay between gaming behaviours, academic performance and psychosocial outcomes. Our findings indicate that although South African adolescents tend to spend fewer minutes per day gaming than peers in North America and Europe, they report comparatively high levels of problematic gaming symptoms and prevalence. We identify three distinct gamer profiles: Heavy gamers, Phone gamers and Light gamers. Heavy gamers perform significantly worse academically than Light gamers. In terms of psychosocial wellbeing, Heavy gamers show higher levels of engagement than Light gamers but lower feelings of connectedness than Phone gamers.

Keywords Video gaming, adolescents, addiction, academic performance, wellbeing

Categories

- **Applied computing** → **Law, social and behavioral science** → **Psychology**
- *Applied computing* → *Education*
- Social and Professional Topics → User characteristics → Age → Adolescents

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1 INTRODUCTION

As computing technologies have rapidly advanced and become increasingly accessible, adolescents worldwide are spending more of their time engaged with digital devices. Gaming accounts for a substantial share of this time. In the US, teens aged 13 to 18 spend an average

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of 1 hour and 46 minutes per day playing games (Rideout et al., 2021) with comparable levels reported in the UK and across Europe (Ofcom, 2024). Given the rise in adolescent smartphone ownership rates over the past decade, mobile gaming has become particularly widespread. Smartphones not only lower barriers to entry, they also make gaming a ubiquitous, portable activity. Free-to-play models and microtransaction systems have created new behavioural dynamics, raising concerns about habit-forming design features and the potential for excessive engagement among adolescents (McMahon, 2025).

Concerns about the potential negative impacts of gaming on adolescents' psychosocial functioning, daily routines, and academic engagement have been a prominent feature of public discourse on gaming since at least the mid-1980s (McCutcheon & Campbell, 1986), and a substantial body of research has accumulated in the decades since. Across this literature, findings remain mixed with some studies reporting positive effects, others negative effects, and still others no meaningful effect at all. Accordingly, a key question that continues to shape the field is what level of gaming should be considered cause for concern (Skripkauskaite et al., 2022).

In contrast to the extensive body of international literature on adolescent gaming behaviours and their consequences, very little is known about these behaviours among South African adolescents. There is a dearth of reliable data on the frequency and duration of gaming among this cohort, and how gaming behaviours vary across gender and age groups. Likewise, there is almost no empirical evidence of the relationship between gaming behaviour and outcomes related to wellbeing or academic performance. The present study aims to address this important gap by analysing survey data collected among a large sample ($n = 960$) of South African adolescents.

1.1 Adolescent Gaming Behaviours

From the arcade cabinets that defined the 1970s and the home consoles that followed, to the networked, AI-enabled computers and consoles of today, each video game generation has successively displaced its predecessor. These evolutions in the video game industry have not only changed how video games are produced and played, but also how they are theorised within academic research. The definition of a video game remains contested due to the medium's rapid evolution and diversity (Bergonse, 2017). Travinor (2009) defines it as a digital visual artifact intended for entertainment via gameplay or interactive fiction. Frasca (2001) offers a broader view, describing video games as any computer-based entertainment software involving one or more players. In contrast, Bergonse (2017, p. 15) proposes a more structured essentialist definition, arguing that a video game is *"a mode of interaction between a player, a machine with an electronic visual display, and possibly other players, that is mediated by a meaningful fictional context, and sustained by an emotional attachment between the player and the outcomes of their actions within this fictional context."*

The amount of time adolescents spend on video gaming (referred to simply as gaming from hereon) has steadily increased over the past decade. A 2022 report by Common Sense Media

indicates that US adolescents spent an average of 1 hour and 46 minutes per day gaming in that year, up from 1 hour and 36 minutes in 2019 (Rideout et al., 2021). In the UK, nine in ten 11–18-year-olds reported gaming at least weekly (Ofcom, 2024), and nearly a third of adolescents living in England play for at least 3.5 hours per day (Skripkauskaite et al., 2022). In Europe, 44% of adolescents report gaming daily, with the highest rates observed among those aged 12–14 years. Across these regions, the evidence consistently indicates that boys spend significantly more time gaming than girls, and that there are differences in the types of games they prefer.

The South African picture is less clear, but some basic data points have been reported. A recent survey-based study estimates that 35% of children (3-17 years) play computer games 1–3 times a week for a couple of hours, while slightly fewer (24%) spend 1–2 hours gaming every day (Kaspersky, 2025). Given the country's high level of income inequality, there are sharp disparities in access to gaming platforms, and gaming behaviours are often shaped by resource constraints related to devices and internet connectivity (Walton & Pallitt, 2012). It is further estimated that around 66% of South African children play games on mobile phones, compared with fewer than 40% who do so on computers or consoles (Kaspersky, 2025).

1.2 Gaming Addiction

As video game consumption has increased, concerns over potential overuse and addiction have been raised across various disciplines including psychology, education and communication studies. These concerns have inspired a growing body research on patterns of excessive or harmful gaming and their potential to negatively impact adolescents' mental health, physical wellbeing, and academic performance (Donati et al., 2021; van der Neut et al., 2023). The domain has received particular academic attention following the inclusion of Internet Gaming Disorder (IGD) in the Diagnostic and Statistical Manual of Mental Disorders' (DSM's) conditions for further study in 2013 (APA, 2013). As a condition for further study, IGD is not officially recognised as a diagnosable disorder but is included to encourage further research and clinical validation. Contrary to what the name suggests, IGD includes both online and offline video gaming, with the *"internet"* prefix being added to differentiate it from gambling as well as highlight the online gaming platform's role in usage patterns. DSM-5 lists nine diagnostic criteria for IGD, derived largely from substance and gambling disorder diagnostics. The nine criteria include:

1. Preoccupation with gaming,
2. Withdrawal symptoms when not playing,
3. Tolerance (needing to spend increasing time gaming),
4. Unsuccessful attempts to control or stop gaming,
5. Loss of interest in other activities,

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6. Continued play despite problems,
7. Deception about gaming time,
8. Using games to escape negative moods, and
9. Jeopardizing relationships, jobs, or education due to gaming.

Various diagnostic instruments have been developed to measure the symptoms associated with gaming addiction. Among these, Lemmens et al.'s (2009) Game Addiction Scale (GAS) (and its 7-item short form, GAS-7) have been widely used among adolescent populations. Both scales target seven criteria:

1. Salience – when gaming becomes the dominant activity in a person's life;
2. Tolerance – the increasing need to spend more time gaming;
3. Mood modification – the emotional effects of gaming;
4. Relapse – tendency to return to excessive gaming behaviour;
5. Withdrawal – negative emotions or physical symptoms;
6. Conflict – interpersonal or intrapersonal tension; and
7. Problems – real-world consequences of excessive gaming.

An individual is classified as displaying symptoms of problematic gaming based on the polythetic method which requires that at least four of the seven criteria are met (i.e. they have experience at least four of the symptoms *"sometimes"* or more frequently over the past six months). More severe cases are identified using the monothetic method which requires that all seven criteria are met (all GAS-7 items answered *"sometimes"* or more frequently over the past six months). In their validation studies of the instruments among two different samples of Dutch adolescents, the polythetic prevalence rates of 9.4% and 9.3% were observed, while the monothetic criteria yielded lower estimates (2.3% and 1.9% respectively) (Lemmens et al., 2009).

While acknowledging the broad range of instruments deployed, recent meta-analyses report comparable prevalence rates to the polythetic rates reported by Lemmens et al. (2009). Satapathy et al. (2025), based on a meta-analysis of 84 studies, report a pooled prevalence rate of 8.6% across all studies included, but note significant heterogenity in reported results. The highest prevalence rate was observed among Chinese samples (11.7%), with lower rates for Spain (9.6%), Sweden (9.5%) and the Netherlands (3.7%). Zhou et al. (2024) included 22 studies in their meta-analysis and report pooled IGD prevalence of 6.7%, but also note that differences in the measures adopted across studies compromise the quality of their findings. Like Satapathy et al. (2025), they observe higher prevalence in Asia compared to Europe.

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Studies of IGD prevalence in Africa and South Africa specifically are rare. In a 2025 study, Kimani et al. (2025) administered the Gaming Disorder Scale for Adolescents (GADIS-A) among 584 university students in Kenya and observed a 34.2% IGD prevelance rate. We were unable to locate any studies that report prevalence rates for South African adolescent samples, highlighting the research gap the present study aims to address.

1.3 Wellbeing Associations

Concerns about the effects of gaming on psychosocial wellbeing have been an important dimension of gaming discourse since the publication of some of the earliest studies in this domain (Panelas, 1983). However, despite decades of research, there remains uncertainty over whether time spent gaming constitutes a meaningful risk factor. In a 2022 study of a large sample of Chinese adolescents from a rural setting (n = 1603), Li et al. (2022) report significant negative associations between gaming time and mental health, measured through symptoms of depression, anxiety, and stress. By contrast, a 2025 meta-analysis by Kaczmarek et al. (2025) challenges this conclusion. Focusing specifically on the COVID-19 pandemic period, during which physical distancing contributed to increased gaming, the authors pooled effects across 22 studies and found that gaming time was unrelated to mental wellbeing. This aligns with findings from Skripkauskaite et al.'s (2022) study of 12 725 UK adolescents, in which nearly half the sample reported gaming for ≥ 4 hours per day while still reporting high levels of wellbeing.

Taken together, the emerging consensus suggests that it is important to distinguish between high volumes of gaming on one hand, and problematic or maladaptive gaming on the other. The amount of time spent playing video games is not, in itself, indicative of problematic behaviour (Skripkauskaite et al., 2022). Instead, attention should be directed toward symptoms captured by instruments such as the GAS, which have shown positive correlations with loneliness ($r = .19$ to $.34$) and aggression ($r = .19$ to $.27$), and negative correlations with life satisfaction ($r = -.14$ to $-.31$) and social competence ($r = -.16$ to $-.19$) (Lemmens et al., 2009). Skripkauskaite et al.'s (2022) findings similarly show that 8% of their sample met criteria for maladaptive gaming based on GAS scores, and that these individuals were most likely to report aggressive behaviours and anxiety.

Evidence from South African adolescent samples is virtually non-existent. One small study of university students in South Africa (n = 114), conducted during the COVID-19 pandemic, found that gamers reported better wellbeing than non-gamers. The authors argue that gaming may have enabled individuals to maintain a sense of social connectedness during lockdowns (Frank, 2023). Hoque et al. (2025) synthesised findings from 38 peer-reviewed studies examining associations between online video gaming and mental wellbeing among children and adolescents across Africa. While not including any South African studies, their review suggests that gaming can lead to both positive and negative outcomes. On the one hand, it can offer benefits such as improvements in general cognitive skills, enhanced social awareness and connectedness, and relief from external stressors and academic pressures; on the other hand,

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it may also pose risks, including problematic gaming, increased anxiety, sleep disruption, and exposure to cyberbullying.

1.4 Academic Performance Associations

Like concerns related to wellbeing outcomes, the potential impacts of gaming behaviours on adolescent academic performance have been repeatedly highlighted in the academic literature (Alzahrani & Griffiths, 2024; Satapathy et al., 2025). At a basic level, such effects can be attributed to the way gaming displaces time that adolescents might otherwise spend on schoolwork and studying. However, other mechanisms may also be involved. For example, a recent study found that gaming time during middle childhood may erode academic motivation among boys (Tiraboschi et al., 2025). Additionally, observed effects of gaming on academic outcomes may be mediated by factors such as sleep, anxiety, and exposure to cyberbullying (Hoque et al., 2025).

In a recent systematic review examining the relationship between problematic gaming and academic performance, Alzahrani and Griffiths (2024) synthesised 27 studies. They report that while 24 of these studies found negative associations, the most recent studies in their corpus observed either no effects or even positive associations: *"Studies conducted prior to 2015 found problematic gaming to be a significant factor in predicting poor academic performance, while most of the recent studies conducted after 2015 reported that poor academic performance was a significant factor in predicting problematic gaming and/or that problematic gaming was not a significant factor in predicting academic performance."* They conclude that these findings challenge the commonly held belief that problematic gaming is causal of lower academic performance, instead suggesting that poor academic performance may be a risk factor for problematic gaming.

While some South African studies have explored associations between various forms of digital media use and academic outcomes (le Roux et al., 2021), there remains a notable lack of research focusing specifically on the role of gaming behaviours.

1.5 Key Research Gaps

Based on the review of literature, it is evident that several key research gaps exist regarding gaming behaviours among South African adolescents. First, there is limited evidence of the amount of time adolescents spend gaming across different platforms, and how these patterns vary by gender and age. Second, little is known about the prevalence of problematic or maladaptive gaming in this population. Third, there is no evidence of the relationships between gaming behaviours, gaming addiction symptoms, wellbeing outcomes, and academic performance among South African adolescents. While it is possible that findings from South African adolescents may align with evidence from other countries, it is critical that the local gaming landscape is better understood through systematic investigation and reporting.

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The primary objective of the present study is to address this important evidentiary gap. Acknowledging the contradictory findings that characterise the observed associations between gaming and wellbeing outcomes, we adopt an exploratory orientation and structure our investigation through the formulation of five primary questions:

RQ1: *How frequently and for how long do South African adolescents game on computers, consoles and smartphones, and how do these figures differ by age and gender?*

RQ2: *How prevalent is gaming addiction among South African adolescents, and how does prevalence vary by age, gender, and gaming platform?*

RQ3: *Which demographic and gaming indicators predict variance in gaming addiction symptoms among South African adolescents?*

RQ4: *What distinct latent profiles of adolescent gaming behaviour can be identified based on gaming behaviour and gaming addiction symptoms?*

RQ5: *How do these latent gaming profiles differ in terms of psychosocial wellbeing and academic performance?*

2 RESEARCH DESIGN

2.1 Sampling and Participants

Acknowledging the study's focus on behavioural patterns and their relationships with addiction symptoms, psychosocial outcomes and academic performance, we adopt a post-positivist research orientation. Accordingly, we accept that although perfect certainty is impossible when examining human behaviour, systematic empirical inquiry can reveal approximate patterns within social settings (Creswell & Creswell, 2018).

We analyse data that was collected as part of a larger research project on adolescent technology use in South Africa. The project, which was led by one of the authors of this study, involved collaboration with high schools to collect data on various aspects of adolescents' technology engagement. South Africa classifies public schools into five categories (Quintiles 1–5) based on the relative poverty of their surrounding communities, with Quintile 1 being the poorest and receiving the most government funding, and Quintile 5 the least poor receiving the least. Although high schools across different quintiles were invited to participate in the project, only five schools, all within Quintile 5, responded positively. This implies that our sample is not representative of all South African adolescents. However, it allows for the examination of gaming behaviours in contexts characterised by relatively high levels of digital access.

The researchers collaborated with each school to organise data collection activities in a manner that would avoid disruptions to the school's regular timetable, and learners completed questionnaires during a single 30-minute session in classroom settings. Before completing the

questionnaire, the class teacher used a verbal script to introduce the study and clarify that participation was voluntary and anonymous. It was emphasised that no identifiable information would be collected. Learners had the option of completing either a paper-based questionnaire or an online version using their smartphones. A QR code was used to provide access to the online questionnaire, and all materials were made available in both English and Afrikaans which were the languages of instruction used at the participating schools. To incentivise participation, the schools received a detailed report from the researchers presenting the data collected at the school. This data could be used to inform the school's policy on smartphone use among learners.

Several different questionnaires were used as part of the project, each focusing on distinct aspects of adolescents' technology engagement. Accordingly, not all participants completed items related to gaming behaviour and addiction. For the purposes of the present analysis, we drew on a subset of the data (n = 960) based on the variables of interest in this study.

2.2 Measures

In addition to items relating to demographic data (school, gender, and grade), the relevant questionnaire included measures of academic performance, gaming behaviour, and gaming addiction symptoms. These measures are described below.

Academic performance

A scale ranging from *below 30%* to *above 90%* with increments of 5% was used to elicit participants' average academic performance in their previous school year. The scale was recoded to values ranging from 1 (< 30%) to 13 (> 90%). Self-reported academic performance indicators have been shown to be reliable and correlate strongly with actual academic results (Sticca et al., 2017).

Gaming Behaviour

Gaming behaviours were reported through questions about the frequency (*how many times per week*) and duration of typical gaming sessions (*Less than 30 minutes; 30-60 minutes; 1-2 hours; 2-3 hours; More than 3 hours*). This was done separately for smartphone gaming and computer/console gaming.

Gaming Addiction

The seven-item Game Addiction Scale for Adolescents (Lemmens et al., 2009) was used to measure gaming addiction symptoms. These included:

1. Preoccupation – *"Have you thought all day long about playing a game?",*
2. Tolerance – *"Have you played longer than intended?",*

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3. Escape – *"Have you played games to forget about real life?"*,
4. Relapse – *"Have others unsuccessfully tried to reduce your time spent on games?"*,
5. Withdrawal – *"Have you felt upset when you were unable to play?"*,
6. Conflict – *"Have you had arguments with others (e.g., family, friends) over your time gaming?"*,
7. Problems/Neglect – *"Have you neglected important activities (e.g., schoolwork, sports) to play games?"*.

Each symptom was rated from 1 (*"Never"*) to 5 (*"Very often"*), and scale scores were computed by averaging the seven item responses. The measure displayed high internal consistency ($\alpha > .80$).

Well-being

The EPOCH Measure of Adolescent Well-being (Kern et al., 2016) was used to measure psychosocial outcomes. It covers five well-being dimensions (engagement, perseverance, optimism, connectedness, and happiness) based on four positively-worded items per dimension. Items are scored on a five-point Likert scale ranging from *"Almost never/Not at all like me"* to *"Almost always/Very much like me"*, with higher scores indicating better well-being. All dimensions displayed high internal consistency ($\alpha > .74$).

Of the 960 respondents that completed the items related to academic performance and gaming behaviour, only a subset ($n = 658$) also completed the EPOCH items. Accordingly, our analyses of the interaction between wellbeing outcomes and gaming behaviours is based on this subset only.

2.3 Ethical Considerations

Ethical approval for the project was secured from the researchers' institutional research ethics committee before any data collection commenced (Project ID#: 29470). In addition, the necessary permissions to work with the participating schools were obtained from the relevant provincial departments of education, in accordance with South African regulatory requirements. The dataset contained no personally identifying information. Learners and their families were fully informed about the aims and procedures of the study, and written consent was obtained from parents or guardians prior to learners' participation. No data that could be used to identify individual participants was collected.

2.4 Data Analysis Plan

To describe learners' gaming behaviour (RQ1), we calculated descriptive statistics for each indicator of gaming behaviour (gaming frequency, session duration, and daily minutes spent

gaming on both consoles/PC and smartphones). Daily gaming minutes were derived using midpoint estimates of the frequency and duration categories. These descriptive statistics were presented overall and stratified by gender and grade group. Group differences (gender and grade) were formally tested using appropriate inferential tests to assess statistical significance.

To evaluate gaming addiction symptoms and prevalence (RQ2), we computed scale scores for the GAS-7 and generated descriptive statistics for these scores. We then calculated both the polythetic and monothetic prevalence rates of gaming addiction. These prevalence estimates were presented overall and stratified by gender and grade groups.

To examine whether behavioural patterns predict addiction symptoms (RQ3), we ran a linear regression model in which GAS-7 scores were predicted by the four behavioural indicators of gaming. Gender and grade were included as covariates. Standardised beta coefficients were interpreted to assess the relative predictive strength of each behavioural indicator.

To address RQ4, we conducted a Latent Profile Analysis (LPA) using the four gaming behaviour indicators and the GAS-7 score as indicators in the model. The resulting latent classes were interpreted and named based on the class-specific means of the four gaming behaviour indicators, and a multinomial logistic regression was conducted to examine whether gender and grade predicted membership in the classes.

Finally, to address RQ5, we compared the latent classes on academic performance and psychosocial wellbeing outcomes. For academic performance, we conducted an ANCOVA to test differences across the LPA classes while controlling for gender and grade. For psychosocial wellbeing, we conducted a MANCOVA to examine whether the LPA classes differed across the five wellbeing outcomes, again controlling for gender and grade. As noted previously, due to data availability, we used a subset (n = 658) of our full sample for the analysis of the wellbeing outcomes.

3 RESULTS

3.1 Sample Characteristics

The full sample consisted of 960 learners from five different high schools in South Africa. Gender distribution was relatively balanced, with 464 female learners, 492 male learners, and 4 learners identifying as another gender. Grade-specific counts showed some variation: Grade 8 had the largest group (n = 234), followed by Grades 11 (n = 221), 9 (n = 190), and 10 (n = 183), while Grade 12 had the smallest group (n = 132). Within each grade, the proportions of male and female learners were generally similar, although Grade 8 had notably more males (133) than females (100), and Grade 9 had slightly more females (104) than males (86). Overall, the sample reflects a broadly even gender distribution with modest variation across grades. Given the small number of adolescents that identified as other genders, we did not include them in gender comparative analyses.

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3.2 Patterns of Gaming Frequency, Duration, and Platform Use

Figure 1 presents heatmaps illustrating the frequency and duration of gaming sessions among boys and girls on smartphones (Panels A and C) and computers/consoles (Panels B and D). Among boys, smartphone gaming shows the highest concentration in the *"less than 30 minutes"* and *"1–2 hours"* duration categories, particularly among those who play on two or three days per week. Computer and console gaming among boys generally involves longer sessions, though a third of boys never game on these platforms. Among girls, smartphone gaming is much more common than computer or console gaming, with the high proportions reported for short sessions (*"less than 30 minutes"*) one to three times per week. Girls' computer/console gaming shows low engagement, with 71% indicating that they never game on these platforms.

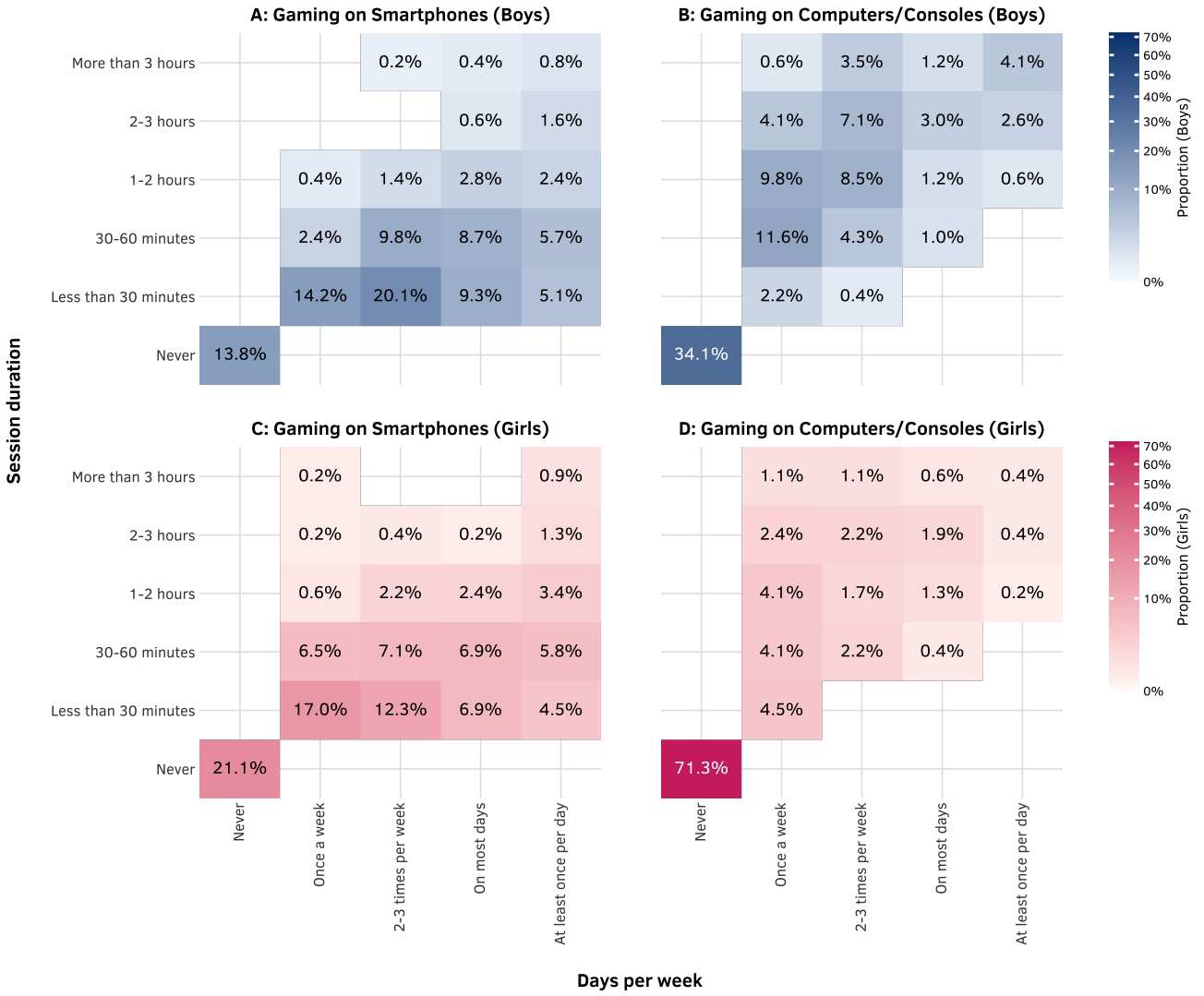

Figure 1: Gaming frequency and duration for boys and girls

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To derive continuous estimates of gaming behaviour, we applied a midpoint coding approach to the categorical frequency and duration items. For weekly gaming frequency on smartphones and computers/consoles, each response option was converted to its logical numeric midpoint: *"Never"* was coded as 0 days, *"Once a week"* as 1 day, *"2–3 times per week"* as 2.5 days, *"On most days"* as 5 days, and *"At least once per day"* as 7 days per week. Likewise, gaming session duration categories were converted to approximate minute values based on the midpoint of each range: *"Less than 30 minutes"* was coded as 20 minutes, "30–60 minutes" as 45 minutes, "1–2 hours" as 90 minutes, *"2–3 hours"* as 150 minutes, and "More than 3 hours" as 210 minutes.

Using the midpoint-coded frequency and duration values, we calculated estimated daily gaming time for smartphone gaming, computer/console gaming, and overall gaming (see Table 1). For each platform, weekly gaming days were multiplied by the typical session duration, and the product was divided by seven to approximate an average number of minutes spent gaming per day. Participants who reported never engaging in gaming on a given platform, were assigned a value of 0 minutes for that platform.

Across grades, average daily gaming time showed clear differences by both device type and gender. For smartphone gaming, boys generally reported slightly higher mean minutes per day than girls, ranging from 15.5 minutes in Grade 11 to 26.0 minutes in Grade 9, compared with girls' range of 17.6 to 22.9 minutes. In contrast, computer/console gaming displayed a much wider gender gap. Boys reported substantially higher daily gaming times across all grades, with the highest means in Grades 9 and 10 (45.5 and 47.9 minutes, respectively), whereas girls' averages remained much lower (5.6 to 12.8 minutes). While there was no statistically significant difference between girls and boys (of all ages) in daily smartphone gaming minutes, $F(1,954) = 0.95$, $p = .331$, the difference was significant for computer/console gaming minutes, $F(1,954) = 65.47$, $p < .001$, with boys reporting substantially more gaming than girls.

Table 1: Gaming minutes per day for genders, grades and platforms*

	Girls			Boys		
	n	**Phone**	**Computer/Console**	***n***	**Phone**	**Computer/Console**
Gr. 8	100	19.0 (±25.7)	12.8 (±28.3)	133	24.3 (±30.7)	23.6 (±38.5)
Gr. 9	104	22.9 (±35.5)	12.0 (±27.3)	86	26.0 (±33.0)	45.5 (±61.2)
Gr. 10	86	18.6 (±34.4)	11.6 (±35.2)	96	22.0 (±41.6)	47.9 (±65.1)
Gr. 11	108	18.0 (±30.8)	5.6 (±17.4)	112	15.5 (±24.3)	26.4 (±44.3)
Gr. 12	66	17.6 (±30.0)	10.4 (±33.6)	65	18.7 (±31.5)	19.2 (±38.4)
All	464	19.4 (±31.4)	10.4 (±28.3)	492	21.4 (±32.5)	32.2 (±51.3)

* indicated as *Mean (±Standard Deviation)*

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3.3 Gaming Addiction Symptoms and Prevalence

Descriptive statistics for GAS-7 scores are presented by grade and gender in Table 2. Overall, males reported higher mean GAS-7 scores ($M = 1.99$, $SD = \pm 0.79$)[1] than females ($M = 1.77$, $SD = \pm 0.77$), a statistically significant difference, $F(1,954) = 18.37$, $p < .001$.

Grade 9 boys displayed the highest mean score ($M = 2.38$, $SD = \pm 0.74$), whereas Grade 11 girls reported the lowest mean ($M = 1.54$, $SD = \pm 0.59$). Mean scores for girls ranged from 1.54 (Grade 11) to 1.95 (Grade 9), while boys' scores ranged from 1.75 (Grade 11) to 2.38 (Grade 9). When considering both genders, the mean GAS-7 score varied between 1.65 (Grade 11) and 2.14 (Grade 9). A One-way ANOVA analyses indicated that the differences between grades were statistically significant $F(4,951) = 12.01$, $p < .001$.

Table 2: GAS-7 scores and gaming addiction prevalence rates *

	Girls			Boys			All		
	GAS-7	Mono	Poly	GAS-7	Mono	Poly	GAS-7	Mono	Poly
Gr. 8	1.86 (±0.73)	2%	17%	1.96 (±0.71)	1%	19%	1.91 (±0.72)	1%	18%
Gr. 9	1.95 (±0.81)	2%	22%	2.38 (±0.74)	3%	37%	2.14 (±0.80)	3%	29%
Gr. 10	1.85 (±0.86)	3%	24%	2.04 (±0.89)	4%	22%	1.95 (±0.88)	4%	23%
Gr. 11	1.54 (±0.59)	1%	10%	1.75 (±0.76)	1%	15%	1.65 (±0.69)	1%	13%
Gr. 12	1.62 (±0.84)	3%	15%	1.85 (±0.72)	2%	20%	1.74 (±0.79)	2%	17%
All	1.77 (±0.77)	2%	18%	1.99 (±0.79)	2%	22%	1.88 (±0.79)	2%	20%

* indicated as *Mean (±Standard Deviation)*

Table 2 also provides the problematic gaming prevalence rates for grades and genders based on both the monolythic and polythetic standards. Monothetic prevalence is 2% for both genders, but polythetic prevalence is four points higher for boys (22%) than girls (18%). The highest prevalence rates for both genders are displayed by the Grade 9 and Grade 10 cohorts (ages 15 and 16 years).

3.4 Predictors of Gaming Addiction Symptoms

To examine the factors associated with gaming addiction symptoms, we estimated a multiple linear regression model predicting GAS-7 scores, using the four indicators of gaming frequency and duration as predictors, while controlling for grade, gender, and school.

The results indicate that all four gaming variables are positively associated with addiction symptoms. Standardized coefficients indicate that smartphone gaming duration ($\beta = 0.26$, 95% *CI* [0.20, 0.31]), computer/console gaming frequency ($\beta = 0.26$, 95% *CI* [0.18, 0.33]), and computer/console gaming duration ($\beta = 0.25$, 95% *CI* [0.18, 0.33]) all had comparable

[1] M = Mean, SD = Standard Deviation

medium-sized effects. Smartphone gaming frequency had a smaller but still significant effect (β = 0.09, 95% *CI* [0.04, 0.15]). Overall, the model explained a substantial proportion of variance in gaming addiction symptoms (adjusted $R^2 = 0.44$), indicating that gaming behaviour, together with demographic and school-level controls, accounted for nearly half of the variability in GAS-7 scores.

3.5 Latent Profile Analysis

Latent profile analysis (LPA) was conducted on adolescents' gaming behaviors, including smartphone and computer/console gaming days and session durations, as well as overall gaming addiction scores (GAS-7). Models with two to four profiles were estimated with equal variances and zero covariances. Model comparisons indicated that the three-class solution provided the best fit with the lowest Bayesian Information Criterion (*BIC* = 29,420.08), whereas the two- and four-class solutions had higher *BIC* values (*BIC* = 29,600.76 and 29,458.99, respectively). Consistent with these results, an analytic hierarchy process incorporating multiple fit indices (*AIC*, *AWE*, *BIC*, *CLC*, *KIC*) suggested that the three-class model was optimal (Akogul & Erisoglu, 2017). The three-class solution was therefore selected as the final model for further interpretation.

Based on the means of gaming frequency and duration for each class (see Table 3, we named the profiles: *Heavy gamers*, *Phone gamers*, and *Light gamers*. Heavy gamers ($n = 213$; 156 male, 57 female) were slightly younger ($M = 15.63$, $SD = \pm 1.28$) and reported high engagement on both smartphones and computers/consoles, averaging 3.64 ($SD = \pm 2.35$) smartphone gaming days per week with sessions lasting 46.38 minutes ($SD = \pm 46.11$), and 3.75 ($SD = \pm 2.05$) computer/console gaming days per week with sessions of 153.31 minutes ($SD = \pm 44.91$). Their GAS-7 scores indicated higher gaming addiction risk ($M = 2.66$, $SD = \pm 0.75$). Phone gamers ($n = 237$; 110 male, 127 female) played frequently on smartphones ($M = 5.86$ days, $SD = \pm 1.11$; session duration $M = 49.83$ minutes, $SD = \pm 39.41$) but rarely on computers/consoles ($M = 0.48$ days, $SD = \pm 0.81$; $M = 20.33$ minutes, $SD = \pm 32.02$), with moderate GAS-7 scores ($M = 1.90$, SD = 0.75). Finally, Light gamers (n = 506; 226 male, 280 female) engaged minimally with both platforms, averaging 1.29 ($SD = \pm 1.03$) smartphone gaming days per week ($M = 21.06$ minutes, $SD = \pm 19.93$), 0.45 ($SD = \pm 0.75$) computer/console gaming days ($M = 20.36$ minutes, $SD = \pm 34.76$), and the lowest GAS-7 scores ($M = 1.55$, $SD = \pm 0.56$).

A multinomial logistic regression was conducted to examine whether gender and grade predicted membership in the three latent gaming profiles. The model displayed a final deviance of 933.28. Using Heavy gamers as the reference category, males were significantly less likely than females to be classified as Light gamers (β = -1.27, $SE = 0.18$, $p < .001$) or Phone gamers (β = −1.20, $SE = 0.21$, $p < .001$). Compared to Grade 12 students, being in Grade 9 was associated with lower odds of membership in the Light gamer (β = -0.57, $SE = 0.25$, $p = .022$) and Phone gamer (β = -0.57, $SE = 0.28$, $p = .039$) profiles. Other grade comparisons were not statistically significant. These findings indicate that both gender and grade are meaningful predictors of latent gaming profile membership, with male students more likely to belong to

Table 3: Gaming frequency and duration for the three latent classes *

	Light Gamers	Phone Gamers	Heavy Gamers
Proportion of sample	53%	25%	22%
Male/female ratio	45% 55%	46% 54%	73% 27%
Age	15.94 (± 1.39)	15.73 (± 1.45)	15.63 (± 1.28)
Gaming minutes per day	9.60 (±10.00)	46.00 (±36.40)	114.40 (±75.20)
Smartphone			
Gaming days per week	1.29 (± 1.03)	5.86 (± 1.11)	3.64 (± 2.35)
Session duration	21.06 (±19.93)	49.83 (±39.41)	46.38 (±46.11)
Computer/console			
Gaming days per week	0.45 (± 0.75)	0.48 (± 0.81)	3.75 (± 2.05)
Session duration	20.36 (±34.76)	20.33 (±32.02)	153.31 (±44.91)
GAS-7	1.55 (± 0.56)	1.90 (± 0.75)	2.66 (± 0.75)
Polythetic prevalence	8%	17%	50%
Monothetic prevalence	0%	2%	7%

* indicated as *Mean (±Standard Deviation)*

the Heavy gamer profile and younger students slightly more likely to belong to this profile compared to older students.

3.6 Academic Performance

A one-way ANCOVA was conducted to determine whether academic performance differed across the three latent gaming classes, while controlling for grade and gender. The overall effect of gaming class was significant, $F(2, 948) = 4.90$, $p = .008$, indicating that academic performance differed between at least some classes after adjustment. Grade was also a significant covariate, $F(4, 948) = 11.27$, $p < .001$, whereas gender showed a marginal effect, $F(2, 948) = 2.72$, $p = .067$. Importantly, the interaction between gaming class and gender was not significant, $F(3, 948) = 1.00$, $p = .394$, indicating that the effect of gaming class on academic performance did not differ by gender and that the assumption of homogeneity of regression slopes was met.

Estimated marginal means (controlling for covariates) showed that Light gamers had the highest academic performance ($M = 9.71$), followed by Phone gamers ($M = 9.38$), and Heavy gamers ($M = 9.26$). Tukey-adjusted pairwise comparisons revealed that Light gamers performed significantly better than Heavy gamers, *mean difference* $= -0.45$, $p = .037$. However, Light gamers did not differ significantly from Phone gamers ($p = .134$), neither did Heavy

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gamers ($p = .824$). Overall, these findings suggest that heavy gaming is associated with slightly lower academic performance compared to light gaming after accounting for learners' grade and gender.

3.7 Psychosocial Wellbeing

A one-way MANCOVA was conducted to examine whether psychosocial wellbeing differed across the three latent classes (Heavy gamers, Phone gamers, Light gamers), controlling for grade and gender. Importantly, due to data availability, this analysis was conducted on smaller subset of the data of which most were girls (n = 657, 464 females).

The multivariate test was significant for gaming class, Pillai's trace = .06, $F(10, 1290) = 4.09$, $p < .001$, indicating overall group differences across the combined wellbeing outcomes. Grade, Pillai's trace = .07, $F(20, 2588) = 2.19$, $p = .002$, and gender, Pillai's trace = .06, $F(10, 1290) = 3.75$, $p < .001$, also showed significant multivariate effects. Follow-up univariate ANCOVAs indicated that gaming class significantly predicted engagement, $F(2, 648) = 5.26$, $p = .005$, and connectedness, $F(2, 648) = 6.96$, $p = .001$. Heavy gamers ($EMM = 3.57$) displayed the highest engagement, followed by Light gamers ($EMM = 3.45$), with Phone gamers scoring lowest ($EMM = 3.32$). Phone gamers ($EMM = 4.21$) displayed the highest connectedness, Light gamers scored moderately ($EMM = 4.09$), and Heavy gamers scored lowest ($EMM = 3.99$). Perseverance, optimism, and happiness did not differ significantly across classes after controlling for the covariates (all p-values > .10). These results suggest that the latent gaming profiles differ mainly in learners' engagement and sense of connectedness, with only small and outcome-specific differences across classes.

4 DISCUSSION

When comparing the gaming behaviours observed in our sample with those reported in recently published studies based on US or UK samples, South African adolescents generally display lower gaming volumes. Differences in measurement and calculation methods across studies make direct comparisons difficult, but the emerging pattern in our data suggests that gaming is less prevalent and less time-intensive among adolescents in the South African sample. Whereas US adolescents spend an average of 1 hour and 46 minutes gaming per day (Rideout et al., 2021) our estimates are noticeably lower with boys reporting an average of approximately 55 minutes per day, and girls around 30 minutes per day. A similar trend can be observed when considering adolescents that game intensively. Those classified as Heavy gamers in our sample average around 114 minutes per day and constitute only 22% of our sample. By contrast, studies from England and Europe report that approximately one-third of adolescents play for more than 3.5 hours per day. Moreover, more than half of our sample average fewer than 10 minutes of gaming per day. Taken together, these findings suggest that South African adolescents' gaming involvement is lower overall than what is typically reported in the United States, the United Kingdom, and Europe.

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A somewhat different picture emerges when examining problematic gaming prevalence. Lemmens et al. reported polythetic prevalence rates of around 9.3% among Dutch adolescents (Lemmens et al., 2009), while a recent study of Spanish gamers (Mean age = 21.12 years) using the same measure (GAS-7) reported a polythetic prevalence of approximately 10% and a monothetic prevalence of 2% (Suárez-Soto et al., 2025). We observed a much higher polythetic rate (20%), with Grade 9 boys reaching an exceptionally high 37% polythetic prevalence. However, our monothetic rate is also 2%. Once again, it should be noted that direct comparisons may be misleading due to considerable methodological heterogeneity across studies.

Interestingly, even among Light gamers, we observed a polythetic rate of 8%, which is unexpectedly high given the very small amount of time these individuals spend gaming (less than 10 minutes per day on average). Several factors may account for this apparent contradiction. One possibility is that frequent, short smartphone-based gaming sessions elicit a level of psychological involvement that persists despite the low overall volume of gaming. Another possibility is that the GAS-7 measure may not perform reliably in populations with high smartphone ownership and use. We therefore call for future research to examine this phenomenon more closely.

When considering academic outcomes, our findings generally align with the broader international literature. Alzahrani and Griffiths' (2024) review of 27 studies found that 24 reported negative associations between problematic gaming and academic performance. Consistent with this pattern, we observed that Heavy gamers performed significantly worse than Light gamers academically, even after controlling for grade and gender. Phone gamers fell between these two groups, although their performance did not differ significantly from either. These results reinforce the well-established association between heavier gaming involvement, particularly when it reflects problematic behavioural patterns, and lower academic achievement. However, given the cross-sectional nature of our data, we cannot make causal claims and must acknowledge that poorer academic performance may itself act as a risk factor for problematic gaming.

Finally, in terms of psychosocial wellbeing, our results contribute to the ongoing debate about the extent to which gaming influences emotional and social functioning. We found significant class differences for engagement and connectedness, but not for perseverance, optimism, or happiness once covariates were included. Heavy gamers displayed higher engagement than Phone gamers, likely reflecting the immersive and absorbing qualities of computer and console gaming. Meanwhile, Phone gamers reported the highest levels of connectedness, which may reflect the social nature of mobile gaming. Many smartphone games integrate social features, encourage interaction between players, and often blend gaming with social media environments, thereby reinforcing a shared hobby around which adolescents may form and maintain social ties.

Importantly, our findings do not indicate that Heavy gamers uniformly experience reduced wellbeing. This aligns with recent research suggesting that high gaming time alone is not necessarily associated with poorer mental health, and that the broader pattern of gaming

behaviours, including frequency, duration, platform, motivations, and social context, may be more relevant to understanding wellbeing outcomes. Our latent profiles help illustrate these differentiated behavioural patterns and highlight the need for nuanced interpretations that go beyond gaming time as a single predictor of psychosocial functioning.

4.1 Limitations

Three primary limitations should be noted in interpreting our results. First, our sample was drawn from adolescents attending Quintile 5 schools. This implies that it is not representative of adolescents across all socioeconomic strata in South Africa. Adolescents that attend Quintile 5 schools display high levels of technology access, including smartphone ownership and use (Le Roux et al., 2025). As a result, the gaming patterns we observed may be higher and qualitatively different compared with those that might be seen in more disadvantaged or under-resourced populations. Second, our data collection was cross-sectional, which limits the ability to draw causal conclusions from any observed associations. Third, the subsample used in the wellbeing outcomes analysis was heavily skewed toward female participants, implying that these findings may not generalise equally across genders.

5 CONCLUSION

Our findings show that smartphone gaming is a common part of everyday life for South African adolescents, with boys and girls engaging in similar amounts of phone-based play. In contrast, computer and console gaming is far less common and is practised mainly by boys, typically in longer sessions (RQ1). Gaming addiction symptoms were more pronounced among boys, with an overall polythetic prevalence rate of 20%, and were positively associated with all four gaming behaviour indicators (RQ2–RQ3). We also identified three distinct latent gaming profiles (Heavy gamers, Phone gamers, and Light gamers) with boys and younger adolescents more likely to belong to the Heavy gamer profile (RQ4). Consistent with international evidence, heavy gaming is associated with poorer academic performance. However, with the exception of slightly lower connectedness, heavy gamers do not experience worse well-being (RQ5).

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