

**Digital gaming and students' psychological wellbeing during the COVID-19 pandemic: An
exploratory study**

by

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Mini-Dissertation

submitted in partial fulfilment of the requirements for the degree of

MASTER OF ARTS IN COUNSELLING PSYCHOLOGY

in the

FACULTY OF HUMANITIES

at the

UNIVERSITY OF PRETORIA

Supervisor: Prof. N. Coetzee

Date of submission: 31st October 2023

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SUMMARY

The COVID-19 pandemic had a significant effect on global wellbeing. The transition from in-person to online learning, COVID-19-related health issues, social restrictions, anxieties surrounding the wellbeing of loved ones, and uncertainty regarding the future significantly impacted the student population's psychological wellbeing. This in turn resulted in elevated symptoms of anxiety and depression. To combat social isolation students embraced digital gaming to maintain a sense of social connection. Many of these games contain elements of violence, which have long been associated with negative psychological wellbeing. The main aim of this study was therefore to determine the effects of violent versus non-violent digital gaming on the psychological wellbeing of students following the COVID-19 lockdown. A quantitative cross-sectional design was employed for the study. A convenience sample was used, which consisted of 114 students from the University of Pretoria divided into three groups, namely violent gamers, non-violent gamers, and the control group. The participants completed an online questionnaire consisting of a biographical questionnaire; the PERMA-Profiler, which measured Positive Emotions, Engagement, Positive Relationships, Meaning and Accomplishment; and the State-Trait Personality Inventory Form Y (STPI-Y), which measured State and Trait Anxiety as well as State and Trait Depression. The results of the MANOVA, accompanied by a follow-up ANOVA indicated significant differences between the groups on the State Anxiety subscale. Lastly, a standard multiple regression analysis indicated that State Depression and Trait Depression were significant predictors of wellbeing. The results of the study indicated that engaging in gameplay resulted in higher levels of psychological wellbeing when compared to those who did not engage in gameplay during the time of the study.

Word count: 265 words

Keywords:

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PREFACE

1.1 Article format

This mini-dissertation was completed in article format, adhering to the guidelines on dissertations set out by the University of Pretoria.

1.2 Selected journal

The *South African Journal of Psychology* was selected as the journal for publication of this article. A version of the manuscript will be submitted to the journal in accordance with the journal's guidelines. The referencing style and editorial approach for this manuscript will therefore be in line with the *South African Journal of Psychology* regulations. However, for the purpose of this mini-dissertation, the pages are numbered consecutively with 1.5 line spacing. For submission to the journal, pages will be numbered according to the journal's requirements and thus start from the title page of the manuscript. Additionally, for the purpose of the mini-dissertation, the tables within the study will be provided in-text. For submission to the journal, the tables will be added after the references.

1.3 Permission from co-authors

Letters of consent signed by the co-authors in which they provide permission for the manuscript; *Digital gaming and students' psychological wellbeing during the COVID-19 pandemic: An exploratory study* to be submitted for the purpose of a mini-dissertation by the first author, Melissa Frank, appears below:

Letter/ Declaration of Consent

I, Nicoleen Coetzee the co-author, hereby give consent that Melissa Frank may submit the manuscript '*Digital gaming and students' psychological wellbeing during the COVID-19 pandemic: An exploratory study*' for purposes of a dissertation in partial fulfilment of the degree Master of Arts in Counselling Psychology and, I Nicoleen Coetzee, declare it may also be submitted to the *South African Journal of Psychology* for review.

Letter/ Declaration of Consent

I, Andries Masenge the co-author, hereby give consent that Melissa Frank may submit the manuscript '*Digital gaming and students' psychological wellbeing during the COVID-19 pandemic: An exploratory study*' for purposes of a dissertation in partial fulfilment of the degree Master of Arts in Counselling Psychology and, I Andries Masenge declare it may also be submitted to the *South African Journal of Psychology* for review.

SOUTH AFRICAN JOURNAL OF PSYCHOLOGY GUIDELINES

Author Guidelines

The following instructions are laid out by the *South African Journal of Psychology* pertaining to the requirements and considerations of the authorship, preparation, and submission of manuscripts.

Instructions to authors:

Manuscripts should be submitted as a Word document only. The text should be double-spaced throughout and with a minimum of 3 cm for left- and right-hand margins and 5cm at head and foot. The text should be standard 12 point.

Research-based manuscripts should use the following format: The introductory/literature review section does not require a heading, thereafter the following headings /subheadings should be used: Method (Participants; Instruments; Procedure; Ethical considerations; Data analysis (which includes the statistical techniques or computerized analytic programmes, if applicable); Results; Discussion; Conclusion; References. The “Ethical considerations” section must include the name of the institution that granted the ethical approval for the study (if applicable).

New submissions should not exceed 5500 words, including references, tables, figures, etc. All manuscripts should be written in English and include an abstract of not more than 250 words. The *South African Journal of Psychology* adheres to the APA reference style. The publication guidelines of the American Psychological Association 7th edition (APA 7) must be followed in the preparation of the manuscript.

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MANUSCRIPT

**Digital gaming and students' psychological wellbeing during the COVID-19 pandemic:
An exploratory study**

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ABSTRACT

The COVID-19 pandemic had a significant effect on global wellbeing. The transition from in-person to online learning, COVID-19-related health issues, social restrictions, anxieties surrounding the wellbeing of loved ones, and uncertainty regarding the future significantly impacted the student population's psychological wellbeing. This in turn resulted in elevated symptoms of anxiety and depression. To combat social isolation students embraced digital gaming to maintain a sense of social connection. Many of these games contain elements of violence, which have long been associated with negative psychological wellbeing. The main aim of this study was therefore to determine the effects of violent versus non-violent digital gaming on the psychological wellbeing of students following the COVID-19 lockdown. A quantitative cross-sectional design was employed for the study. A convenience sample was used, which consisted of 114 students from the University of Pretoria divided into three groups, namely violent gamers, non-violent gamers, and the control group. The participants completed an online questionnaire consisting of a biographical questionnaire; the PERMA-Profilier, which measured Positive Emotions, Engagement, Positive Relationships, Meaning and Accomplishment; and the State-Trait Personality Inventory Form Y (STPI-Y), which measured State- and Trait-Anxiety as well as State- and Trait-Depression. The results of the MANOVA, accompanied by a follow-up ANOVA indicated significant differences between the groups on the State Anxiety subscale. Lastly, a standard multiple regression analysis indicated that State Depression and Trait Depression were significant predictors of wellbeing. The results of the study indicated that engaging in gameplay resulted in higher levels of psychological wellbeing when compared to those who did not engage in gameplay during the time of the study.

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INTRODUCTION

Students experience a high prevalence of daily stressors, including financial worries, academic hardship and social issues (Evans et al., 2021; Villani et al., 2021). The outbreak of the COVID-19 pandemic brought with it additional stressors, such as adjustment to distance learning, reduced social interaction with friends and family, adherence to strict public health measures and a rising mortality rate (Kostić et al., 2021). In turn, students experienced heightened susceptibility to the negative psychological effects associated with the pandemic (Villani et al., 2021). Such distress often results in compromised psychological wellbeing, marked by higher levels of depression and anxiety (Evans et al., 2021; Villani et al., 2021).

Psychological wellbeing has been defined in many ways, which are often grounded in theoretical models that have been developed to explain wellbeing. An example of this is the PERMA model developed by Seligman (2011). The model provides a comprehensive conceptualisation of psychological wellbeing that incorporates both eudaimonic components of wellbeing, referring to aspects such as living a life of purpose; as well as hedonic components of wellbeing, referring to aspects such as the enjoyment of a life full of pleasure (Coffey et al., 2014). According to the PERMA model, the presence of Positive Emotion, Engagement, Positive Relationships, Meaning and Accomplishment are required for one to lead a fulfilled and meaningful life, therefore leading to psychological wellbeing (Seligman, 2011). **Positive Emotion** refers to hedonic feelings of happiness (Morgan & Simmons, 2021) such as “pleasure, rapture, ecstasy, warmth and comfort” (Seligman, 2011, p. 11). **Engagement**, on the other hand, indicates feelings of connection to activities or organisations and can be related to flow: a feeling of complete absorption within an activity that requires the use of all cognitive and emotional resources (Seligman, 2011). Students may experience flow while completing

an assignment or engaging in a sporting match. **Positive Relationships** describe a feeling of social integration and satisfaction with one's social connections (Kern et al., 2015). Seligman (2011) noted that positive relationships could act as a remedy for those who face hardships, such as the social isolation experienced by many during the COVID-19 pandemic. **Meaning** denotes having direction in life (Butler & Kern, 2016) as well as a feeling of belonging, especially to something greater than oneself. Lastly, **Accomplishment** or **Achievement** is based on success and mastery. It involves making progress toward goals and feeling competent to complete day-to-day activities (Kern et al., 2015). This could manifest as attaining an excellent mark on an assignment, which may drive the student to attain similar excellent marks on upcoming tests.

In addition to understanding wellbeing in terms of hedonic and eudaimonic conceptualisations, it can also be understood as the absence of emotional distress. Spielberger and Reheiser (2009) identify the presence of anxiety and depression as the experience of emotional distress. Anxiety is a fundamental human emotion and a natural reaction to stress (Spielberger & Reheiser, 2009). It can be identified by feelings of nervousness or worry, tension, fatigue, irritability and restlessness, difficulty in concentration and sleep disturbances. These symptoms become problematic when they are experienced in excess and when they cause impairment to daily functioning (American Psychiatric Association, 2013), which may result in emotional distress and impaired wellbeing (Spielberger & Reheiser, 2009). Spielberger and Reheiser (2009) noted that anxiety can be broken down into two types. **State Anxiety** refers to the intensity of anxiety-related feelings in the present moment, while **Trait Anxiety** is the stable tendency to feel anxious (Spielberger & Reheiser, 2009). Research has found that there is a high comorbidity between the experience of anxiety and depression (Kalin, 2020). Depression is experienced as consistent feelings of sadness and anhedonia. Other

symptoms may include changes in eating and sleeping habits; weight changes; reduced ability to concentrate; and feelings of restlessness, fatigue and worthlessness (American Psychiatric Association, 2013). Similar to anxiety, Spielberger and Reheiser (2009) distinguish between **State** and **Trait Depression**. Depression as an emotional or affective state is measured by determining the intensity of the depressive feelings in the present moment. On the other hand, depression as a personality trait is measured by determining the frequency of depression-related feelings. The intensity and duration of feelings related to anxiety and depression provide information about how both recent and longstanding conflicts affect an individual's life, as well as their experience of emotional distress (Spielberger & Reheiser, 2009). This is essential for understanding the long-term effects of COVID-19 on psychological wellbeing.

Research by Spielberger and Reheiser (2009) noted inverse correlations between psychological wellbeing and anxiety and depression. Villani et al. (2021), who explored the impact of the pandemic on the psychological wellbeing of 501 university students, reported that 35.33% of students experienced symptoms of anxiety, while 72.93% experienced symptoms of depression – a prevalence almost double that of the general population. A United States of America survey found that 73% of students who experienced feelings of anxiety or depression attributed these feelings to the COVID-19 pandemic (Fitzgerald & Konrad, 2021), while a study conducted in Nigeria indicated that 24% of the student sample experienced severe anxiety during lockdown (Rakhmanov & Dane, 2020). A study conducted on South African students by Visser and Law-van Wyk (2021) demonstrated that almost a third of participants had trouble with the psychological challenges created by the pandemic. The study furthermore noted that students were “languishing rather than flourishing”, with 35% of students indicating feelings of depression and 45.6% indicating feelings of anxiety (Visser & Law-van Wyk,

2021, p. 238). These results demonstrate a significant change from the subjective feelings of anxiety and depression pre-pandemic, where Bantjies et al. (2016) reported levels of anxiety and depression of 15.5% and 11.2% respectively within the South African student population. Brooks et al. (2020) found that symptoms of anxiety have increased due to social isolation resulting from the COVID-19 pandemic. In addition to greater levels of psychological distress, young adults have been particularly affected by loneliness in 2020 (Li & Wang, 2020). Visser and Law-van Wyk (2021) found that 56.7% of South African student participants experienced feelings of loneliness and isolation during the pandemic. Both aspects have been linked to an increased risk of experiencing symptoms of anxiety and depression (Santini et al., 2020).

Gaming is one of the most popular leisure activities worldwide (Johannes et al., 2021), and has been used as an effective coping mechanism in times of emotional distress (Iacovides & Mekler, 2019; Russoniello et al., 2009). Since the start of the pandemic, there has been a significant increase in the number of gamers (Statista, 2020). The #PlayTogetherApart initiative encouraged gameplay in order to promote social distancing while minimising the negative effects of social isolation (Nebel & Ninaus, 2022). In turn, there has been an increased interest in the effects of gaming to reduce emotional distress and enhance psychological wellbeing (Karhulahti et al., 2022; Nebel & Ninaus, 2022). Digital games are defined as “electronic games played on computers, consoles, tablets, mobile devices and the world wide web” (Jones et al., 2014, p. 1). The content of digital games ranges from violent to non-violent. The Entertainment Software Rating Board (ESRB) (n.d.) defines intense violence within digital games as explicit and realistic portrayals of physical conflict. This includes games that may contain depictions of extreme or realistic blood, gore, weapons and harm or death to humans. Non-violent digital games therefore encompass all digital games not included within this definition

of violence. This is comprised of animated or cartoon depictions of violence, where the character may not show signs of being hurt; or fantasy depictions, where characters do not exist in real life, such as ogres (ESRB, n.d.). A study that consists of 128 students, conducted by Balhara et al. (2020), found that around 50% of their participants had increased their gaming during the lockdown period. Higuchi et al. (2020) found similar increases in gaming during the lockdown, while Wu et al. (2022) found that there was an increase in gaming even after the initial lockdown had ended, due to the continuing social restrictions and fear of falling ill with the COVID-19 virus.

In addition to reducing emotional distress, Granic et al. (2014) noted that playing digital games enhances the gamer's mood, thus resulting in the experience of **Positive Emotions**. Within the digital gaming space, experiences of failure do not always lead to anger, frustration, or sadness. Although players do feel these emotions, they are also highly motivated to return to the task of winning and reaching their in-game goals, while the positive emotions elicited by games help to counteract the harmful effects of negative emotions (Granic et al., 2014). In addition, Reinecke (2009) argues that gamers may experience relaxation as a result of distraction from stress- or anxiety-inducing stimuli within the gaming simulation. Results from Jones et al.'s (2014) study confirm these findings, stating that digital gameplay often results in feelings of **Engagement**, or intense immersion within a game, which can allow individuals to attain deep relaxation, diverting their attention from real-world stressors. Digital games also promote **Positive Relationships** as they are often played with real-life friends, promoting the quality of their relationship. However, players also report forming new friendships within the online space and continuing those friendships in real-life settings, therefore providing an alternative manner to maintain social connections with others (Cole & Griffiths, 2007; Ferguson & Olson, 2013; Granic et al., 2014; Odrowska & Massar, 2014; Reinecke, 2009).

A study conducted by Vuorre et al. (2021) shows increased engagement in multiplayer games over single-player games during the pandemic, as the social distancing requirements of the pandemic led individuals to turn to other means of social interaction. Positive Relationships may also be linked to a sense of **Meaning**, as McGonigal (2011) stated that gaming allows one to gain a sense of belonging to something bigger than oneself, while Seligman (1998) suggested that more meaning can be derived from attachment to a larger group. This implies that connecting to multiple players across the world or forming groups to take down a common in-game enemy enables gamers to derive greater meaning within the task, leading to increased psychological wellbeing (Jones et al., 2014). In this way, gaming environments offer tasks that are challenging yet achievable, providing positive feedback and immediate rewards, and therefore contribute to the individual's need for competence and autonomy, sustaining their need for **Accomplishment**. Furthermore, digital games provide the opportunity to set structured goals, thus promoting positive affect and enhancing general wellbeing (Jones et al., 2014). The experience of positive emotions, social connectedness and feelings of competence enhanced by gameplay is imperative for psychological wellbeing, as loneliness and social isolation have been linked to depressive symptoms (Kowal et al., 2021). Research conducted by Ferguson and Rueda (2010) showed that the use of violent video games may reduce the experience of depressed mood. In addition, a study by Villani et al. (2018) displayed the ability of violent video games to positively influence mood repair. A systematic review conducted by Pine et al. (2020) indicated that a reduction in symptoms of depression and anxiety was experienced after just 30 minutes of gameplay. Engaging in digital games has been shown to effectively aid in preventing and alleviating symptoms of anxiety (Fish et al., 2014; Kowal et al., 2021; Pine et al., 2020).

While it appears that gameplay decreases symptoms of anxiety and depression, which results in enhanced psychological wellbeing, there is limited research exploring this association. In addition, little research has been conducted to determine which category of game, whether that be violent or non-violent, has a greater impact on psychological wellbeing. The aim of this study was therefore to investigate the impact of engaging in digital games on student psychological wellbeing. To attain this aim, two objectives were set. The first objective involved determining if there were significant differences in students' psychological wellbeing, as well as experiences of anxiety and depression when comparing those who engaged in violent gaming with those who engaged in non-violent gaming or those who did not game. The second objective aimed to determine whether group membership (if participants fell within the violent gamer, non-violent gamer, or non-gamer groups), as well as State and Trait Anxiety and Depression, could predict changes in students' psychological wellbeing.

METHODOLOGY

The study utilised an exploratory cross-sectional research design, which is quantitative in nature. A cross-sectional study consists of data collected during a single period. The exploratory design was selected due to its usefulness in determining associations between variables, where more information is needed before one can develop conclusive results (Christensen et al., 2020).

Participants

The participants for the study were identified using convenience sampling, a nonprobability sampling method where participants are selected based on convenience (Christensen et al., 2020). This form of sampling includes readily available participants

who could be easily recruited and who volunteered to be part of the study. The participants were approached online via an advertisement posted on ClickUp; an online platform used by students to access important course communications. There were no restrictions as to who could participate in the study, as students who did not engage in gameplay formed part of the control group. The sample consisted of 114 ($n = 114$) students who volunteered to participate in the study. The majority of the sample (57.0%) identified as female, while 38.6% identified as male and 3.5% identified as gender non-conforming. The age of participants ranged from 18 to 57, with the mean age being 24 and a standard deviation of 7.58.

Participants were required to answer close-ended questions related to their gameplay on the biographical questionnaire which will be discussed in the next section. Participants selected the digital games they were most likely to play by choosing from a predetermined list of games that fit the ESBP's definitions of violent and non-violent games. Using the answers as well as the ESBP's definition of violent games, participants were grouped as most likely to play violent digital games or non-violent digital games. Within the sample, 37 participants (31.6%) were grouped as predominantly playing violent digital games, while 59 participants (50.4%) were grouped as predominantly playing non-violent video games. The non-gaming group consisted of 21 participants (17.9%) who indicated that they did not engage in any form of gameplay at the time of the study.

Instruments

Biographical questionnaire. The biographical questionnaire was used to obtain the participant's biographical information and to gain an indication of the games participants were most likely to play. A modified version of open-ended questions developed by Evans et al. (2021) were incorporated into the questionnaire to briefly

explore the effect of the COVID-19 pandemic on participants. The questions included were as follows (Evans et al., 2021, p. 3): “How well do you feel you have adapted to isolation and social distancing? Please elaborate on your answer or provide examples”; and “Do you feel that gaming has helped you during the COVID-19 pandemic, and if so, how?”.

State-Trait Personality Inventory (Y Form). The State-Trait Personality Inventory Form Y (STPI-Y) (Spielberger & Reheiser, 2009) was used to measure emotional distress presenting as symptoms of anxiety and depression. The inventory consists of eight 10-item scales to measure State and Trait Anxiety, Depression, Anger, and Curiosity. Measurement of the State scales indicates the intensity that the individuals feel in the present moment, while the Trait scales provide an indication of the frequency or duration of an individual’s stable tendency to experience that construct. For the purpose of this study, only State and Trait Anxiety and Depression were measured. Internal consistency reliability produced alpha coefficients of 0.86 or higher for State Anxiety and a median alpha coefficient of 0.90 for Trait Anxiety (Spielberger & Reheiser, 2009). Du Plessis (2013) studied the reliability of the STPI-Y within a South African student population and found an alpha coefficient of 0.82 for State Anxiety and alpha coefficients that ranged from 0.75 to 0.81 for Trait Anxiety. The Trait Depression scale produced a Cronbach’s alpha coefficient of 0.90, while the State Depression scale produced a Cronbach’s alpha coefficient of 0.85 (Spielberger & Reheiser, 2009). For this study, the reliability of the scale was tested using Cronbach’s alpha coefficient test to ensure the appropriate use of the measure. The current study demonstrated Cronbach alpha scores of 0.77 and 0.86 for State and Trait Anxiety respectively. It also demonstrated Cronbach alpha scores of 0.73 and 0.91 for State and Trait Depression respectively. These findings are consistent with Du Plessis’ (2013) and indicate that the

STPI displays good internal consistency reliability for use within the South African student population.

PERMA-Profiler. The PERMA-Profiler (Butler & Kern, 2016) was used to measure psychological wellbeing. The PERMA-Profiler is based on Seligman's (2011) PERMA model. The questionnaire consists of 23 items divided into five components, namely: Positive Emotions, Engagement, Positive Relationships, Meaning and Achievement. Each component consists of three items, while eight additional items assess Negative Emotion, Loneliness, Overall wellbeing, and Physical Health. According to Butler and Kern (2016), the PERMA-Profiler displays evidence of internal and cross-time validity as well as content, convergent and divergent reliability. Their study on the internal and test-retest reliability of the PERMA-Profiler yielded a Cronbach alpha value of 0.90. The components also demonstrated acceptable Cronbach alpha values, with 0.71 - 0.89 for Positive Emotion, 0.60 - 0.81 for Engagement, 0.75 - 0.85 for Relationships, 0.85 - 0.92 for Meaning and 0.70 - 0.86 for Accomplishment. Studies by Umucu et al. (2020), Butler and Kern (2016) and Coffey et al. (2014) provided evidence that the PERMA-Profiler can be successfully used with a student cohort. Research conducted by Janse van Rensburg et al. (2017), Gush and Greeff (2018), and Kock (2020), indicated that the instrument produced reliable data within a South African context. The current study further tested the reliability of the scale using Cronbach's alpha coefficient test to ensure the appropriate use of the scale. Consistent with Butler and Kern's (2016) findings, this study demonstrated a Cronbach alpha coefficient of 0.92 for the PERMA score. Considering each component of the PERMA-Profiler, the study indicated Cronbach coefficients of 0.84 for Positive Emotions, 0.56 for Engagement, 0.80 for Relationships, 0.86 for Meaning, and 0.47 for Accomplishment. Each component of the PERMA-Profiler yielded acceptable Cronbach alpha values taking into account the number of items within each

subscale (Pallant, 2020). It therefore appears that the PERMA-Profiler displays good internal consistency for use within the South African student population.

Procedure

Students indicated their willingness to participate in the study by clicking the link on the advertisement posted via clickUp. The study made use of Qualtrics software to present participants with a web-based survey. Clicking on the link in clickUp redirected participants to the Qualtrics website, where they could complete the questionnaires. The data collected was then captured using Microsoft Excel.

Ethical considerations

The research complied with the ethics procedures according to the University of Pretoria's ethical guidelines. Ethical approval was obtained for the study from the Ethics Committee of the University of Pretoria Faculty of Humanities (ethical approval number: HUM014/1021). Informed consent was indicated by the student participants checking multiple boxes to indicate their understanding of the study, its voluntary and anonymous nature, as well as the use of the results for research purposes. Confidentiality was ensured by allocating each participant with a participant number. Participants were made aware that they could withdraw from the study at any point. In the unlikely event that students experienced distress during participation in the study, the contact details of organisations providing free psychological services were provided. Data was attained anonymously and stored in a password-protected folder, with access only to the authors of this article.

Data analysis

The data obtained from the survey was analysed using the SPSS Version 29©. Due to the exploratory nature of the study, descriptive and inferential statistics were utilised to

attain the objectives of the study. Inferential statistics in the form of a one-way between-groups multivariate analysis of variance (MANOVA) was conducted to determine if significant differences occurred between the groups with regards to their psychological wellbeing (measured by the PERMA Profiler and Anxiety and Depression subscales of the STPI). A one-way between-groups Analysis of Variance (ANOVA) with post-hoc tests was conducted to explore where significant differences occurred within the MANOVA. Given that multiple subscales were utilised within the study, a standard multiple regression was used to determine the relationship between the continuous dependent variable (PERMA) and the independent variables (State Anxiety, State Depression, Trait Anxiety, Trait Depression, and the gamer groups). Lastly, the two open-ended questions presented to the participants were analysed using a thematic analysis according to Braun and Clarke's (2006) six-phase framework. The analysis entailed becoming familiar with the participants' responses and identifying themes for the data. These themes were reviewed and refined with the second author and applied to the participants' responses.

QUANTITATIVE RESULTS

Descriptive statistics were used to obtain the demographic information of the participants, as well as to determine their level of wellbeing (measured by the PERMA-Profiler and the STPI) within their different groups (namely violent gamers, non-violent gamers and non-gamers). Table 1 displays the descriptive statistics for the PERMA-Profiler for each group as well as the full sample.

Table 1
Descriptive statistics for PERMA-Profiler on full and grouped sample

		N	Mean	Std. Deviation	Median (iqr)	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
P	Non-violent	58	6.17	± 1.97	6.33 (5.42, 7.92)	5.67	6.68	0.67	9.67
	Violent	36	5.87	± 1.72	5.67 (5.00, 7.00)	5.31	6.43	1.67	9.33
	Control	20	5.85	± 1.71	5.83 (5.25, 7.00)	5.10	6.60	1.00	9.33
	Total	114	6.02	± 1.84	6.00 (5.00, 7.00)	5.68	6.36	0.67	9.67
E	Non-violent	58	7.52	± 1.49	7.67 (6.67, 8.58)	7.14	7.91	3.67	9.67
	Violent	36	7.05	± 1.54	7.17 (5.58, 8.42)	6.54	7.55	4.00	9.00
	Control	20	6.17	± 1.67	6.17 (5.00, 7.42)	5.43	6.90	3.33	9.00
	Total	114	7.13	± 1.60	7.33 (6.08, 8.33)	6.84	7.43	3.33	9.67
R	Non-violent	58	6.75	± 2.40	7.50 (5.17, 8.67)	6.13	7.37	0.67	9.67
	Violent	36	6.70	± 2.24	6.83 (5.17, 8.42)	5.97	7.43	0.67	10.00
	Control	20	5.77	± 2.80	6.67 (4.58, 7.75)	4.54	6.99	0.00	9.67
	Total	114	6.56	± 2.43	7.17 (4.75, 8.67)	6.11	7.01	0.00	10.00
M	Non-violent	58	6.35	± 2.5	7.00 (4.42, 8.00)	5.71	6.99	0.00	10.00
	Violent	36	6.56	± 1.72	6.83 (5.58, 7.67)	6.00	7.13	1.33	10.00
	Control	20	6.60	± 1.83	7.00 (5.17, 8.08)	5.80	7.40	3.33	9.33
	Total	114	6.46	± 2.15	7.00 (5.00, 8.00)	6.07	6.86	0.00	10.00
A	Non-violent	58	6.42	± 1.77	6.67 (5.33, 7.58)	5.96	6.88	1.67	9.00
	Violent	36	6.77	± 1.37	7.00 (6.00, 7.75)	6.32	7.21	4.00	10.00
	Control	20	6.37	± 1.69	6.17 (4.92, 7.67)	5.63	7.11	3.67	9.33

PERMA	Total	114	6.52	± 1.63	6.67 (5.33, 7.67)	6.22	6.82	1.67	10.00
	Non-violent	58	6.66	± 1.76	6.94 (5.84, 8.11)	6.20	7.11	2.19	9.37
	Violent	36	6.57	± 1.24	6.56 (6.12, 7.56)	6.16	6.98	3.87	9.12
	Control	20	6.12	± 1.62	6.16 (5.47, 7.14)	5.41	6.83	2.56	8.94
N	Total	114	6.53	± 1.59	6.72 (5.66, 7.67)	6.24	6.83	2.19	9.37
	Non-violent	58	5.01	± 2.05	5.00 (3.67, 6.33)	4.48	5.54	1.33	9.67
	Violent	36	4.92	± 1.82	5.00 (3.92, 6.33)	4.32	5.51	0.33	8.33
	Control	20	5.78	± 2.09	6.33 (4.00, 7.33)	4.87	6.70	1.67	9.33
H	Total	114	5.12	± 2.00	5.00 (3.75, 6.58)	4.75	5.48	0.33	9.67
	Non-violent	58	6.16	± 1.88	6.33 (4.67, 7.33)	5.67	6.64	2.00	9.67
	Violent	36	6.04	± 1.92	6.33 (4.67, 7.42)	5.41	6.66	2.33	10.00
	Control	20	5.83	± 1.88	5.67 (4.33, 7.33)	5.01	6.66	2.67	9.33
Lon	Total	114	6.06	± 1.88	6.33 (4.67, 7.33)	5.72	6.41	2.00	10.00
	Non-violent	58	4.14	± 2.89	4.00 (2.00, 6.00)	3.40	4.88	0.00	9.00
	Violent	36	4.22	± 2.89	4.00 (2.00, 6.00)	3.25	5.19	0.00	10.00
	Control	20	5.70	± 2.60	6.00 (3.75, 7.25)	4.56	6.84	1.00	10.00
	Total	114	4.44	± 2.90	4.00 (2.00, 7.00)	3.91	4.97	0.00	10.00

Note. Descriptive statistics for PERMA-Profiler on full and grouped sample.

When divided into groups, the results of the overall PERMA component indicated that non-violent gamers attained the highest mean of 6.66, followed by the violent gamer group ($M = 6.57$).

The non-violent gaming group displayed the highest mean score for Positive Emotions ($M = 6.17$), followed by those who preferred violent digital games ($M = 5.87$). Table 1

shows that non-violent gamers had the highest mean score of Engagement ($M = 7.52$), followed by those who engaged in violent gameplay ($M = 7.05$). Non-gamers displayed the lowest mean score within the Relationships subscale ($M = 5.77$), while non-violent gamers attained a mean score of 6.75. As evident in Table 1, non-gamers attained the highest average of 6.60 in the Meaning component, while those who played violent games attained a score of 6.56. Within the Accomplishment scale, violent gamers attained mean of 6.77, followed by non-violent gamers ($M = 6.42$). Table 1 also indicates that non-gamers attained the highest averages for both Negative Emotions ($M = 5.78$) and Loneliness ($M = 5.70$) in comparison to the non-violent gamer group ($M = 5.01$ for Negative Emotion and $M = 4.14$ for Loneliness). Those who did not engage in gameplay attained the lowest mean score for Health ($M = 5.83$), followed by the violent gamer group ($M = 6.04$).

The descriptive statistics for State and Trait Anxiety and State and Trait Depression are presented in Table 2.

Table 2

Descriptive statistics for STPI on full and grouped sample

		N	Mean	Std. Deviation	Median (iqr)	95% Confidence Interval for Mean			
						Lower Bound	Upper Bound	Minimum	Maximum
SAnx	Non-violent	58	21.33	6.91	21.00 (16.00, 26.00)	19.51	23.14	10.00	36.00
	Violent	36	19.64	4.93	20.00 (16.00, 23.00)	17.97	21.31	11.00	30.00
	Control	20	24.90	5.27	24.50 (21.00, 29.50)	22.43	27.37	16.00	33.00

	Total	114	21.42	6.28	21.00 (16.25, 26.00)	20.25	22.59	10.00	36.00
SDep	Non-violent	58	19.95	7.08	19.50 (14.00, 24.00)	18.09	21.81	10.00	40.00
	Violent	36	19.42	5.07	18.00 (15.75, 24.00)	17.70	21.13	11.00	29.00
	Control	20	21.15	6.14	21.00 (17.00, 25.00)	18.27	24.02	10.00	35.00
	Total	114	19.99	6.32	19.00 (15.00, 24.00)	18.82	21.16	10.00	40.00
TAnx	Non-violent	58	24.98	6.79	24.50 (19.50, 30.00)	24.00	26.77	11.00	40.00
	Violent	36	25.50	7.03	25.00 (20.00, 30.50)	23.12	27.88	11.00	38.00
	Control	20	26.90	7.00	28.50 (22.75, 33.00)	23.62	30.18	13.00	36.00
	Total	114	25.48	6.87	26.00 (20.25, 31.00)	24.21	26.76	11.00	40.00
TDep	Non-violent	58	22.19	7.49	21.50 (16.00, 26.75)	20.22	24.16	10.00	39.00
	Violent	36	23.17	6.61	22.00 (17.75, 28.25)	20.93	25.40	11.00	35.00
	Control	20	25.75	6.89	26.50 (20.50, 31.25)	22.52	28.97	14.00	38.00
	Total	114	23.12	7.18	22.00 (17.00, 29.00)	21.79	24.45	10.00	39.00

Note. Descriptive statistics for STPI on full and grouped sample.

Table 2 shows that non-gamers displayed the highest mean scores for depression and anxiety ($M = 24.90$ for State Anxiety, $M = 21.15$ for State Depression, $M = 26.90$ for Trait Anxiety and $M = 25.75$ for Trait Depression). Within the State subscales, violent gamers displayed the lowest mean scores of 19.64 and 19.42 for State Anxiety and Depression respectively. As evident in Table 2, the non-violent game group attained the lowest mean score of 24.98 for Trait Anxiety and 22.19 for Trait Depression.

With regards to the first objective, a one-way between-groups multivariate analysis of variance (MANOVA) was conducted to determine if significant differences existed between the three groups (violent gamers, non-violent gamers, and non-gamers) on the components measured by the PERMA-Profilier (Positive Emotion, Engagement, Positive

Relationships, Meaning and Accomplishment. This MANOVA failed to produce any significant results. This outcome was expected however, as when comparing the means of each group obtained on the components of the PERMA-Profiler, no mathematical differences were evident. A second MANOVA was then conducted to investigate if significant differences existed between the three groups (violent gamers, non-violent gamers, and non-gamers) on the State and Trait Anxiety and Depression subscales of the STPI as well as the overall PERMA score. The latter was included because it did not form part of the first MANOVA.

Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity, with no serious violations noted. Following this, the interaction effect was tested using the multivariate tests of significance. The test was used to determine if there were statistically significant differences between the groups with regards to the independent variables. The results obtained from the Wilks' Lambda indicated that there was a significant difference between the independent variables, $F(10, 214) = 2.57$, $p = .006$, Wilks' Lambda = .797, partial eta squared = .107 (See Table 3).

Table 3

Multivariate Tests

Multivariate Tests ^a							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.988	1817.521 ^b	5.000	107.000	<.001	.988
	Wilks' Lambda	.012	1817.521 ^b	5.000	107.000	<.001	.988

	Hotelling's Trace	84.931	1817.521 ^b	5.000	107.000	<.001	.988
	Roy's Largest Root	84.931	1817.521 ^b	5.000	107.000	<.001	.988
Group	Pillai's Trace	.211	2.547	10.000	216.000	.006	.105
	Wilks' Lambda	.797	2.572 ^b	10.000	214.000	.006	.107
	Hotelling's Trace	.245	2.596	10.000	212.000	.005	.109
	Roy's Largest Root	.194	4.188 ^c	5.000	108.000	.002	.162

a. Design: Intercept + Group

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Note. Multivariate Tests.

Due to the significant result obtained within the multivariate tests of significance, the Tests of Between-Subjects Effects was conducted. Due to the number of separate analyses conducted on the variables, a Bonferroni adjustment was made. This entails setting a higher alpha level to decrease the chance of a Type 1 error occurring (Pallant, 2020). The adjusted alpha level was set to .01. The results of the Tests of Between-Subjects Effects are displayed in Table 4.

Table 4

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	PERMA	4.345 ^a	2	2.173	.857	.427	.015
	SAnx	356.908 ^b	2	178.454	4.833	.010	.080
	SDep	38.846 ^c	2	19.423	.482	.619	.009
	TAnx	54.682 ^d	2	27.341	.574	.565	.010

	TDep	188.617 ^e	2	94.308	1.859	.161	.032
Intercept	PERMA	3937.794	1	3937.794	1554.076	<.001	.933
	SAnx	45658.083	1	45658.083	1236.446	<.001	.918
	SDep	38540.210	1	38540.210	956.152	<.001	.896
	TAnx	63019.832	1	63019.832	1322.899	<.001	.923
	TDep	53211.470	1	53211.470	1048.797	<.001	.904
Group	PERMA	4.345	2	2.173	.857	.427	.015
	SAnx	356.908	2	178.454	4.833	.010	.080
	SDep	38.846	2	19.423	.482	.619	.009
	TAnx	54.682	2	27.341	.574	.565	.010
	TDep	188.617	2	94.308	1.859	.161	.032
Error	PERMA	281.257	111	2.534			
	SAnx	4098.881	111	36.927			
	SDep	4474.145	111	40.308			
	TAnx	5287.783	111	47.638			
	TDep	5631.664	111	50.736			
Total	PERMA	5152.609	114				
	SAnx	56766.000	114				
	SDep	50073.000	114				
	TAnx	79369.000	114				
	TDep	66772.000	114				
Corrected Total	PERMA	285.603	113				
	SAnx	4455.789	113				

SDep	4512.991	113
TAnx	5342.465	113
TDep	5820.281	113

a. R Squared = .015 (Adjusted R Squared = -.003)

b. R Squared = .080 (Adjusted R Squared = .064)

c. R Squared = .009 (Adjusted R Squared = -.009)

d. R Squared = .010 (Adjusted R Squared = -.008)

e. R Squared = .032 (Adjusted R Squared = .015)

Note. Tests of Between-Subjects Effects.

The results indicated that there was a statistically significant difference between the groups on the State Anxiety scores, $F(2, 111) = 4.83, p = .01$, partial eta squared = .080. Using the criteria of Cohen's d , the partial eta squared indicated a moderate effect size (Pallant, 2020). Further exploration of the mean scores in Table 5 within the State Anxiety subscale indicated that the non-gaming group attained the highest mean score of 24.90, followed by the non-violent gamer group ($M = 21.33$).

Table 5

Estimated Marginal Means

Dependent Variable	Group	Group			
		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
PERMA	Non-violent	6.66	.209	6.241	7.069
	Violent	6.57	.265	6.044	7.095
	Control	6.12	.356	5.413	6.824
SAnx	Non-violent	21.33	.798	19.746	22.909
	Violent	19.64	1.013	17.632	21.646

SDep	Control	24.90	1.359	22.207	27.593
	Non-violent	19.95	.834	18.296	21.600
	Violent	19.42	1.058	17.320	21.513
TAnx	Control	21.15	1.420	18.337	23.963
	Non-violent	24.98	.906	23.187	26.779
	Violent	25.50	1.150	23.221	27.779
TDep	Control	26.90	1.543	23.842	29.958
	Non-violent	22.19	.935	20.336	24.043
	Violent	23.17	1.187	20.814	25.519
	Control	25.75	1.593	22.594	28.906

Note. Estimated Marginal Means.

A follow-up analysis, in the form of a One-Way between-groups Analysis of Variance (ANOVA) with post-hoc tests, were conducted to determine where the significant differences occurred. However, before the ANOVA was conducted, a Test of Homogeneity of Variances was conducted. The results indicated that the Levene's test was not significant as it equalled .047. The assumption of the homogeneity of variance was therefore violated. As a result, the Robust Tests of Equality of Means were consulted instead. The results are shown in Table 6.

Table 6

Robust Tests of Equality of Means

SAnx				
	Statistic ^a	df1	df2	Sig.
Welch	6.620	2	54.163	.003
Brown-Forsythe	5.665	2	87.848	.005

a. Asymptotically F distributed.

Note. Robust Tests of Equality of Means.

Since both the Welch ($p = .003$) and the Brown-Forsythe ($p = .005$) tests indicated significant results ($p < .05$), the assumption was made that significant differences occurred between the three groups with regards to State Anxiety. This meant that the ANOVA could be conducted. The results are presented in Table 7.

Table 7

ANOVA

SAnx					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	356.908	2	178.454	4.833	.010
Within Groups	4098.881	111	36.927		
Total	4455.789	113			

Note. ANOVA.

The results from the ANOVA indicated that there was a statistically significant difference at the $p < .05$ level between the groups within the State anxiety subscale, $F(2, 111) = 4,833$, $p < .010$. The difference in mean scores between the groups was moderate, as the effect size (which was calculated using eta squared) was .080. A post-hoc comparison was conducted using the Games-Howell test. The test was selected since the Levene's test did not yield a significant result, meaning that the assumption of the homogeneity of variance could not be assumed. The results are indicated in Table 8.

Table 8

Post-hoc comparison - Games-Howell Test

Multiple Comparisons						
Dependent Variable: SAnx						
Games-Howell						
(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Non-violent	Violent	1.68870	1.22426	.356	-1.2288	4.6062
	Control	-3.57241	1.48705	.053	-7.1818	.0370
Violent	Non-violent	-1.68870	1.22426	.356	-4.6062	1.2288
	Control	-5.26111*	1.43714	.002	-8.7690	-1.7532
Control	Non-violent	3.57241	1.48705	.053	-.0370	7.1818
	Violent	5.26111*	1.43714	.002	1.7532	8.7690

*. The mean difference is significant at the 0.05 level.

Note. Post-hoc comparison - Games-Howell Test.

The Games-Howell post-hoc test indicated that the mean score for the control group ($M = 24.90$, $SD = 5.27$) differed significantly from the violent gamer group ($M = 19.64$, $SD = 4.93$, $p = .002$). Further scrutiny of Table 8 reveals that the non-violent gamer group ($M = 21.33$, $SD = 6.91$) approached a significance ($p = .053$) when compared to the control group ($M = 24.90$, $SD = 5.27$). The lack of a true significant result could be attributed to the violation of Homogeneity of Variances as indicated by the Levene's Test. Revisiting the results above we can deduce that, to a certain degree, there were significant differences in students' experiences of Anxiety, when comparing those who engaged in violent gaming with those who engaged in non-violent gaming or no gaming at all.

To attain the second objective, a standard multiple regression analysis was conducted. The overall score on the PERMA-Profilier was selected as the dependent variable. The independent variables consisted of State Anxiety, State Depression, Trait Anxiety, Trait Depression, and the gamer groups. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity had occurred. The ANOVA conducted as part of the regression analysis indicated that the model yielded significant results (see Table 9).

Table 9

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	152.888	5	30.578	24.883	<.001 ^b
	Residual	132.715	108	1.229		
	Total	285.603	113			

a. Dependent Variable: PERMA

b. Predictors: (Constant), Group, SDep, TAnx, SAnx, TDep

Note. ANOVA.

A summary of the model is provided in Table 10.

Table 10

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732 ^a	.535	.514	1.10853

a. Predictors: (Constant), Group, SDep, TAnx, SAnx, TDep

Note. Model summary.

The results indicated that the independent variables used in the model explained 53.5% of the variance in the dependent variable. The independent variables responsible for the variance are indicated in Table 11.

Table 11

Coefficients^a

Model		Unstandardized		Standardized		95% Confidence Interval for B				Collinearity Statistics			
		Coefficients		Coefficients		Lower Bound		Upper Bound		Zero-order	Partial	Tolerance	VIF
		B	Std. Error	Beta	T	Sig.							
1	(Constant)	10.191	.462		22.071	<.001	9.276	11.106					
	SAnx	.013	.028	.05	.470	.639	-.042	.069	-.491	.045	.031	.352	2.841
	SDep	-.133	.035	-.53	-3.785	<.001	-.202	-.063	-.707	-.342	-.248	.221	4.520
	TAnx	.028	.028	.12	.973	.333	-.029	.084	-.490	.093	.064	.286	3.498
	TDep	-.079	.034	-.36	-2.356	.020	-.146	-.013	-.673	-.221	-.155	.186	5.366
	Group	-.092	.144	-.04	-.641	.523	-.378	.193	-.112	-.062	-.042	.905	1.105

a. Dependent Variable: PERMA

The results of the regression analysis indicated that State Depression (beta = $-.53$, $p < .05$) followed by Trait Depression (beta = $-.36$, $p < .05$) were the only significant predictors of wellbeing.

QUALITATIVE RESULTS

The two open-ended questions presented on the biographical questionnaire were analysed using open coding. This meant that the participants' answers were interpreted and a phrase that encapsulated the meaning of the response was recorded. Following this, a thematic pattern was obtained and used to find common occurrences of the instances within the participants' responses. Participant responses were then tabulated according to their group membership. Tables 12 and 13 display the participant responses for both questions. The results for question 1 (How well do you feel you have adapted to isolation and social distancing? Please elaborate on your answer or provide examples) indicated that 28.5% of non-gamers had difficulty with social distancing, while 22% of those who engaged in non-violent gaming stated that they coped well with the social distancing as they had utilised online platforms. 24.3% of the violent gamer group stated that they adjusted to social distancing well since they did not experience much social change. This indicated that prior to the state-enforced social distancing, those who engaged in violent digital games already had a well-established online presence, making the transition to state-imposed social distancing easier to manage.

Results for question 2 (Do you feel that gaming has helped you during the social isolation period brought on by the pandemic, and if so, how?) indicated that the majority of participants who engaged in non-violent gaming (66.1%) stated that they felt digital gaming had helped during the prescribed social distancing period, specifically by

allowing them to stay socially connected and mentally engaged (35.6%), stay entertained (20.3%), and distress (10.2%). Similarly, a majority of violent gamers (81%) indicated that they felt gaming had helped them during the lockdown period, specifically by allowing them to stay socially connected and mentally engaged (67.5%) and distress (13.5%).

Table 12

Frequency table of participant responses for question 1

How well do you feel you have adapted to isolation and social distancing? Please elaborate on your answer or provide examples.

Group			Frequency	Percent	Valid Percent	Cumulative Percent
-	Valid	Not well, became better with time	1	4.8	5.3	5.3
		Not well	1	4.8	5.3	10.5
		Well; prefer to maintain social distancing	1	4.8	5.3	15.8
		Not well; mental health affected	1	4.8	5.3	21.1
		Initially difficult however adapted well	1	4.8	5.3	26.3
		Adapted well, now prefer social distancing	1	4.8	5.3	31.6
		Well	4	19.0	21.1	52.6
		Well, but affected social skills	1	4.8	5.3	57.9
		Not well, difficulty with social distancing	4	19.0	21.1	78.9
		Well, not much change socially	2	9.5	10.5	89.5
		Well but difficulty with social distancing	2	9.5	10.5	100.0
		Total	19	90.5	100.0	
		Missing	System	2	9.5	
Total		21	100,0			
N	Valid	Not well, became better with time	2	3.4	3.5	3.5
		Well, used online platforms for work and communication	13	22.0	22.8	26.3
		Struggled initially, became used to online platforms, are well now	1	1.7	1.8	28.1

		Not well	1	1.7	1.8	29.8
		Well, more quality time for self	3	5.1	5.3	35.1
		Got used to social distancing; now less outgoing	2	3.4	3.5	38.6
		Well; prefer to maintain social distancing	1	1.7	1.8	40.4
		Not well; mental health affected	5	8.5	8.8	49.1
		Adapted well, now prefer social distancing	1	1.7	1.8	50.9
		Well	12	20.3	21.1	71.9
		Well when isolating with family; not well when alone	2	3.4	3.5	75.4
		Well, but affected social skills	2	3.4	3.5	78.9
		Not well, difficulty with social distancing	3	5.1	5.3	84.2
		Well, not much change socially	6	10.2	10.5	94.7
		Well, isolated with family	3	5.1	5.3	100.0
		Total	57	96.6	100.0	
	Missing	System	2	3.4		
	Total		59	100,0		
V	Valid	Not well, became better with time	5	13.5	14.7	14.7
		Well, used online platforms for work and communication	2	5.4	5.9	20.6
		Struggled initially, became use to online platforms, are well now	1	2.7	2.9	23.5
		Well, more quality time for self	1	2.7	2.9	26.5
		Got used to social distancing; now less outgoing	1	2.7	2.9	29.4
		Not well; mental health affected	1	2.7	2.9	32.4
		Initially difficult however adapted well	1	2.7	2.9	35.3
		Well	4	10.8	11.8	47.1
		Not well, difficulty with social distancing	4	10.8	11.8	58.8
		Well, not much change socially	9	24.3	26.5	85.3
		Well but difficulty with social distancing	3	8.1	8.8	94.1
		Well, isolated with family	2	5.4	5.9	100.0
		Total	34	91.9	100.0	
	Missing	System	3	8.1		
	Total		37	100,0		

Table 13
Frequency table of participant responses for question 2

Do you feel that gaming has helped you during the social isolation period brought on by the pandemic, and if so, how?

Group			Frequency	Percent	Valid Percent	Cumulative Percent
-	Valid	Helped, stay mentally engaged	1	4.8	5.0	5.0
		Helped, stay socially connected	1	4.8	5.0	10.0
		Helped, stay entertained	1	4.8	5.0	15.0
		Do not game	13	61.9	65.0	80.0
		Didn't help	3	14.3	15.0	95.0
		Helped, destress and socially connected	1	4.8	5.0	100.0
		Total	20	95.2	100.0	
	Missing	System	1	4.8		
	Total		21	100.0		
N	Valid	Helped, stay mentally engaged	4	6.8	6.8	6.8
		Helped, stay socially connected	16	27.1	27.1	33.9
		Helped, stay entertained	12	20.3	20.3	54.2
		Helped, destress	6	10.2	10.2	64.4
		Helped, mentally engaged and social connection	5	8.5	8.5	72.9
		Do not game	1	1.7	1.7	74.6
		Didn't help, but stayed mentally engaged	2	3.4	3.4	78.0
		Didn't help, but stayed socially connected	1	1.7	1.7	79.7
		Didn't help, wasted time	1	1.7	1.7	81.4
		Helped, social skills	1	1.7	1.7	83.1
		Didn't help	4	6.8	6.8	89.8
		Helped, destress and socially connected	4	6.8	6.8	96.6
		Helped	2	3.4	3.4	100.0

		Total	59	100.0	100.0	
V	Valid	Helped, stay mentally engaged	9	24.3	25.0	25.0
		Helped, stay socially connected	10	27.0	27.8	52.8
		Helped, stay entertained	2	5.4	5.6	58.3
		Helped, distress	5	13.5	13.9	72.2
		Helped, mentally engaged and social connection	6	16.2	16.7	88.9
		Do not game	1	2.7	2.8	91.7
		Didn't help	1	2.7	2.8	94.4
		Helped	1	2.7	2.8	97.2
		Helped, more time to game with lockdown	1	2.7	2.8	100.0
		Total	36	97.3	100.0	
	Missing	System	1	2.7		
	Total		37	100.0		

DISCUSSION

The average sample age ranged from 18 to 57, with the majority of the sample identifying as female (57%). The sample was grouped into three categories based on their gaming preferences, which resulted in 31.6% assigned to the violent gaming group, 50.9% to the non-violent gaming group and 17.5% assigned to the non-gamer group.

Table 3 indicated that the prevalence of Positive Emotions, Engagement, Positive Relationships and Accomplishment, as well as the additional scale of Health were highest amongst those who engaged in gaming, whether violent or non-violent. These results suggest that both groups of gamers experienced higher overall psychological wellbeing when compared to non-gamers. This result is consistent with multiple studies indicating that engagement in digital gaming enhances wellbeing (Granic et al., 2014;

Halbrook et al., 2019; Reinecke, 2009). Table 3 also showed that Negative Emotions and Loneliness were most prevalent amongst non-gamers. Keeping this in mind, the qualitative results indicated that non-gamers had difficulty with social distancing and loneliness, therefore it is assumed that engaging in gameplay facilitates social interactions and enhances feelings of social connection (Depping et al., 2018; Marston & Kowert, 2020; Türkay et al., 2023).

Given that feelings of loneliness and social isolation have been linked to depressive symptoms (Kowal et al., 2021), it stands to reason State Anxiety, State Depression, Trait Anxiety and Trait Depression were most prevalent amongst non-gamers. The significant difference between non-gamers and the violent gaming group on their State Anxiety scores (Table 5) confirms this notion. These findings correspond with research indicating that gameplay leads to decreased symptoms of anxiety and depression (Fish et al., 2014; Kowal et al., 2021; Russoniello et al., 2013; Villani et al., 2018). In a similar vein, Pine et al. (2020) noted that individuals experienced a reduction in symptoms of anxiety and depression after 30 minutes of gameplay daily over the course of a month. The results indicating that State and Trait Depression were the best predictors of psychological wellbeing (Table 11) add weight to the argument that engaging in gameplay would result in decreased symptoms of anxiety and depression. This confirms Spielberger and Reheiser's (2009) argument that psychological wellbeing is inversely correlated with anxiety and depression.

In light of the discussion above and the fact that the results of the MANOVA indicated a significant difference between non-violent gamers and non-gamers on State Anxiety (Table 5), one could reason that both violent and non-violent games contribute to

psychological wellbeing. As such, a systematic review of 13 studies exploring the connection between casual or non-violent gaming and distressed mood indicated that 12 of the 13 studies reported improvement in mood after playing a casual or non-violent game (Pine et al., 2020). While this, along with the results of this study, indicate the potential therapeutic contributions of gaming on emotional distress, it is unclear if these therapeutic effects could be maintained long-term. Russoniello et al. (2013) found that consistent engagement in non-violent gameplay for a month led to a reduction in symptoms of depression. Similarly, Fish et al. (2014) found a decrease in Trait Anxiety after a month of casual gameplay. The current study did not explore how long the participants had engaged in gaming, yet it could be hypothesised that the long-term effects of gaming have promising implications as an alternative or additional intervention to improve psychological wellbeing. Research conducted by Caldwell (2005) found that activities that are deemed important or valuable provide coping and wellbeing benefits while Morse et al. (2021) noted that engaging in leisure activities, such as gaming, resulted in increased levels of psychological wellbeing.

This study provides important implications for future exploration of digital gaming and wellbeing. It emphasises the detrimental effects of the COVID-19 pandemic on students' anxiety and depression levels, which could set the trend for the study of any future pandemics. It also highlighted that those who engaged in digital gaming during the pandemic experienced higher levels of psychological wellbeing, which challenges the opinion that digital gaming is exclusively detrimental to one's emotional state. Digital gaming could therefore be explored as a possible aid to psychological treatment, especially considering the lengthy waiting periods that students experience within their university counselling centres in the South African context.

Limitations

The first limitation relates to group size. As a result of the unequal group sizes used in the present study, caution should be exercised when interpreting the results of the study. Future research should therefore aim to obtain equal group representativeness when conducting a similar study. Secondly, since the University of Pretoria served as the population framework for the study, the results obtained cannot necessarily be generalised to other populations. Because of this, it is recommended that researchers attempt to obtain a sample representative of the university population should more research be conducted on the topic. Finally, the study did not determine how long participants engaged in gaming. The amount of time gaming might have a significant effect on the increase of psychological wellbeing while at the same time, decreases the levels of anxiety and depression. Future research should therefore include a question in the biographical questionnaire to determine the amount of time participants are engaged in gaming.

CONCLUSION

The study aimed to explore the impact of engaging in gameplay on psychological wellbeing following the COVID-19 pandemic. The findings indicated that those who engaged in digital gaming, regardless of the category of game, consistently attained higher levels of psychological wellbeing when compared to those who did not engage in gameplay. While significant differences were not observed between the non-violent and violent gaming groups with regards to psychological wellbeing, significant differences were observed between gamers and non-gamers in terms of their anxiety and depression levels, as well as their overall wellbeing.

Declaration of conflicting interests

The authors declare no conflicts of interest regarding the research, authorship or publication of this article.

Funding

The authors received no financial support for the research, authorship or publication of this article.

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APPENDICES

Appendix A – Participant Information sheet

DIGITAL GAMING AND STUDENTS' PSYCHOLOGICAL WELLBEING DURING THE COVID-19 PANDEMIC: AN EXPLORATORY STUDY

Hello, my name is Melissa Frank, and I am a Master's student in Psychology at the University of Pretoria. Welcome and thank you for taking an interest in this research study! Before deciding to become a participant, you may have questions. Below is important information regarding the research study, including what the study entails and what your role will be. Should you have any further questions, please do not hesitate to contact me.

WHAT IS THE PURPOSE OF THE STUDY?

The purpose of the study is to explore the relationship that engaging in digital gaming has on psychological wellbeing, particularly during the COVID-19 pandemic, and within a student sample.

WHY HAVE I BEEN INVITED TO PARTICIPATE?

You have been invited to participate in the study because you are a student at the University of Pretoria. While the title includes “digital gaming”, you are also invited to participate if you do not play any games, as you will contribute important data.

WHAT DOES PARTICIPATION IN THIS STUDY ENTAIL?

Once you have consented to your participation, you will be expected to complete an online questionnaire. A biographical questionnaire will require your basic information (your gender and age). You will then be asked to indicate which games you are most likely to play and how much time you spend gaming. Finally, you will be asked questions regarding your experience of the COVID-19 pandemic. This will be followed by questions exploring aspects of your psychological wellbeing.

CAN I WITHDRAW FROM THE STUDY ONCE I HAVE AGREED TO PARTICIPATE?

Participation in this study is completely voluntary. You are free to withdraw at any time if for any reason you decide you would no longer like to be part of the study. You will not be asked to provide a reason and will not experience any negative consequences due to your withdrawal.

WILL MY PERSONAL INFORMATION REMAIN CONFIDENTIAL?

Your anonymity will be maintained owing to the use of a numbering system for each participant. In turn, the results of the questionnaires will remain anonymous to both the

researchers and the public, should the results be published. All data collected within the study will not be disclosed to any unauthorised persons.

ARE THERE BENEFITS TO PARTICIPATING IN THE STUDY?

While there are not direct benefits or compensation to participation in the study, the researchers hope that the findings of the study will shed some light on the influence of violent digital games on psychological wellbeing, particularly in a South African context.

ARE THERE RISKS ASSOCIATED WITH PARTICIPATION IN THE STUDY?

The risk of harm is minimal. However, should you experience psychological distress, please contact the South African Depression and Anxiety Group (SADAG), who offer 24-hour assistance and can be contacted through the UP careline: 0800 747 747. Alternatively, you can contact Life Line: 012 804 3619.

HOW WILL MY DATA BE SECURED?

All data from the study will be stored on a password protected folder in the Department of Psychology at University of Pretoria, for a minimum of 15 years.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

The study has received ethical approval from the Faculty of Humanities Ethical Committee at the University of Pretoria. The Ethical approval number is HUM014/1021. Should you request it, a copy of the letter will be sent to you.

I HAVE A CONCERN/COMPLAINT REGARDING THE STUDY. WHO CAN I CONTACT?

Any questions, queries or complaints can be addressed to the researcher of the study. If for any reason you do not feel comfortable contacting me, please contact my supervisor. Both contact details have been included below.

Thank you in advance for your time and effort in participating in this study.

RESEARCHER

Name: Melissa Frank

Email address: melissasimonefrank@gmail.com

SUPERVISOR

Name: Prof. Nicoleen Coetzee

Email address: nicoleen.coetzee@up.ac.za

Appendix B – Written informed consent form

DIGITAL GAMING AND STUDENTS' PSYCHOLOGICAL WELLBEING DURING THE COVID-19 PANDEMIC: AN EXPLORATORY STUDY

WRITTEN CONSENT TO PARTICIPATE IN THIS STUDY

I confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits, and anticipated inconvenience of participation.

STATEMENT	AGREE	DISAGREE
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without any consequences or penalties.		
I understand that information collected during the study will not be linked to my identity and I give permission to the researchers of this study to access the information.		
I understand that this study has been reviewed by, and received ethics clearance from Research Ethics		

<p>Committee Faculty of Humanities of the University of Pretoria.</p>		
<p>I understand who will have access to personal information and how the information will be stored in a password-protected folder within the department of psychology for a minimum of 15 years. I also have a clear understanding that I will not be linked to the information in any way.</p>		
<p>I give consent that data gathered may be used for dissertation, article publication, conference presentations and writing policy briefs.</p>		
<p>I understand how to raise a concern or make a complaint.</p>		
<p>I give permission to be quoted directly in the research publication whilst remaining anonymous.</p>		
<p>I give permission that the data can be used for future research.</p>		

I have sufficient opportunity to ask questions and I agree to take part in the above study.		
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Name of Participant

Date

Signature

Appendix C – Biographical questionnaire

Thank you for taking the time to complete this questionnaire. Please note that all information is strictly confidential and will only be reported on when collated.

Please answer the following questions in the spaces provided.

Gender: _____

Age: _____

1. If you play digital games, which of the following games are you most likely to play?

Please select three (3) from the list.

<input type="checkbox"/> DOOM Eternal	<input type="checkbox"/> F1 2021	<input type="checkbox"/> The Elder Scrolls V: Skyrim
<input type="checkbox"/> Sniper Elite	<input type="checkbox"/> Hades	<input type="checkbox"/> Assassins Creed Valhalla
<input type="checkbox"/> Fallout 4	<input type="checkbox"/> The Sims	<input type="checkbox"/> Grand Theft Auto V
<input type="checkbox"/> The Witcher 3	<input type="checkbox"/> War Thunder	<input type="checkbox"/> Resident Evil 2 Remake

<input type="checkbox"/> Wolfenstein II: The New Colossus	<input type="checkbox"/> DOTA 2	<input type="checkbox"/> Ratchet and Clank: Rift Apart
<input type="checkbox"/> Yakuza 0	<input type="checkbox"/> Mortal Kombat 11	<input type="checkbox"/> Rocket League
<input type="checkbox"/> Crash Bandicoot	<input type="checkbox"/> Stardew Valley	<input type="checkbox"/> Animal crossing
<input type="checkbox"/> Gran Turismo Sport	<input type="checkbox"/> Angry Birds	<input type="checkbox"/> Among us
<input type="checkbox"/> Rock Band/Guitar Hero	<input type="checkbox"/> Hitman	<input type="checkbox"/> Street fighter
<input type="checkbox"/> Counter Strike Global Offensive	<input type="checkbox"/> The last of us	<input type="checkbox"/> Candy crush
<input type="checkbox"/> Apex Legends	<input type="checkbox"/> Overcooked	<input type="checkbox"/> Genshin Impact
<input type="checkbox"/> Call of Duty	<input type="checkbox"/> Peggle	<input type="checkbox"/> Pokémon go
<input type="checkbox"/> The Walking Dead	<input type="checkbox"/> Minecraft	<input type="checkbox"/> Fortnite
<input type="checkbox"/> Mario Kart	<input type="checkbox"/> FIFA	<input type="checkbox"/> Clash of clans/Clash royale
<input type="checkbox"/> PUBG	<input type="checkbox"/> Life is strange	<input type="checkbox"/> Dragon Ball FighterZ

2. Please answer the following questions related to the COVID-19 pandemic in the space provided.

2.1. How well do you feel you have adapted to isolation and social distancing? Please elaborate on your answer or provide examples.

2.3. Do you feel that gaming has helped you during the social isolation period brought on by the pandemic, and if so, how?
