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The relationship between spiritual well-being and game addiction of youths: a cross-sectional study

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The relationship between spiritual well-being and game addiction of youths: a cross-sectional study

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ABSTRACT

This study explores the correlation between spiritual well-being and game addiction among Chinese youths in Hong Kong. To examine such a relationship, cross-sectional data (N = 401) were taken from a sample of 209 Chinese university students in 2021 and 192 Chinese university students in 2022. They are between 18–21 years old. The participants answered the Spiritual Well-being Questionnaire to gauge their spiritual well-being in the personal-communal, environmental and transcendental domains. Then, the respondents accomplished the Game Addiction Scale 21 to assess the extent of their gaming use in seven dimensions, namely, salience, tolerance, mood modification, relapse, withdrawal, conflict and problems of game addiction. The study revealed a negative correlation between the three domains of spiritual well-being and the seven dimensions of game addiction. Moreover, multiple regression analysis showed that the personal-communal and environmental domains of spiritual well-being accounted for 59.0% and 10% of the variance in students' overall game addiction, respectively. The personal-communal domain was found to be the strongest predictor of game addiction. As an effective preventive strategy and treatment, the spiritual well-being and health of adolescents should be enhanced.

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KEYWORDS
Spiritual well-being; game addiction; spirituality; youth

Computer and online games have become a popular source of entertainment and leisure for children and teenagers worldwide. Studies have shown that a proper amount of playing such games is beneficial and constructive for youths (Blumberg et al. 2013). However, young individuals are also at risk of game addiction when their game time is left unrestrained. For instance, Liu and Potenza (2007) found that excessive participation in massively multiplayer online role-playing games can lead to addiction.

Game addiction has become a pressing societal issue globally, and children and adolescents are under threat (Ferguson, Coulson, and Barnett 2011). Such addiction may be linked to one's character and social interactions (Festl, Scharkow, and Quandt 2013) and can even lead to psychological illnesses (Griffiths and Meredith 2009).

In the past decades, researchers have investigated how game addiction affects children and adolescents, revealing findings on shortened attention spans, barriers to social

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development, apathy and detachment. Moreover, scholars have found that excessive gaming can lead to social, family (Wan and Chiou 2006) and physical (Shek and Yu 2016) issues. Meanwhile, a small number of researchers have endeavoured to determine whether certain traits, such as spiritual fragility, hyperactivity, inattentiveness and low self-confidence, increase the likelihood of gaming addiction among adolescents.

Theoretical framework

Previous studies have demonstrated that the well-being and game addiction of youths are closely associated with each other (Kowert et al. 2015; Lemmens, Valkenburg, and Peter 2011; Molinos 2016). Spiritual well-being is a deeply personal dimension of well-being that manifests in different ways and contents (Bartlett et al. 2003). The hypothesised conceptual model of the study is shown in Figure 1. In this model, it is suggested that spiritual well-being (including specific domains) is negatively associated with game addiction (including particular dimensions). Also, in this model, it is proposed that spiritual well-being is predictive of game addiction based on the findings of studies (e.g. Wang et al. 2014; Olumide et al. 2014) which indicated that well-being was found to be a good predictor of addiction.

Research on the link between spirituality and game addiction among youths remains lacking, and even fewer studies on the subject matter have been conducted within the Chinese context.

The current research enriches the related literature by investigating the correlation between spiritual well-being and game addiction. It further explores how specific domains of spiritual well-being predict game addiction. The current undertaking takes its cue from previous empirical studies to expand the research on youths within the Chinese cultural context. This investigation seeks to demonstrate the relationship between spiritual well-being and game addiction using existing empirical research. Hence, this work addresses the following research questions:

Research Question 1: Is spiritual well-being associated with game addiction among Chinese youths?

Research Question 2: If so, can one's spiritual well-being predict game addiction?

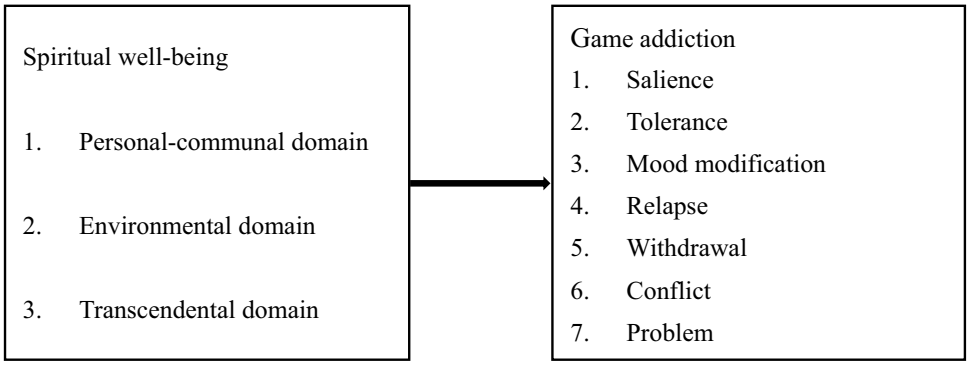

Figure 1. The hypothesized conceptual model.

Spirituality, spiritual health and spiritual well-being

Spirituality pertains to one's search for meaning and value in human dynamics and inner life. These dynamics include one's journey towards finding the ultimate meaning of life, understanding one's purpose, achieving transcendence and sustaining relationships with the self, family, society, nature and the divine (Fisher 2021). Generally, people have used the terms spirituality and religiosity interchangeably (McSherry, Cash, and Ross 2004). However, although spirituality is linked to religion, they are two separate concepts (Zimmer et al. 2016).

Spirituality is not exclusively a component of religion. Although researchers have discussed the link between the two concepts (Ammerman 2013), they have not definitively established the difference between the two. Nevertheless, those who do not adhere to any religion still refer to belief systems that seek life's meaning and purpose (Büssing 2010), which indicates that spirituality is a more comprehensive idea than religiosity.

According to the World Health Organisation (WHO), spirituality is the fourth dimension of health, after physical, mental, and social dimensions (Sepúlveda et al. 2002), thus being essential to one's overall well-being (Eberst 1984). Spiritual health highlights the role of inner harmony in connecting the self with others, nature and a higher being, which results in the integration of the body, mind and spirit (Fisher 2021).

Spiritual well-being pertains to the spiritual aspect of one's quality of life, which subsequently permeates to other domains of health, such as the physical, psychological and social dimensions (Fisher 2010). As such, one's spiritual condition is correlated to happiness (Alvarez et al. 2016). One's expression of his or her spirituality is an indicator of spiritual well-being, which can be further divided into the personal, communal, environmental and transcendental dimensions (Fisher 1998). Fisher (1998) formulated the Spiritual Health and Life-orientation Measure (SHALOM), which initially consisted of 20 items distributed into five items for each of the four dimensions of spiritual well-being. Each item required two answers: one response was the participants' ideal answer, while the second answer was based on their experiences. In doing so, the conductors of the experiment would have a comparison between the ideal and experiential values of each item. Then, the information on people's experiences formed the Spiritual Well-being Questionnaire (SWBQ). Fisher (2013) later revised the model by adding the deceased, a higher entity and the higher self. These additions aimed to expand SHALOM to other worldviews by also extending the range of spirituality from belief in God and non-belief.

Researchers have since used SHALOM in various contexts worldwide, with published works in Spanish (Muñoz-García and Aviles-Herrera 2014), Brazilian Portuguese (Nunes et al. 2018), Hebrew (Elhai et al. 2018), Lithuanian (Riklikiene, Kaseliene, and Fisher 2018), Chinese (Pong, Leung, and Lung 2020), French (Papillon and Rajesh 2020) and Portuguese (Valdivia, Alves, and Rocha 2020) contexts. Scholars have also employed exploratory factor analysis (EFA) and multi-group confirmatory factor analysis (CFA) to reinforce the validity and reliability of Fisher's measurement (e.g. Pong, Leung, and Lung 2020; Fisher 2021; Papillon and Rajesh 2020), as well as its internal consistency,

composite reliability and variance. Following the established credibility of the measurement, this study uses the SWBQ as well.

Game addiction and association between game addiction and spirituality, well-being and spiritual well-being

Scholars have not reached a consensus on the definition and measurement of online video game addiction among youths despite the existing literature on the subject (e.g. Baysak et al. 2016; Lemmens, Valkenburg, and Peter 2009). For instance, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric Association APA 2013) or the International Classification of Diseases (ICD 10) (World Health Organisation WHO 1992) do not offer any definitive meanings and conditions.

Although addiction is commonly associated with drug abuse, it also subsumes the excessive use of substances and engagement in a particular activity; moreover, it pertains to physical and psychological states of being that cannot be controlled by one's mental agency (Hatterer 1994). One such example is game addiction, in which the daily lives of players are impeded by their unrestrained playing (Weinstein 2010). Researchers have found a strong link between the duration of playing games and game addiction (e.g. Donati et al. 2015; Porter et al. 2010). For instance, those addicted to gaming play an average of 4.7 hours daily (Grusser, Thalemann, and Griffiths 2007). In the current study, the term 'game addiction' is synonymous to 'pathological use', which is excessive gaming-induced dysfunctions in daily life (Wang et al. 2014).

Various studies have found the close association between game addiction and spirituality (Barnet 2019), well-being (Afriwilda and Mulawarman 2021) and spiritual well-being (Raith et al. 2021) among children and adolescents. For instance, Jones et al. (2014) demonstrated that those who play video games in moderation had higher well-being scores than those who do not play such games. Hence, this outcome hints at the positive effects of playing video games, such as alleviating stress tension and stimulating both physical and mental health. Meanwhile, Przybylski (2014) conducted a similar study in England, which revealed that less than an hour per day of gaming can significantly increase life satisfaction among children and adolescents than those who do not play video games. In addition, Khoo, Chen, and Hyekyung (2015) conducted a longitudinal study spanning three years in Singapore. They found that playing video games in moderation can improve prosocial behaviour, empathy and social relationships. In fact, research comparing the magnetic resonance imaging (MRI) functions of video gamers and non-gamers showed increased cognition and focus among gamers (Granic, Lobel, and Engels 2014), thus supporting an earlier study on gamers being more in control and disciplined than non-gamers in perceptual and cognitive tests (Boot, Blakely, and Simons 2011).

Although moderate engagement in video games have been shown to be beneficial, excessive long-term gaming can be detrimental to one's physiological and psychological conditions (Von Der Heiden et al. 2019), cognition and development (Çetin & Ceyhan, 2014) and social relationships (Jones et al. 2014; Khoo, Chen, and Hyekyung 2015). Some specific outcomes include disrupted sleeping patterns, susceptibility to develop anorexia and decline in performance in school or work (Cao and Su 2006).

Game addiction has also been associated with the development of attention deficit hyperactivity disorder, depression and anxiety disorder and impulsivity among young individuals (Aboujaoude et al. 2006). In addition, adolescents who become addicted to gaming have decreased cognitive flexibility and difficulty responding (Zhou, Yuan, and Yao 2012); moreover, they have a tendency to provide repetitive answers and can easily make the same mistakes (Han, Lyoo, and Renshaw 2012).

Those who exhibit symptoms of game addiction and those with substance abuse have also been found to have similar structural brain profiles (Kuss and Griffiths 2012). Gaming increases dopamine and changes reward pathways in the brain, thus having a similar effect to substances with abuse potential. These substances include caffeine, tobacco, alcohol, marijuana and painkillers (Ream, Elliott, and Dunlap 2011).

Game Addiction Scale 21 (GAS 21)

The Game Addiction Scale 21 (GAS 21) comprises 21 items that gauge the extent of gaming addiction among adolescents (Lemmens, Valkenburg, and Peter 2009). The questions were based on seven dimensions, namely, salience, tolerance, mood modification, relapse, withdrawal, conflict and problems, which were taken from Griffiths' (2005) criteria for pathological gambling, as seen in the DSM-IV. In the GAS 21, the seven criteria were measured using three items, thus summing to a total of 21 questions. The scale has also been identified as an effective and suitable model for its use of the seven domains compared with other available models (Abdoli et al. 2021; Lemos, Cardoso, and Sougey 2016). Given its high validity, the GAS 21 has been applied to numerous studies on game addiction (Baysak et al. 2016; Costa et al. 2020). Moreover, it has been translated into Chinese (Liu et al. 2020), Italian (Costa et al. 2020), Persian (Abdoli et al. 2021), Portuguese (Lemos, Cardoso, and Sougey 2016) and Turkish (Baysak et al. 2016). As such, the current study has opted to use the GAS 21 given its credibility and wide usage in this field of research (King, Delfabbro, and King 2016).

Method

Design, research instrument, data collection and procedure

The study was conducted during the pandemic. Given this circumstance, online questionnaire surveys were disseminated through convenient and snowballing sampling from February 1 to 30 April 2021 and from February 21 to 29 April 2022, respectively. Emails containing a hyperlink to the survey via Google Forms were sent to potential participants. To aid in the dissemination of the surveys, assistance from lecturers and programs heads were sought. The participants could only accomplish the questionnaire once, and browser cookies were enabled to prevent duplicates. In addition, as the participants were from Hong Kong, the questionnaire was available in either Chinese or English.

The cover page explained the purpose of the research. This page also included a statement that assured the anonymity and confidentiality of information. In addition, the instructions indicated that the participants could opt out of the survey at any time. Along with these instructions, the respondents had to sign a written consent and agree to the terms of the survey.

This survey had three sections that took an average of 15 minutes to accomplish. The first section was about the participants' demographic information, which included their gender, age and religious denomination. The second section included the items from the SWBQ. The third section included items from the GAS 21. Notably, approval from the Research Ethics Committee of the affiliated institution was obtained.

Participants

In 2021, 209 Chinese university students participated in the survey. In particular, the respondents comprised 132 males and 77 females, with ages ranging between 18 and 21 years old. A total of 71.3% had no religious beliefs, 22% were from various Christian denominations, 5.3% were Catholics, and 1.4% were Buddhists. In 2022, 192 Chinese university students participated in the survey. In particular, the respondents comprised 62 males and 130 females, with ages ranging between 18 and 21 years old. A total of 73.4% had no religious beliefs, 19.3% were from various Christian denominations, 4.7% were Catholics, and 2.6% were Buddhists.

The total number of participants was sufficient for the validity of the research. In addition, t-tests were conducted, which found that the mean scores of the domains of spiritual well-being and game addiction ($ps > .05$) in the two samples were not significantly different. Therefore, the samples were combined for further analysis and discussion.

Spiritual Well-Being Questionnaire (SWBQ)

The SWBQ (Fisher 1998, 2013) contains 20 questions divided equally into four dimensions of spiritual well-being: personal (e.g. 'a sense of identity'), communal (e.g. 'kindness towards other people'), environmental (e.g. 'connection with nature') and transcendental (e.g. 'worship of the creator'). Participants gauge the importance of each facet in their daily lives using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

A three-domain model of the SWBQ has also been developed and has been found more fitting for studies in the Chinese context. This modified model combined the personal and communal domains (Pong 2021; Yuen 2015) given that these two dimensions are strongly linked in Chinese culture (Hofstede 2001).

Testing the reliability of the three-domain model resulted in the following Cronbach's alphas: the overall model was .98, the personal-communal domain was .99, the environmental domain was .98, and the transcendental domain was .98. In addition, principal components analysis validated the suitability of the model, the Kaiser–Meyer–Olkin value was also adequate at .93, while Bartlett's test of sphericity was significant at $p < .001$. In terms of EFA, each domain had an eigenvalue higher than 1.0 and explained 75.28% of variance in the personal-communal dimension, 11.54% in the environmental dimension and 6.79% in the transcendental dimension. The results of the analysis are presented in detail in Table 1.

Game Addiction Scale 21 (GAS 21)

The GAS 21 contains 21 items on seven dimensions: salience (e.g. spend a lot of free time playing games), tolerance (e.g. play longer than planned), mood modification (e.g.

Table 1. Results of exploratory factor analysis of items on the Spiritual Well-Being Questionnaire (SWBQ) (N = 401).

	Component		
	Personal- communal	Transcendental	Environmental
1. A love of other people	**.83**	.33	.39
2. Personal relationship with the Divine/God	.38	.28	**.82**
3. Forgiveness towards others	**.84**	.31	.37
4. Connection with nature	.28	**.90**	.25
5. A sense of identity	**.86**	.35	.32
6. Worship of the Creator	.46	.27	**.80**
7. Awe at a breathtaking view	.31	**.90**	.20
8. Trust between individuals	**.83**	.30	.40
9. Self-awareness	**.84**	.29	.395
10. Oneness with nature	.25	**.90**	.22
11. Oneness with God	.38	.30	**.84**
12. Harmony with the environment	.29	**.89**	.22
13. Peace with God	.42	.10	**.84**
14. Joy in life	**.86**	.25	.39
15. Prayer in life	.41	.25	**.85**
16. Inner peace	**.85**	.33	.37
17. Respect for others	**.86**	.35	.32
18. Meaning in life	**.87**	.33	.32
19. Kindness towards other people	**.87**	.26	.38
20. A sense of 'magic' in the environment	.32	**.84**	.14

N = 401. Participants were asked to complete the Spiritual Well-Being Questionnaire (SWBQ), which consists of 20 items that are divided equally into four subscales measuring the spiritual status in personal and communal, environmental and transcendental domains.

release stress through gaming), relapse (e.g. difficulty reducing time spend playing games), withdrawal (e.g. feeling angry when unable to play), conflict (e.g. choosing to play over paying attention to others) and problems (e.g. sleep deprivation due to gaming) (Lemmens, Valkenburg, and Peter 2009). Each item is scored a five-point Likert scale, ranging 1 (never) to 5 (very often). Higher total scores indicate more serious problems. Testing the reliability of the seven dimensions has resulted in the following Cronbach's alphas: .93 for salience, .73 for tolerance, .68 for mood modification, .92 for relapse, .85 for withdrawal, .98 for conflict and .97 for problems.

In the current study, principal components analysis validated the appropriateness of the model, the Kaiser–Meyer–Olkin value was adequate .76, and Bartlett's test of sphericity had a significance of $p < .001$. In terms of EFA, each domain had an eigenvalue higher than 1.0 and explained 30.51% of variance for salience, 14.74% for tolerance, 11.78% for mood modification, 7.72% for relapse, 7.23% for withdrawal, 6.30% for conflict and 5.58% for problems. Table 2 presents the results of the EFA.

Results

Descriptive statistics

The descriptive statistics and the results of the examination of demographics on the specific and overall scores of the SWBQ and GAS 21 are presented in Tables 3 and 4. The survey collected 401 valid responses from participants. In particular, 207 or 51.6% were female, and 194 or 48.4% were male. The sociodemographic background of the participants were mostly similar, with majority of the participants belonging to

Table 2. Results of exploratory factor analysis of items on the Game Addiction Scale 21 (GAS 21) (N = 401).

Component	Salience	Tolerance	Mood modification	Relapse	Withdrawal	Conflict	Problems
1. Did you think about playing a game all day long?	.04	.02	**.95**	.08	.04	.05	.13
2. Did you spend much free time on games?	.07	.10	**.91**	.05	.06	.07	.00
3. Have you felt addicted to a game?	.07	.00	**.92**	−.06	.08	.00	.06
4. Did you play longer than intended?	.08	.26	−.04	.10	.10	**.83**	.02
5. Did you spend increasing amounts of time on games?	.25	−.01	.18	.10	.20	**.73**	−.05
6. Were you unable to stop once you started playing?	.01	.30	.01	.07	−.07	**.72**	.17
7. Did you play games to forget about real life?	.25	.08	.17	.13	.10	.02	**.80**
8. Have you played games to release stress?	.15	−.22	.11	−.02	.13	.24	**.77**
9. Have you played games to feel better?	.12	.27	−.08	−.05	−.25	−.10	**.67**
10. Were you unable to reduce your game time?	.24	.31	.08	**.75**	.23	.04	−.02
11. Have others unsuccessfully tried to reduce your game use?	.04	.18	.01	**.93**	.15	.12	.01
12. Have others unsuccessfully tried to reduce your game use?	.03	.19	.01	**.92**	.11	.11	.07
13. Have you felt bad when you were unable to play?	.04	.14	.10	.20	**.89**	.08	−.03
14. Have you become angry when unable to play?	−.02	.30	.04	−.02	**.82**	.10	−.02
15. Have you become stressed when unable to play?	.06	.15	.05	.29	**.83**	.03	.09
16. Did you have fights with others (e.g. family, friends) over your time spent on games?	.10	**.87**	.06	.25	.25	.24	.05
17. Have you neglected others (e.g. family, friends) because you were playing games?	.12	**.87**	.07	.27	.21	.23	.04
18. Have you lied about time spent on games?	.11	**.84**	.04	.27	.28	.19	.04
19. Has your time on games caused sleep deprivation?	**.93**	.09	.05	.12	.09	.11	.11
20. Have you neglected other important activities (e.g. school, work, sports) to play games?	**.95**	.04	.06	.00	−.03	.10	.20
21. Did you feel bad after playing for a long time?	**.93**	.15	.08	.12	.02	.12	.20

the middle class bracket. In particular, 75% earned a monthly household income ranging from HK$38,001 to HK$58,000 and above as shown in Table 5. Notably, the median monthly household income in Hong Kong in 2018 was HK$28,300, lower than the income of the participants in the study. Moreover, 77.6% of the participants' fathers and 64.1% of their mothers attained post-secondary education level or above.

Table 6 presents the Pearson correlations between scores on the SWBQ and scores on the GAS 21. The table shows that the three dimensions of spiritual well-being had a significant and negative relationship with the seven domains of game addiction. In particular, the personal-communal dimension had a moderate-to-strong negative correlation with the seven domains, with Pearson's r values ranging from − .32 to − .67.

Table 3. Descriptive statistics: participants' demographics and their relationship with spiritual well-being (N = 401).

Factors	N (%)	SWB Personal – communal M (SD)	SWB Environmental M (SD)	SWB Transcendental M (SD)	SWB overall M (SD)
All	401 (100%)	3.87 (1.09)	2.55 (.74)	3.48 (.57)	3.44 (.80)
Year of data collection					
2021	209 (52.1%)	3.83 (1.11)	2.53 (.74)	3.47 (.55)	3.42 (.80)
2022	192 (47.9%)	3.91 (1.08)	2.57 (.74)	3.49 (.58)	3.47 (.79)
Gender					
Male	194 (48.4%)	3.69 (1.10)	2.46 (.72)	3.39 (.58)	3.31 (.79)
Female	207 (51.6%)	4.03 (1.07)	2.63 (.75)	3.56 (.55)	3.56 (.78)
Age					
18	81 (20.2%)	3.98 (1.09)	2.64 (.73)	3.5 (.58)	3.52 (.79)
19	102 (25.4%)	3.87 (1.08)	2.53 (.76)	3.49 (.57)	3.44 (.79)
20	120 (29.9%)	3.80 (1.11)	2.52 (.73)	3.47 (.56)	3.40 (.80)
21	98 (24.4%)	3.85 (1.11)	2.52 (.75)	3.47 (.58)	3.42 (.81)
Religious beliefs					
Yes	250 (62.3%)	3.34 (.99)	2.34 (.71)	3.21 (.54)	3.06 (.72)
No	151 (37.7%)	4.74 (.59)	2.89 (.66)	3.92 (.24)	4.07 (.43)

The environmental dimension also had a moderate-to-strong negative correlation, with Pearson's *r* values ranging from −.31 to −.68. Meanwhile, the transcendental dimension had a small-to-moderate negative correlation, with Pearson's *r* values ranging from −.17 to − .51. Furthermore, all three dimensions had a moderate-to-strong negative correlation with the game addiction overall, with Pearson's *r* values ranging from − .58 to − .77.

In the stepwise multiple regression analyses, we used the dimensions of spiritual well-being as predictor variables and game addiction overall as a dependent variable. The results can be seen in Table 7. Each model used the personal-communal dimension, the environmental dimension and the transcendental dimension of spiritual well-being as the predictor, respectively. The results of Model 1 were as follows: F (1, 399) = 566.66 and $p < .001$. This value explained 59.0% of the variance in overall game addiction. In Model 2, F (2, 398) = 435.76 and $p < .001$, which explained 69% of the variance and 10% for overall game addiction. Then, in Model 3, F (3, 397) = 295.09 and $p < .001$, which accounted for 83% of the variance. Given these outcomes, the personal-communal dimension is the strongest predictor among the three domains for overall game addiction.

Table 4. Descriptive statistics: participants' demographics and their relationship with game addiction (N = 401).

Factors	N (%)	GAS 21 salience *M* (*SD*)	GAS 21 tolerance *M* (*SD*)	GAS 21 mood modification *M* (*SD*)	GAS 21 relapse *M* (*SD*)	GAS 21 withdrawal *M* (*SD*)	GAS 21 conflict *M* (*SD*)	GAS 21 problems *M* (*SD*)	GAS 21 Overall *M* (*SD*)
All	401 (100%)	2.75 (.41)	3.00 (.41)	3.13 (.37)	2.07 (.38)	2.89 (.37)	2.07 (.47)	3.03 (.46)	2.71 (.24)
Year of data collection									
2021	209 (52.1%)	2.76 (.41)	3.03 (.41)	3.12 (.36)	2.07 (.40)	2.91 (.39)	2.10 (.51)	3.01 (.47)	2.71 (.25)
2022	192 (47.9%)	2.75 (.41)	2.97 (.42)	3.14 (.38)	2.07 (.35)	2.88 (.35)	2.04 (.42)	3.06 (.46)	2.70 (.23)
Gender									
Male	194 (48.4%)	2.81 (.37)	3.04 (.41)	3.14 (.37)	2.08 (.38)	2.91 (.39)	2.12 (.49)	3.04 (.48)	2.73 (.25)
Female	207 (51.6%)	2.70 (.44)	2.96 (.41)	3.12 (.37)	2.07 (.37)	2.88 (.35)	2.03 (.45)	3.02 (.45)	2.68 (.23)
Age									
18	81 (20.2%)	2.74 (.41)	2.95 (.39)	3.08 (.37)	2.02 (.27)	2.85 (.34)	2.01 (.34)	2.95 (.45)	2.66 (.20)
19	102 (25.4%)	2.75 (.40)	2.99 (.45)	3.14 (.36)	2.09 (.37)	2.89 (.38)	2.08 (.51)	3.06 (.47)	2.71 (.25)
20	120 (29.9%)	2.76 (.41)	3.03 (.41)	3.14 (.38)	2.07 (.40)	2.91 (.36)	2.10 (.47)	3.04 (.49)	2.72 (.25)
21	98 (24.4%)	2.76 (.41)	3.01 (.40)	3.14 (.36)	2.10 (.43)	2.91 (.40)	2.08 (.52)	3.06 (.44)	2.72 (.26)
Religious beliefs									
Yes	250 (62.3%)	2.81 (.36)	3.15 (.37)	3.27 (.36)	2.13 (.40)	2.93 (.36)	2.13 (.50)	3.16 (.37)	2.79 (.23)
No	151 (37.7%)	2.66 (.46)	2.75 (.36)	2.91 (.25)	1.98 (.31)	2.84 (.37)	1.98 (.39)	2.82 (.52)	2.56 (.19)

Table 5. Statistics: monthly household income and parental highest education level (N = 401).

	N (%)	Cumulative Percentage
Monthly family income		
Below HKD$28,300	24 (6%)	6%
From HKD$28,300 to HKD$38,000	76 (19%)	24.9%
From HKD$38,001 to HKD$48,000	96 (23.9%)	48.9%
From HKD$48,001 to HKD$58,000	104 (25.9%)	74.8%
Above HKD$58,000	101 (25.2%)	100%
Father's highest education level		
Secondary education level	90 (22.4%)	22.4%
Tertiary education level, including diploma, associate degree, and bachelor's degree	137 (34.2%)	56.6%
Postgraduate education level	174 (43.4%)	100%
Mother's highest education level		
Secondary education level	144 (35.9%)	35.9%
Tertiary education level, including diploma, associate degree, and bachelor's degree	228 (56.9%)	92.8%
Postgraduate education level	29 (7.2%)	100%

Remark: HK$ 7.78 = US$ 1.

Table 6. Pearson correlations between scores on SWBQ and scores on GAS 21.

	GAS 21 salience	GAS 21 tolerance	GAS 21 mood modification	GAS 21 relapse	GAS 21 withdrawal	GAS 21 conflict	GAS 21 problems	GAS 21 Overall
SWBQ Personal and communal	−.53**	−.67**	−.47**	−.32**	−.35**	−.44**	−.39**	−.77**
SWBQ Environmental	−.68**	−.49**	−.39**	−.40**	−.31**	−.45**	−.32**	−.73**
SWBQ Transcendental	−.48**	−.51**	−.48**	−.20**	−.17**	−.26**	−.30**	−.58**
SWBQ ALL	−.61**	−.66**	−.50**	−.35**	−.34**	−.54**	−.40**	−.80**

N = 401. SWBQ = Spiritual Well-Being Questionnaire. The SWBQ includes personal-communal, environmental and transcendental domains. GAS 21 = Game Addiction Scale 21 subscales are salience, tolerance, mood modification, relapse, withdrawal, conflict and problems.
**$p < .01$.

Table 7. Results of stepwise multiple regression analyses with spiritual well-being in the personal-communal, environmental and transcendental domains (SWBQ) as predictors of the overall (total scores) of Game Addiction Scores (GAS 21).

GAS – Overall		Standardised Coefficients Beta	*B*	*T*	*F*	*R*	R^2	ΔR^2	*Adjusted* R^2
Model 1					566.66***	.77	.59	.59	.59
	Personal – communal	−.77	−.17	−23.81					
Model 2					435.76***	.83	.69	.10	.69
	Personal – communal	−.50	−.11	−13.76					
	Transcendental	−.41	−.14	−11.25					
Model 3					295.09***	.83	.69	0	.69
	Personal – communal	−.58	−.13	−11.84					
	Transcendental	−.42	−.14	−11.48					
	Environmental	.10	−.04	2.24					

N = 401. *Note.* N = 401. SWBQ = Spiritual Well-Being Questionnaire. The SWBQ includes personal-communal, environmental and transcendental domains. GAS 21 = Game Addiction Scale 21 subscales are salience, tolerance, mood modification, relapse, withdrawal, conflict and problems. ***$p < .001$.

Discussion

We hypothesised that spiritual well-being is negatively correlated with game addiction, that is, lower levels of spiritual well-being in the specific domains are associated with high levels of game addiction in the particular dimensions, and the results confirmed this hypothesis. The current findings are in line with the empirical findings of Molinos (2016) and Lemmens, Valkenburg, and Peter (2011). Also, the results confirmed another hypothesis of the prediction of game addiction by spiritual well-being. The current outcomes are also consistent with those of Kowert et al. (2015) and Lemmens, Valkenburg, and Peter (2011).

Personal-communal domain

The outcomes of this study conform to the findings of Liu et al. (2018a) and Wu et al. (2018). In their study, a significant correlation was observed between lower levels of

spiritual well-being in the personal domain (e.g. happiness, tranquillity and life values) and game addiction. In relation to these outcomes, other studies have identified a strong link between game addiction and anxiety, depression, decreased self-esteem and decreased life satisfaction (Bélanger et al. 2011). Moreover, game addiction is linked with insomnia and lack of other leisurely activities (Rehbein et al. 2010). As such, people addicted to playing games can also have attention difficulties (Gentile 2009). Such people may experience loneliness, stress and unhappiness, thus driving them to play games as an escape, may subsequently to dependence and addiction (Jeong, Kim, and Lee 2017).

Prolonged exposure to sensory and psychological stimuli can overwork the reward circuit and the limbic system of the brain (Weinstein 2017). Addiction causes excessive cravings that can only be satiated by intensely and rapidly stimulating the brain multiple times (Robinson et al. 2015). One such example is game addiction, which can cause cognitive dysfunction and similar symptoms to heroin dependence. In addition, a lack of control and discipline in playing games as a leisurely activity can cause stress, anxiety, impulsiveness and aggression among adolescents in the long run (Lavoie et al. 2021).

Wan and Chiou (2006) also determined that game addiction is closely linked to conflicts in relationships and family dynamics. Furthermore, Spilkova, Chomynova, and Csemy (2017) and Van et al. (2014) observed a strong correlation between game addiction and anti-social behaviour. Similarly, Lemmens, Valkenburg, and Peter (2009) found that game addiction is linked to isolation and loneliness. Hence, the findings of the current research are in line with the findings of these earlier studies.

Other studies with related outcomes to those of the current study are as follows. Ebeling-Witte, Frank, and Lester (2007) observed that the tendency to become addicted to games can be predicted by an individual's shyness and declined social skills. Meanwhile, Kuss, Griffiths, and Binder (2013) presented other predictors of game addiction, including high levels of neuroticism and low levels of affinity and tolerance.

An early study by Blazer (1983) showed that game addiction causes a decline in adolescents' retention of their social networks and feelings for others. This finding was corroborated by Ge et al.'s (2014) more recent research, which revealed that anti-social behaviour can manifest in some teens who have developed game addiction. In addition, McLeod, Liu, and Axline (2014) explained that social networks formed in the virtual gaming sphere can interfere with the normal development of one's personality.

Environmental domain

The findings of the current study regarding the environmental dimension are consistent with significant related research. For instance, Selhub and Logan (2012) found that nature has an inverse correlation with addiction. They showed that activities in nature, such as hiking or sightseeing, stimulate the control system in the brain to obtain rewards and fight addiction. Hence, their outcomes confirmed that nature can help prevent addiction and aid in recovery from it. These findings are significant for adolescents, as those who enjoy and engage in outdoor activities have a lower tendency to become addicted to online games.

Other related studies are as follows. Annerstedt and Wahrborg (2011) identified the mutual exclusivity between a healthy lifestyle and curbing addiction. Moreover, Annerstedt and Währborg (2011) and Haubenhofer et al. (2010) found that horticultural therapy can help lower the cravings of people struggling with addiction and make their sobriety more sustainable. Meanwhile, Bradley (2008) observed that oil vapours from plants stimulate the production of gabapentin, a naturally occurring calming chemical in the brain, and serotonin, which regulates mood. In another related study, Taylor and Kuo (2009) stated that a daily 20-minute walk in nature aids in self-regulation as well as in the alleviation of symptoms of Attention Deficit and Hyperactivity Disorder. This outcome was further expanded by Gabrielsen and Harper (2018), who concluded that wilderness therapy effectively manages substance abuse, stress, anxiety and depression among young individuals.

Transcendental domain

The findings of the study regarding the transcendental dimension are in line with those of Braun, Kornhuber, and Lenz (2016), who concluded that a stronger belief in God and a higher transcendental spirituality have a significant inverse correlation with game addiction among youths. Although, Barnet (2019) did not find any significant link between religious beliefs and video game addiction.

Wenger (2004) demonstrated that high levels of religiosity help individuals adhere to the tenets of their beliefs. Within this vein, Michalak, Trocki, and Bond (2007) pointed out that religious beliefs can guide individuals' aversion to excessive indulgence and debauchery of substance use. In addition, Clements and Ermakova (2012) expressed that such adherence is a reflection of an individual's commitment to religious tenets.

Braun, Kornhuber, and Lenz (2016) also pointed out that people with religious affiliations, particularly Christians, spent less time playing games and were less susceptible to game addiction than individuals with no religious affiliation. One explanation is that Christian values uphold one's active seeking of healthy behaviours. In addition, Debnam et al. (2012) demonstrated that support from a religious community reduces alcohol and drug consumption.

In an earlier study, Morjaria and Orford (2002) presented the contribution of religious beliefs in preventing addiction and implementing strategies for intervention. As Heinz et al. (2010) emphasised, the most prominent programs for the treatment of substance abuse and behavioural addiction are linked to religious affiliations. Moreover, Weinandy and Grubbs (2021) reinforced the notion that religious spirituality and traditions influence people's openness and willingness to receive an intervention.

Limitation

The current study has several significant contributions to the existing literature. However, it has three major limitations that can be remedied in further studies. Firstly, given the limited scope of the sample in the survey, the generalisability of the findings of this research could not been confirmed. Notably, the sample size is only representative of a small portion of Chinese youths. Hence, researchers should expand the samples to

cover participants from universities in other parts of China, including the large cities of Shenzhen, Guangzhou and Shanghai.

Secondly, researchers have not reached any agreement on the definitions of 'spiritual' and 'pathological use', among other terms used in the field. Currently, the SWBQ is a reliable model for measuring spiritual well-being, and the GAS 21 also has high validity in gauging the degree of game addiction for adolescents. To enhance data collection, researchers can tap into the participants' social network to gain a more comprehensive understanding of the subjects' spiritual well-being and game addiction tendencies. Qualitative research that includes exhaustive interviews and focus group discussions should also be considered.

Thirdly, the research is limited to the participants' personal reports on their spiritual well-being and game use. Respondents may opt to assess themselves on the basis of the ideal answers rather than provide answers based on their experiences due to social expectations on what the best answer should be. Under this condition, accurate responses cannot be guaranteed. Longitudinal studies can be conducted as a follow-up to supplement the validity of the research outcomes.

Conclusion

The study demonstrates that the personal-communal, environmental and transcendental dimensions of spiritual well-being are negatively correlated with the salience, tolerance, mood modification, relapse, withdrawal, conflict and problems of game addiction among Chinese youths. Furthermore, the findings of this research suggest high levels of spiritual well-being lower the likelihood of young Chinese individuals developing excessive gaming use or even game addiction, with the personal-communal domain of spiritual well-being being the strongest predictor of game addiction overall.

The current work is the first to analyse the correlation of spiritual well-being with game addiction among youths within the Chinese cultural context. Game addiction and the problematic behaviours that come with it are not only due to the act of playing games itself. Instead, low levels of spiritual well-being and health also influence how one develops game addiction. Thus, as an effective preventive strategy, the spiritual well-being and health of adolescents should be enhanced. Moreover, the findings of this research underscore the importance of spiritual education to reinforce children and adolescents' spirituality.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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