

The nexus of video gaming experiences: The associations among basic needs in games, real-life basic needs, well-being indicators, and problematic online gaming

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Abstract

Recent research highlights the vital roles of basic needs in video gaming experiences. Both need-supportive and need-frustrating video gaming experiences have theoretical and practical implications for real-life need satisfaction and frustration, and well-being outcomes. This study aimed to adapt the Basic Needs in Games Scale into Turkish, tested the psychometric properties of “gaming in general” and “gaming in a particular game” versions of the Turkish Basic Needs in Games Scale, and investigated the associations among the Basic Needs in Games Scale, problematic online gaming, life satisfaction, meaning in life (i.e., coherence, purpose, significance), and real-life basic psychological needs. This study recruited a sample of 247 Turkishspeaking participants who played at least one video game over the past 2 weeks. The results provided evidence for the structural validity of the Turkish Basic Needs in Games Scale versions, and demonstrated good reliability for the Basic Needs in Games Scale subscales. The findings indicated that indicators of need satisfaction and frustration in games were primarily associated with their real-life counterparts and showed complex associations with life satisfaction, meaning in life, and problematic online gaming. The implications for further research on basic needs in video games are discussed.

Keywords: basic needs in video games, meaning in life, need frustration, need satisfaction, problematic online gaming, well-being

Main points

- When studying player experiences in video games and their effects on mental health, need-satisfying and frustrating experiences (i.e., autonomy, competence, relatedness) play pivotal roles.
- The Basic Needs in Games Scale is a novel instrument for measuring need satisfaction and frustration in video games.
- The Turkish versions of the Basic Needs in Games Scale, considering particular or general gaming experiences, supported structural validity, demonstrated good reliability, and consistent psychometric properties across gender.
- Need satisfaction indicators in video games had predominantly positive associations with real-life need satisfaction indicators, meaning in life (i.e., coherence, purpose, significance), and well-being, and negative associations with problematic online gaming, while need frustration indicators had positive associations with real-life need frustration indicators and problematic online gaming.

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Received: August 8, 2024 **Accepted:** August 15, 2025 **Published:** November 7, 2025

This work was previously made available as a preprint: Subasi, M., Gürkan, E., Karaman, H., et al. (2024). The Nexus of Video Gaming Experiences: The Associations Among Basic Needs in Games, Real-Life Basic Needs, Well-Being Indicators, and Problematic Online Gaming. Research Square (Version 1, December 09, 2024). <https://doi.org/10.21203/rs.3.rs-5591069/v1>

Cite as: Subasi, M., Gürkan, E., Karaman, H., Bulut, S., & Osin, E. N.. (2026). The nexus of video gaming experiences: The associations among basic needs in games, real-life basic needs, well-being indicators, and problematic online gaming. *Addicta: The Turkish Journal on Addictions*, 13(1), 108-116. <https://doi.org/10.15805/addicta.2025.24142>

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Introduction

Recent research has increasingly focused on player experiences in video games. Researchers have particularly paid attention to flow, presence, engagement, immersion, and joy in the gaming experiences of players when playing video games (Ballou et al., 2023). According to Statista (2024), there are 1.31 billion active video game players in 2024, equal to 16% of the world's population. It is estimated that there will be 1.47 billion video game players worldwide in 2027, equal to 17.7% of the world's population. The revenues from video games in a global scope currently correspond to \$455.27 billion in 2024. This estimation is envisioned to exceed \$625.64 billion in 2028 by a 37.42% growth. These statistics definitely indicate that video games have become so pervasive in people's lives that a huge amount of the human population engages in them.

The conceptualization and measurement of gaming experiences has gained increasing importance, particularly in educational and industrial contexts (Denisova et al., 2016). A large body of research has emphasized possible negative effects of video games such as aggression (Greitemeyer & Mügge, 2014), less academic achievement (Savić Tot et al., 2023), and worse physical health (Pelletier et al., 2020). In contrast, substantial research has demonstrated the positive effects of video games such as higher physical activity (LeBlanc et al., 2013), greater vitality, and less psychological distress (Formosa et al., 2022), and promoting well-being (Barr & Copeland-Stewart, 2022).

Player experiences play a pivotal role in the observed outcomes in video gaming as well as game content, time spent playing games, or game contexts (Sánchez et al., 2012). They have an important position in digital games research to understand how games affect players (Denisova et al., 2016). In this context, self-determination theory (SDT) and basic psychological needs theory have increasingly been applied in recent video game research (Ryan et al., 2006; Tamborini et al., 2011). Self-determination theory suggests that basic psychological needs (i.e., autonomy, competence, relatedness) serve as universal fundamental nutrients for healthy functioning. When these needs are satisfied, individuals have greater well-being and psychological health. However, when these are thwarted or frustrated, individuals may experience negative outcomes in well-being and go through greater psychological distress.

These basic needs have particularly been investigated in digital games in terms of motivation across genres, human-computer interaction, virtual reality, and problematic online gaming (POG) (Ballou, 2023; Ballou & Deterding, 2023; Ryan et al., 2006; Tamborini et al., 2011; Tyack & Mekler, 2020). A great deal of research has shown that when individuals' basic needs are satisfied, they have higher levels of autonomous motivation, better engagement, stronger resilience, and beneficial well-being outcomes (e.g., Allen & Anderson, 2018; Formosa et al., 2022; Ijaz et al., 2020; Johannes et al., 2021; Tamborini et al., 2011; Vella et al., 2015). In contrast, research has indicated that when individuals' basic needs are frustrated, they may experience an obsessive passion for games, spend more time in gaming (Mills et al., 2018a) and demonstrate

higher scores in problematic video gaming (Allen & Anderson, 2018; Mills et al., 2018b; Mills & Allen, 2020). Despite these findings, results present a more complex picture since some studies demonstrated that need satisfaction had weak positive associations with POG (e.g., Bender & Gentile, 2020; Formosa et al., 2022) and that need frustration had moderate positive associations with them (e.g., Kosa & Uysal, 2021).

Although previous research has underlined the measurement of basic psychological needs in video games, available instruments to measure need satisfaction and/or need frustration in video games have been criticized (e.g., Allen & Anderson, 2018; Kosa & Uysal, 2021, 2024). Ballou et al. (2023) argue that existing measures lack of including and effectively measuring need frustration, involving relatedness items in the contexts of single-player or multiplayer games, and demonstrating inadequate support for validity regarding various generality levels of video games. Thus, current measures of basic psychological needs assessment fail to capture the intended constructs of need satisfaction and frustration in video game contexts because of not including need frustration and taking on limited perspectives on basic needs, particularly concentrating on relatedness. Moreover, real-life measures of basic psychological needs are likely to be unsuitable for video game contexts (Kosa & Uysal, 2021).

To overcome these limitations and challenges, Ballou et al. (2023) developed the Basic Needs in Games Scale (BANGS), a measure of need satisfaction and frustration in video games based on SDT. The BANGS showed good structural validity and demonstrated a good model fit as well as longitudinal measurement invariance, criterion validity, and convergent validity. The final version of the BANGS included six three-item subscales for basic needs satisfaction and frustration (i.e., autonomy, competence, relatedness) in video games. The BANGS is based on the basic needs in games (BANG) model relying on SDT (Ballou & Deterding, 2023). The BANG suggests that SDT can better explain when and why games influence well-being and mental health, particularly in the following areas: (1) better engaging in games through causal modeling, (2) including need frustration, (3) studying different levels of generality, and (4) specifying negative and positive outcomes of compensation. The BANG particularly proposes that need satisfaction and frustration in games at the contextual level regarding gaming experiences in a particular game or in general will translate into player's need satisfaction and frustration at the global level (i.e., in life), supported by previous research (Allen, 2020; Allen & Anderson, 2018).

The present research aims to investigate the psychometric properties of the BANGS in Turkish considering basic needs in gaming experiences in general and in a particular context. The current research attempts to achieve the following goals: (1) to confirm the structural validity of the two versions of the BANGS, (2) to test the configural, metric, scalar, and strict invariances of the two versions of the BANGS across gender, (3) to evaluate reliability scores of the two versions of the BANGS, and (4) to explore the associations among the BANGS versions, POG, life satisfaction, meaning in life, and real-life basic psychological needs.

Material and Methods

Participants

We recruited a total of 251 Turkish-speaking participants. 247 university students were involved in the study as four participants did not meet the criteria (see Data Collection below). They were 63% female. Participants' ages ranged between 18 and 46 ($M = 21.70$; $SD = 3.58$). About 81% were undergraduate students, and 79% reported a medium level of subjective economic status. Common examples of video games reported by the participants included Mobile Legends, Valorant, PUBG, and much more.

Measures

Demographics. Demographic data included gender, education, subjective economic status, and marital status.

Basic Needs in Games Scale (Ballou et al., 2023): The BANGS measures the satisfaction and frustration of basic psychological needs in games. It includes six three-item subscales for autonomy, competence, and relatedness in games including items such as "I could make choices regarding how to play [X]," "I felt that I made progress while playing [X]," and "I felt that other players and/or characters in [X] cared about me." The BANGS is rated on a 7-point Likert scale from "1 = Strongly disagree" to "7 = Strongly agree." So, it includes 18 items in total (i.e., nine items for need satisfaction in games and 9 items for need frustration in games). The current research tested two versions of the BANGS in Turkish. The first version evaluated gaming experiences in general over the past 2 weeks, while the second version assessed gaming experiences in a particular game indicated by the participants over the past 2 weeks. The reliability scores of each BANGS version are provided in the Results section.

Satisfaction with Life Scale (SWLS) (Diener et al., 1985; Köker, 1991): The SWLS has five items such as "The conditions of my life are excellent" to evaluate a global judgment of satisfaction with life. The SWLS employs a 7-point Likert scale from "1 = Strongly disagree" to "7 = Strongly agree." The reliability score of the SWLS was as follows: SWLS ($\alpha = .88$).

Three Dimensional Meaning in Life Scale (3DM) (Martela & Steger, 2023; Subaşı, 2024): The 3DM encompasses three subscales (i.e., coherence, purpose, significance) having 11 items in total. Coherence (e.g., "I can make sense of my life") and purpose (e.g., "I am highly committed to certain core goals in my life") are four-item subscales, whereas significance (e.g., "My life is full of value") includes three items. The 3DM employs a 7-point Likert scale from "1 = Not at all true" to "7 = Very true." The reliability scores of the 3DM were as follows: coherence ($\alpha = .80$); purpose ($\alpha = .86$); significance ($\alpha = .88$).

Balanced Measure of Psychological Needs Scale (BMPN) (Sheldon & Hilpert, 2012; Kardas & Yalcin, 2018): The BMPN evaluates the satisfaction and frustration of each of basic psychological needs (i.e., autonomy, competence, relatedness)

through six three-item scales including items such as "I was successfully completing difficult tasks and projects," "I felt close and connected with other people who are important to me," "I was really doing what interests me." Each subscale employs a 7-point Likert scale from "1 = Strongly disagree" to "7 = Strongly agree." The reliability scores of the BMPN were as follows: autonomy satisfaction ($\alpha = .78$); autonomy frustration ($\alpha = .79$); competence satisfaction ($\alpha = .81$); competence frustration ($\alpha = .78$); relatedness satisfaction ($\alpha = .82$); relatedness frustration ($\alpha = .72$).

Problematic Online Gaming (Lemmens et al., 2009; Baysak et al., 2016): This measure assesses POG with seven three-item subscales (i.e., salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems) including items such as "Have you felt addicted to a game?" This scale can also be calculated through a total of seven items in a shortened way. The present research used the seven-item version of the scale. The measure utilizes a 5-point Likert scale from "1 = never" to "5 = very often." The reliability score of the scale was as follows: POG ($\alpha = .89$).

Adaptation of the Turkish Basic Needs in Games Scale

The present research adhered to the double-translation method. Two PhD students in psychology and counseling psychology did the initial translation of the BANGS into Turkish. An expert in psychology, an expert in social work, and three specialists in Turkish language evaluated the translated items. Turkish language specialists assessed the translated items in terms of Turkish grammar and expression. The other experts evaluated the items with regard to measurement. The first two authors revised the items and sent the revised items for reverse translation. Following this step, two PhD students in psychology and social work translated this version of the items to English. Finally, two experts in psychology reviewed the latest version of the BANGS regarding measurement. The first two authors finalized the items and this version of the BANGS included two versions: basic psychological need satisfaction and frustration considering general gaming experiences and gaming experiences in a particular game. A pilot study was conducted for face validity. In the pilot study, 60 participants were recruited to test the finalized items. All subscales regarding both scales demonstrated adequate reliability from .80 to .91 except for the autonomy frustration subscale in both scales ranging from .68 to .74.

Data Collection

The present research was a cross-sectional study using convenience sampling. Inclusion criteria for taking part in the study were: being at least over 18 years old, being a student (e.g., preparatory, undergraduate, master's, or doctorate), having played at least one video game in the past 2 weeks, and providing informed consent. Participants were asked to indicate a game that they have played in the past 2 weeks on any of the following devices: smartphones, tablets, computers, or a device that they have been using for gaming.

Participants were free to choose what sort of game(s) they wanted to write down. Turkish validations of the scales were used. The present research collected data through a Google Forms link at the beginning of the second semester of the 2023-2024 academic year in Türkiye. The Commission for the Ethical Evaluation of Empirical Research Projects of the Department of Psychology at HSE University granted ethical approval to this study. The present research followed the Helsinki Declaration and its later amendments, and ethical guidelines (e.g., anonymity, confidentiality, and voluntariness).

Data Analysis

The current research utilized R language to perform the analyses. Missing values, outliers, and normality assumptions were assessed. No missing data or outliers were found. The BANGS items were sufficiently normally distributed considering the suggestion by Tabachnick and Fidell (2013) that skewness and kurtosis values are acceptable when they range between -1.5 and $+1.5$. As recommended by Kline (2015), the sample size was adequate as it was at least 200 participants.

First of all, descriptive statistics of the BANGS were provided along with their corrected item-total scores, and carried out confirmatory factor analyses (CFAs) for both versions of the BANGS to test their structural validity. Second, the measurement invariance of the BANGS across gender was analyzed. Third, the reliability scores of both BANGS scales were calculated. Finally, the associations among the BANGS scales, life satisfaction, meaning in life indicators, real-life basic psychological needs, and POG were analyzed.

The current research employed several criteria as fit indices in CFAs (Hu & Bentler, 1999; West et al., 2012): the chi-square, the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the (standardized) root mean square residual (SRMR). The chi-squared/df values should be less than three to indicate good fit, five to demonstrate acceptable fit, and 10 to show marginal fit. The CFI value should be higher than .95 to indicate good fit, .90 to demonstrate acceptable fit, and .85 to show marginal fit. The TLI value should be higher than .95 to indicate good fit, .90 to demonstrate acceptable fit, and .85 to show marginal fit. The RMSEA should be less than or equal to .08 to indicate good fit, .10 to demonstrate acceptable fit, and .12 to show marginal fit. The SRMR should be less than or equal to .08 to indicate good fit, .10 to demonstrate acceptable fit, and .12 to show marginal fit.

Results

Preliminary Analyses

For the version of gaming experiences in general, the lowest and highest scores of the BANGS items' mean, standard deviation, skewness, and kurtosis respectively ranged from 2.51 to 5.54; from 1.51 to 2.02; from -1.17 to 1.10 ; from -1.23 to 0.88 . For the version of gaming experiences in a particular

game, the lowest and highest scores of the BANGS items' mean, standard deviation, skewness, and kurtosis respectively ranged from 2.44 to 5.67; from 1.49 to 2.12; from -1.21 to 1.07 ; from -1.35 to 1.00 . Consequently, multivariate normality was assumed for each version. The item-total correlation of the items of version of gaming experiences in general ranged from .32 to .81. The item-total correlation of the items of version of gaming experiences in a particular game ranged from .41 to .84, showing similarity in each version.

Factor Structure of the Basic Needs in Games Scale Versions

To evaluate the factor structures of both versions of the BANGS, the CFAs for one-factor, two-factor, and six-factor models were conducted. The CFAs were performed through the R lavaan package using the maximum likelihood estimator and standard error with full information maximum likelihood. No modifications were made and no item was removed. One-factor, two-factor, and six-factor solutions of the BANGS versions were tested to assess the best fit to the data, to evaluate whether need satisfaction and frustration constructs can explain the variance in the items, and to confirm whether the BANGS subscales are replicated in Turkish. The two-factor solution of the BANGS was tested to see whether need satisfaction and frustration including each need represent higher-order factors. As shown in Table 1, one-factor and two-factor solutions of both versions of the BANGS demonstrated poor fit indices. Six-factor solutions of both versions of the BANGS indicated excellent fit indices. The factor loadings of the version of gaming experiences in general ranged from .42 to .91. The factor loadings of the version of gaming experiences in a particular game ranged from .53 to .90.

Measurement Invariance of the Basic Needs in Games Scale Versions across Gender

To assess the configural, metric, scalar, and strict invariance of both versions of the BANGS, CFAs were performed across gender. As shown in Table 2, all types of invariance provided excellent or good fit indices for both versions of the BANGS, revealing consistent psychometric properties across gender in terms of the latent factor, factor loadings, metric equivalence, and residual variances (consider nesting the models in Table 2). The general version of the BANGS had slightly better fit indices than the particular version of the BANGS.

Reliability Scores of the Basic Needs in Games Scale Versions

To assess the reliability scores, Cronbach's alpha and McDonald's omega scores were calculated. As shown in

Table 1. Fit indices for confirmatory factor analysis of both versions of the basic needs in games scale

Model	X ²	df	X ² /df	CFI	TLI	SRMR	RMSEA
BANGS-General							
One-factor	1414.84	135	10.48	.39	.30	.19	.20
Two-factor	740.26	134	5.52	.71	.67	.12	.14
Six-factor	190.99	120	1.59	.97	.96	.05	.05
BANGS-Particular							
One-factor	1595.95	135	11.82	.46	.38	.19	.21
Two-factor	942.06	134	7.03	.70	.66	.13	.16
Six-factor	221.14	120	1.84	.96	.95	.04	.06

Note: BANGS = Basic Needs in Games Scale; CFI = Comparative fit index; df = Degree of freedom; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; TLI = Tucker–Lewis Index; X² = Chi-square.

Table 2. Measurement invariance of the basic needs in games scale across gender

Model	X ²	df	X ² /df	CFI	TLI	SRMR	RMSEA
BANGS-General							
Configural invariance	313.83	234	1.34	.96	.95	.06	.05
Metric invariance	325.39	246	1.32	.96	.95	.07	.05
Scalar invariance	339.50	264	1.29	.96	.96	.07	.05
Strict invariance	371.74	282	1.32	.96	.95	.07	.05
BANGS-Particular							
Configural invariance	391.76	234	1.67	.94	.93	.05	.07
Metric invariance	405.89	246	1.65	.94	.93	.06	.07
Scalar invariance	416.50	264	1.58	.94	.94	.06	.07
Strict invariance	463.05	282	1.64	.93	.93	.06	.07

Note: BANGS = Basic Needs in Games Scale; CFI = Comparative fit index; df = Degree of freedom; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; TLI = Tucker–Lewis Index; X² = Chi-square.

Table 3, the majority of the subscales of both versions of the BANGS demonstrated good reliability, ranging from .81 to .91. Autonomy frustration in gaming experiences in general indicated questionable reliability, while showing acceptable reliability in the other version.

Table 3. Reliability scores of the basic needs in games scale

BANGS Subscale	Cronbach's Alpha	McDonald's Omega
G-Autonomy Satisfaction	.84	.84
G-Autonomy Frustration	.58	.60
G-Competence Satisfaction	.87	.88
G-Competence Frustration	.81	.81
G-Relatedness Satisfaction	.84	.85
G-Relatedness Frustration	.83	.83
S-Autonomy Satisfaction	.89	.89
S-Autonomy Frustration	.68	.71
S-Competence Satisfaction	.84	.85
S-Competence Frustration	.82	.82
S-Relatedness Satisfaction	.89	.89
S-Relatedness Frustration	.91	.91

Note: BANGS = Basic Needs in Games Scale; G = Video gaming experiences in general; S = Video gaming experiences in a particular game.

The Associations Among the Basic Needs in Games Scale, Problematic Online Gaming, Life Satisfaction, Meaning in Life, and Real-Life Basic Psychological Needs

To explore the associations among the variables, Pearson correlation analyses were carried out. As shown in Table 4, for the version of gaming experiences in general, autonomy satisfaction and competence satisfaction had weak or moderate positive associations with all of well-being, meaning in life, and real-life need satisfaction indicators. Relatedness satisfaction had a moderate positive association with POG and weak positive associations with real-life autonomy satisfaction and real-life competence satisfaction. Autonomy satisfaction had weak negative associations with POG, real-life competence frustration, and real-life relatedness frustration. Competence satisfaction had weak negative associations with real-life competence frustration and real-life relatedness frustration.

For the version of gaming experiences in general, autonomy frustration had a weak positive association with POG, while competence frustration and relatedness frustration had moderate positive associations with it. Autonomy frustration had weak positive associations with real-life autonomy frustration, real-life competence frustration, and real-

Table 4. The associations among the basic needs in games scale version of gaming experiences in general, real-life basic psychological needs, meaning in life indicators, and life satisfaction

	BANGS Subscales					
	GAS	GAF	GCS	GCF	GRS	GRF
AUS	0.38 ***	-0.03	0.38 ***	-0.1	0.20 **	-0.10
AUF	-0.01	0.17 **	-0.03	0.27 ***	0.07	0.21 ***
COS	0.36 ***	-0.06	0.33 ***	-0.12	0.13 *	-0.10
COF	-0.13 *	0.28 ***	-0.17 **	0.42 ***	0.08	0.39 ***
RES	0.40 ***	-0.11	0.39 ***	-0.32 ***	0.11	-0.41 ***
RES	-0.18 **	0.28 ***	-0.22 ***	0.40 ***	0.01	0.39 ***
SWLS	0.27 ***	-0.07	0.21 **	-0.06	0.11	-0.08
COH	0.35 ***	-0.05	0.26 ***	-0.16 *	0.08	-0.25 ***
PUR	0.25 ***	-0.05	0.24 ***	-0.12	0.06	-0.25 ***
SIG	0.23 ***	0.01	0.19 **	-0.11	0.07	-0.20 **
POG	-0.15 *	0.14 *	-0.08	0.52 ***	0.32 ***	0.52 ***

Note: AUS = Autonomy satisfaction; AUF = Autonomy frustration; COF = Competence frustration; COH = Coherence; COS = Competence satisfaction; GAF = Autonomy frustration in gaming experiences in general; GAS = Autonomy satisfaction in gaming experiences in general; GCF = Competence frustration in gaming experiences in general; GCS = Competence satisfaction in gaming experiences in general; GRF = Relatedness frustration in gaming experiences in general; GRS = Relatedness satisfaction in gaming experiences in general; POG = Problematic online gaming; PUR = Purpose; RES = Relatedness satisfaction; SIG = Significance; SWLS = Satisfaction with Life Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$.

life relatedness frustration. Competence frustration and relatedness frustration had weak positive associations with real-life autonomy frustration, while having moderate positive associations with real-life competence frustration and real-life relatedness frustration. Competence frustration had a weak negative association with coherence, while having a moderate negative association with real-life relatedness satisfaction. Relatedness frustration had weak negative associations with coherence, purpose, and significance, while having a moderate negative association with real-life relatedness satisfaction.

As shown in Table 5, for the version of gaming experiences in a particular game, autonomy satisfaction had a weak negative association with POG, while relatedness satisfaction had a moderate positive association with it. Autonomy satisfaction and competence satisfaction had weak or moderate positive associations with all of well-being, meaning in life, and real-life need satisfaction indicators. Relatedness satisfaction had only a weak positive association with real-life autonomy satisfaction. Autonomy satisfaction and competence satisfaction had weak negative associations with real-life competence frustration and real-life relatedness frustration.

Table 5. The associations among the basic needs in games scale version of gaming experiences in a particular game, real-life basic psychological needs, meaning in life indicators, and life satisfaction

	BANGS Subscales					
	SAS	SAF	SCS	SCF	SRS	SRF
AUS	0.42 ***	-0.10	0.38 ***	-0.06	0.22 ***	-0.11
AUF	0.05	0.21 **	-0.02	0.25 ***	0.07	0.19 **
COS	0.39 ***	-0.16 **	0.33 ***	-0.12	0.10	-0.08
COF	-0.18 **	0.29 ***	-0.13 *	0.40 ***	0.11	0.42 ***
RES	0.44 ***	-0.25 ***	0.38 ***	-0.30 ***	0.03	-0.41 ***
RES	-0.20 **	0.34 ***	-0.23 ***	0.43 ***	0.04	0.36 ***
SWLS	0.22 ***	-0.10	0.23 ***	-0.10	0.08	-0.05
COH	0.31 ***	-0.16 *	0.23 ***	-0.18 ***	0.01	-0.19 **
PUR	0.23 ***	-0.15 *	0.24 ***	-0.20 **	-0.01	-0.24 ***
SIG	0.23 ***	-0.09	0.21 ***	-0.17 **	0.01	-0.17 **
POG	-0.14 *	0.31 ***	-0.05	0.51 ***	0.34 ***	0.52 ***

Note: AUF = Autonomy frustration; AUS = Autonomy satisfaction; COF = Competence frustration; COH = Coherence; COS = Competence satisfaction; RES = Relatedness satisfaction; SAF = Autonomy frustration in gaming experiences in a particular game; SAS = Autonomy satisfaction in gaming experiences in a particular game; SCF = Competence frustration in gaming experiences in a particular game; SCS = Competence satisfaction in gaming experiences in a particular game; SIG = Significance; SRF = Relatedness frustration in gaming experiences in a particular game; SRS = Relatedness satisfaction in gaming experiences in a particular game; SWLS = Satisfaction with Life Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$.

For the version of gaming experiences in a particular game, autonomy frustration, competence frustration, and relatedness frustration had moderate positive associations with POG. Autonomy frustration, competence frustration, and relatedness frustration had weak positive associations with real-life autonomy frustration. They had moderate positive associations with real-life competence frustration and real-life relatedness frustration except for a weak positive association between autonomy frustration and real-life competence frustration. They had weak negative associations with coherence and purpose. Competence frustration and relatedness frustration had weak negative associations with significance. Autonomy frustration had weak negative associations with real-life competence satisfaction and real-life relatedness satisfaction. Competence frustration, and relatedness frustration had moderate negative associations with real-life relatedness satisfaction.

Discussion

The results provided strong evidence for the structural validity of the two versions of the BANGS. The measurement invariance analyses for the two versions of the BANGS fully supported the configural, metric, scalar, and strict invariances of the two versions of the BANGS across gender. The original version of the BANGS demonstrated partial support for the measurement invariance of the BANGS across game contexts and for the longitudinal invariance, but did not include any measurement invariance analysis across gender (Ballou et al., 2023). The results largely demonstrated good reliability scores of the BANGS. The reliability scores of each need satisfaction and need frustration subscale of the Turkish BANGS had slightly higher scores than the original BANGS subscales (Ballou et al., 2023). The only exception was that autonomy frustration in the version of gaming experiences in general had a low reliability, relatively less than the score in the original study. Overall, this study was the first non-English study to confirm the original structure of the BANGS and to evidence good reliability scores.

These findings in need satisfaction in games for each version mainly demonstrated positive associations with real-life psychological needs, life satisfaction, and meaning in life indicators (i.e., coherence, purpose, significance). These results were in line with prior research (e.g., Ijaz et al., 2020; Johannes et al., 2021; Ryan et al., 2006; Vella et al., 2015), while other research demonstrated negative or no associations with well-being indicators (e.g., Allen & Anderson, 2018; Formosa et al., 2022). The differences across the results may emerge from various factors such as sample characteristics, the usage of different measures of basic needs in video games and of well-being outcomes, or contextual variables that can affect video gaming experiences. These findings imply that feeling autonomous and/or competent in video gaming experiences may contribute to individuals' sense of coherence, purpose, and significance in life. Furthermore, experiencing need frustration in autonomy, competence, and relatedness in video gaming experiences may detract from individuals' sense of coherence, purpose, and significance in life.

The results indicated that each need satisfaction and frustration indicators in video game experiences in general or in a particular game related to their counterparts of real-life need satisfaction and frustration indicators except for relatedness satisfaction in both versions. In prior studies, researchers indicated that experiencing and satisfying basic needs in video games have positive outcomes on need satisfaction (e.g., Allen, 2020; Allen & Anderson, 2018; Ballou & Deterding, 2023), while Noon et al. (2024) did not replicate these associations for competence and relatedness satisfaction in video game experiences among adolescents. Overall, these findings largely provide support for the hypothesis of the BANG model that need satisfaction and frustration in games at the contextual level regarding gaming experiences in a particular game or in general may translate into player's need satisfaction and frustration at the global level (i.e., in life) (Ballou & Deterding, 2023).

The results demonstrated that each need satisfaction and frustration indicators in video game experiences in general or in a particular game related to POG except for relatedness satisfaction in both versions. These results were similar to previous research (e.g., Allen & Anderson, 2018; Mills et al., 2018a); however, several studies demonstrated that game need satisfaction had weak positive associations with POG and that need frustration had positive associations with it (e.g., Bender & Gentile, 2020; Formosa et al., 2022; Kosa & Uysal, 2021). As need frustration scores in both versions had higher associations with POG, need-frustrating experiences in video games may be a strong risk factor for developing and maintaining game-addictive behaviors.

The present versions of the Turkish BANGS employed university students in a cross-sectional design, which can limit the generalizability of the results and the speculation of causality. The present research relied on self-report measures, raising the possibility of bias such as social desirability. The present research did not evaluate the role of need satisfaction and frustration in daily life on POG as correlations among them were provided. The current study did not perform exploratory factor analysis (EFA) because of the theoretically sound structure of the BANGS, which may still require further attempts to evaluate it in Turkish through EFA in further studies. Another limitation was the relative imbalance of participants, which also serves as a caution when interpreting measurement invariance results across gender. In addition, the autonomy frustration subscale demonstrated poor reliability in both versions of the Turkish BANGS, which was the case in the original version. This can be due to several factors (e.g., cultural differences, conceptualization, or items that could be revised). Finally, participants were free to indicate any game(s) they wanted and evaluated their experiences in that/those. As games have different genres, they may differently affect players' gaming experiences in relation to their basic needs.

Future research should examine the psychometric properties of the BANGS in diverse populations such as divergent validity, particularly among teenagers and adults. Research should employ populations in which gender is balanced and

focus on revising the autonomy frustration subscale. Further research should investigate how different game genres can affect basic needs in video games. Additional research can also investigate the longitudinal and contextual invariance of the BANGS as in the original version and test other propositions of the BANG model. These studies can be performed through objectively tracked playtime. Future research can particularly focus on compensatory game selection, need-compensating gaming, and BANG. Research can investigate how to tap into the autonomy subscales in video games and strive to develop single-item versions of basic needs in video games.

In conclusion, the results of both versions of the BANGS demonstrate that the Turkish BANGS is a valid and reliable measure to assess BANG. This study highlights the importance of need-supportive and need-frustrating experiences in video games and their potential outcomes in real-life need satisfaction and well-being. The results suggest that need-supportive and need-frustrating experiences in video games may be instrumental in individuals' sense of coherence, purpose, and significance in life. As video games and gaming become more pervasive around the globe, identifying and improving healthy gaming experiences in the context of basic needs may warrant broader implications for individuals' well-being and mental health. Further research should explore the complexity of BANG and mental health outcomes across diverse cultural and demographic contexts.

Acknowledgements

The authors thank Nick Ballou for their feedback and contributions.

Author contributions

Conception: M.S.; Design: M.S., E.G.; Data acquisition: H.K., S.B.; Data interpretation: M.S., E.G., E.N.O.; Drafting of the manuscript: M.S.; Critical revision of the manuscript: E.G., H.K., S.B., E.N.O. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ethical Evaluation of Empirical Research Projects of the Department of Psychology of the HSE University (Date: February 20, 2024). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Funding

This study was prepared within the framework of the HSE University Basic Research Program.

Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

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