BMC Psychology

RESEARCH Open Access

Internet gaming disorder and verbal communication skills: the predictive role of listening and speaking skills in internet gaming disorder

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Abstract

Objective The aim of this study is to examine the impact of verbal communication skills, including speaking self-efficacy and different listening styles, on Internet Gaming Disorder (IGD). In this context, it is considered that weak communication skills may increase the tendency towards digital games. Accordingly, the study investigates the predictive role of middle school students' verbal communication skills on IGD.

Method The study was conducted in April-May 2025 using a quantitative approach and the relational screening model, and 495 middle school students from a province in Türkiye participated in the study. Data were collected using the Sociodemographic Data Form, the Internet Gaming Disorder Questionnaire, the Internet Gaming Cognition Scale, the Listening Styles Profile - Revised Scale, and the Speaking Self-Efficacy Scale. For data analysis, Pearson correlation, partial correlation, group comparisons, hierarchical regression, and moderation analyses were utilized. The Benjamini-Hochberg False Discovery Rate (FDR) procedure was applied to control for Type I error inflation in correlation analyses.

Results A significant negative correlation was found between IGD and speaking self-efficacy. Among the listening styles, relational and analytical listening were negatively correlated with IGD, whereas transactional listening was positively correlated. Hierarchical regression analysis revealed that communication skills explained an additional 9.2% of variance in IGD beyond demographic factors. Speaking self-efficacy ($\beta = -0.257$, $p < 0.001$) and transactional listening ($\beta = 0.134$, $p = 0.002$) emerged as significant predictors. Gender and age showed significant differences in relation to IGD; male students were identified as being in a higher risk group. Moderation analyses indicated that these effects did not differ by gender.

Discussion The findings revealed that verbal communication skills have an effect on IGD. It was understood that individuals with high speaking self-efficacy were less inclined towards digital games, while students with developed transactional listening skills were more open to social satisfaction in digital gaming environments. It is suggested that enhancing verbal communication skills may have a protective effect against IGD.

Keywords Internet Gaming Disorder, Verbal Communication Skills, Listening Styles, Speaking Self-Efficacy

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Background

Communication skills, defined as the ability to understand and express, are broadly categorized into two forms: verbal and written. In Turkish school and social contexts, it is often the case thatwhile reading and writing are emphasized, speaking and listening skills receive relatively less attention [1, 2]. However, verbal communication skills play a decisive role in individuals' participation in social life and psychosocial development.

Listening, the first means of communicating with the world, also forms the foundation of other language skills [2, 3]. According to the International Listening Association (ILA), listening is defined as the process of perceiving what the speaker says, deriving meaning from it, and responding to verbal and/or nonverbal messages [4]. It is a skill that begins even before birth, serving as the primary means through which an individual first connects with the external world, and it underlies daily activities throughout life. The fulfillment of the communication, comprehension, and learning needs required by an individual's social identity is ensured through the effective use of listening skills [3, 5].

Speaking is essential for establishing social relationships and to develop skills based on these relationships, and that individuals with poor speaking skills may also experience negative effects on other language skills [6, 7]. Speaking is one of the fundamental skills that an individual must acquire in order to communicate effectively with society, express oneself, and be successful in life. Moreover, understanding, being understood, and engaging in interaction are made possible through the healthy development of this skill. The healthy development of speaking skills depends on the quality of listening skills [8].

Speaking and listening, defined as verbal communication skills, form the basis of an individual's higher-level abilities such as establishing social relationships, developing empathy, resolving conflicts, and regulating emotions. Thus, communication skills are crucial not only for academic and professional success but also in shaping behavioral patterns and habits. Indeed, weaknesses in communication skills can lead individuals to social isolation, make it difficult to cope with problems, and render them more vulnerable to certain addictive behaviors [9–11].

The increasingly widespread behavior of internet gaming among children and adolescents merits specific attention. It is known that digital games have both positive and negative effects on users. Studies have shown that digital games, when played in a controlled manner, can have benefits such as reducing fatigue and stress, supporting problem-solving skills, increasing self-confidence, and enhancing visual-attention skills [12, 13]. Additionally, educational digital games can accelerate learning and increase achievement related to the targeted subject [14].

However, Internet Gaming Disorder (IGD) has become a prevalent issue, and its frequency is rapidly increasing across all age and gender groups [15]. Children and adolescents, in particular, are more sensitive to the psychological problems that may arise from excessive digital gaming [16]. In the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), this issue was first defined as "Internet Gaming Disorder" and described as "persistent and recurrent gaming that causes clinically significant impairment or distress" [17]. In Türkiye, when examining children and adolescents, it is reported that 36% of children play digital games, with this rate being 32.7% among 6–10-year-olds and 39.4% among 11–15-year-olds [18]. Meta-analyses indicate that the prevalence of IGD ranges between 0.7% and 15.6% [19], with an approximate overall rate of 6% [20]. The COVID-19 pandemic marked a turning point in the increase of IGD, with gaming duration and the number of online multiplayer gamers rising significantly due to lockdowns, restrictions, and the shift to online education [21, 22].

Furthermore, many studies have identified that IGD leads to significant negative effects in individuals' lives, including mental health issues (e.g., depression, anxiety), behavioral problems (e.g., risky online behaviors, violence), physical issues (e.g., sleep and musculoskeletal disorders), and functional impairments (e.g., cognitive decline and academic decline) [23–27].

A review of the literature reveals that while the cognitive and behavioral correlates of IGD are well-documented —often explained through cognitive-behavioral models focusing on maladaptive thought patterns [28]— studies examining its relationship with core verbal communication skills are scarce and often lack granularity. This oversight is significant because communication skill deficits align closely with the motivational drivers of problematic use. Specifically, the Compensatory Internet Use Theory (CIUT) suggests that individuals may turn to online activities, like gaming, to cope with real-life psychosocial deficiencies [29]. From this perspective, difficulties in verbal expression or empathic listening could represent the precise type of real-world shortcoming that increases vulnerability to using games as a compensatory space for social satisfaction. Recent research supports CIUT's relevance, demonstrating how such compensatory pathways operate in modern digital contexts [30].

However, critically applying this theory to gaming reveals a nuance: not all engagement is equal. Evidence suggests that intensive and socially skilled involvement within game communities can actually foster belonging and support, whereas more casual or less socially integrated use may not confer such benefits and could

be linked to distress [31]. This distinction underscores the need to move beyond viewing communication skills merely as risk factors. A prominent critique of prevailing theoretical models is their overwhelming focus on vulnerabilities, with a notable lack of attention to identifiable protective factors [32]. More critically, no study to date has concurrently investigated the differential predictive roles of distinct listening styles (relational, analytical, transactional, critical) alongside speaking self-efficacy in the context of IGD among adolescents. This represents a significant gap, as communication is a multidimensional construct.

Therefore, this study aims to investigate the following specific research questions (RQ) and hypotheses among middle school students:

This study investigates these questions to make a dual contribution: extending the theoretical understanding of IGD by incorporating fundamental social-communication competencies, and providing actionable insights for developing targeted, skill-based preventive interventions.

Method

This research was conducted in accordance with the relational screening model, one of the quantitative research designs. The relational screening model is a descriptive approach that aims to determine whether there is a co-variation between two or more variables and, if so, the nature of this relationship [33, 34]. This model was deemed appropriate for the study as the primary objective was to determine the existence, direction, and degree of co-variation between multiple variables (IGD, listening styles, speaking self-efficacy) without manipulating them. Given the exploratory nature of examining these under-researched links, this cross-sectional design provides a necessary foundational step to identify significant associations that can inform future longitudinal or experimental studies.

Sample

The sample of the study consisted of 495 middle school students studying in the city center of Rize, a province in the Black Sea Region of Türkiye. In April and May of 2025, data were collected from all public (state) middle schools in the city center, with the aim of creating a representative sample of the adolescent population in this urban setting. No private schools were included in the sampling frame. Students who volunteered to participate in the research were included. The study was approved by the Ethics Committee of Recep Tayyip Erdoğan University (Approval No: 2024/184, Date: 08/05/2024). In accordance with the Helsinki Declaration, written informed consent was obtained from all participants aged 12 and older and from their legal guardians.

All participants who agreed to take part and for whom parental consent was obtained completed the Sociodemographic Data Form developed by the researchers, which included questions on age, gender, parental education level, and school grade. Subsequently, all participants completed the Internet Gaming Disorder Questionnaire (IGD-20 Test), the Internet Gaming Cognition Scale (IGCS), the Listening Styles Profile - Revised (LSP-R) Scale, and the Speaking Self-Efficacy Scale (SSES). Considering the importance of the data to be obtained, the scales were administered in three separate sessions. Participants with known psychiatric disorders or a history of regular medication use were excluded from the study.

Data collected from the 495 middle school students were analyzed. The mean age of the participants was 12.06 years (SD = 1.111; min–max = 10–15). Of the students, 53.1% ($n = 263$) were male and 46.9% ($n = 232$) were female. When the distribution by grade level was examined, the highest proportion was in the 7th grade (44%, $n = 218$), followed by the 5th grade (30.5%, $n = 151$) and the 6th grade (18.4%, $n = 91$). The lowest representation was among 8th-grade students (7.1%, $n = 35$).

Procedure

The data collection was carried out during regular school hours in the students' own classrooms. The survey packages, containing all scales, were administered in three separate sessions to prevent participant fatigue, with each session lasting approximately 20–25 min. A researcher was present in each session to provide standard instructions and answer questions.

Data collection tools

Sociodemographic Data Form (SDF)

This form, prepared by the researchers, was used to evaluate the participants' sociodemographic characteristics. It includes information related to age, gender, and grade distribution.

Internet Gaming Disorder Questionnaire (IGD-20 Test)

Developed by Pontes et al. (2014) and adapted to Turkish by Çakıroğlu and Soylu (2019), this scale includes the nine criteria of IGD as defined in DSM-5 [35, 36]. The scale consists of 20 items and six sub-dimensions. The internal consistency coefficient (Cronbach's alpha) was found to be $\alpha = 0.86$, indicating strong reliability [36].

Internet Gaming Cognition Scale (IGCS)

Developed by King and Delfabbro (2016) and adapted to Turkish by Çakıroğlu and Görmez (2020), this scale was designed to evaluate maladaptive cognitions related to gaming [37, 38]. It consists of four sub-dimensions and 24 items. The internal consistency coefficient for the entire scale was found to be 0.91.

The Listening Styles Profile - Revised (LSP-R) scale

Developed by Bodie, Worthington, and Gearhart (2013) to identify listening styles, this scale comprises 24 items under four factors [39]. These factors are: "Relational Listening," "Analytical Listening," "Transactional Listening," and "Critical Listening." The scale was adapted to Turkish by Kaya (2014). The Cronbach's alpha coefficient for the overall scale is 0.83, while for the sub-factors it ranges between 0.64 and 0.83 [40].

Speaking Self-Efficacy Scale (SSES)

Developed by Aksoy et al. (2021) to evaluate middle school students' speaking competencies, this five-point Likert-type scale includes 24 items. It consists of four factors: emotional, content, metalinguistic, and interactive. The internal consistency coefficient was calculated as 0.815, indicating that the scale is valid and reliable [41].

Statistical analysis

To interpret the quantitative data, IBM SPSS 25.0 software was used. In testing the hypotheses, various statistical methods were applied depending on the scale types of the variables and the research questions. To examine the relationships between IGD (measured by the IGD-20 Test) and Internet Gaming Cognition Scale with verbal communication skills (speaking self-efficacy and listening styles), Pearson correlation analysis was used. Correlation coefficients (r) were reported to determine the direction and strength of the relationships, and partial correlation analyses were conducted to control for the influence of a third factor on the relationships among variables.

For group comparisons (gender, grade level), independent samples t-tests and one-way ANOVA tests were conducted, and homogeneity of variances was assessed using the Levene test. The level of significance was accepted as $p < 0.05$, and effect sizes were calculated using Cohen's d (for t-tests) and eta-squared (η^2) (for ANOVA). All analyses were supported by reporting 95% confidence intervals and standard error values to ensure the reliability of the results.

To examine the unique contribution of communication skills beyond demographic factors and to test potential moderation effects, hierarchical regression analyses were conducted. Demographic variables (age and gender) were entered in Step 1, followed by communication skills (speaking self-efficacy, relational, transactional, and analytical listening) in Step 2. Interaction terms (gender × transactional listening and gender × speaking self-efficacy) were added in Step 3 after centering the predictors to reduce multicollinearity. R^2 change values were reported to assess the incremental variance explained by each block.

Given the number of statistical tests conducted within each family of analyses, the Benjamini-Hochberg False Discovery Rate (FDR) procedure was applied separately to each family to control for Type I error inflation. An FDR threshold of $q < 0.05$ was used to determine statistical significance. For the bivariate correlations between IGD-20 and other variables (6 tests), all correlations that were significant at $p < 0.05$ remained significant after FDR correction. For the partial correlations controlling for speaking self-efficacy (5 tests), only the correlation with transactional listening remained significant after FDR correction ($q < 0.05$), consistent with the original interpretation. Effect sizes and confidence intervals were reported alongside p-values to facilitate interpretation of the practical significance of the findings.

Results

Scale Scores and relationships between the scales

The mean total score of the IGD-20 Test was 47.62 (SD: 11.884); the mean score of the Internet Gaming Cognition Scale was 16.83 (SD: 9.807); the total score of the LSP-R Scale was 86.34 (SD: 16.439); and the total score of the SSES was 84.26 (SD: 13.774). The descriptive values of all scales and their subscales are presented in Table 1.

A strong positive correlation was identified between the IGD-20 Test total score and the total score of the Internet Gaming Cognition Scale ($r = 0.559$, $p < 0.001$). This result indicates that IGD increases in parallel with maladaptive cognitions (e.g., rule-breaking, lack of social acceptance). The relationships between the IGD-20 Test and verbal communication skills (speaking self-efficacy and listening styles) were also examined.

A statistically significant negative correlation was found between the IGD-20 Test total score and the SSES total score (r = -0.271, $p < 0.001$). Regarding the relationship between listening styles and IGD, weak negative correlations were observed between relational and analytical listening and the IGD-20 Test (r = -0.102, $p = 0.024$; r = -0.114, $p = 0.011$, respectively), which remained statistically significant after Benjamini-Hochberg FDR correction ($q < 0.05$). In contrast, a weak positive correlation was found between transactional listening and the IGD-20 Test ($r = 0.130$, $p = 0.004$), which also remained significant after FDR correction ($q < 0.05$). Critical listening showed no significant correlation with IGD ($r = 0.016$, $p = 0.717$).

The listening styles (relational, transactional, critical, and analytical) demonstrated moderate positive intercorrelations (r ranging from 0.230 to 0.589, $p < 0.001$). Significant positive correlations were found between the SSES and relational listening ($r = 0.223$, $p < 0.001$), critical listening ($r = 0.232$, $p < 0.001$), and analytical listening ($r = 0.208$, $p < 0.001$). The relationships among the scales and subscales are illustrated in Fig. 1.

Controlling for listening styles, the relationship between the IGD-20 Test and SSES was evaluated using

Table 1 Descriptive Statistics Among IGD, Gaming Cognitions, Listening Styles, and Speaking Self-Efficacy ($n = 495$)

Scales / Subscales	Minimum -Maximum	Mean	Std. Deviation
IGD-20 Test	20–86	47.62	11.88
IGCS	0–48	16.83	9.81
Belief	0–8	2.50	1.92
Rules	0–16	5.60	3.51
Self-esteem	0–14	4.97	3.35
Social Acceptance	0–10	3.76	2.56
LSP-R Scale	18–126	86.34	16.44
Relational Listening	6–42	30.17	6.99
Transactional Listening	5–35	23.07	6.17
Critical Listening	4–28	17.88	5.39
Analytical Listening	3–21	15.21	4.17
SSES	24–120	84.26	13.77
Emotional	8–40	27.18	5.54
Content	7–35	25.44	4.70
Metalinguistic	6–30	21.45	4.46
Interactive	3–15	10.19	2.54

IGD-20 Test Internet Gaming Disorder Questionnaire, *IGCS* Internet Gaming Cognition Scale, *LSP-R* The Listening Styles Profile – Revised, *SSES* Speaking Self-Efficacy Scale

Correlations

	IGD-20 Test	IGCS	Relational Listening	Transactional Listening	Critical Listening	Analytical Listening	LSP-R Total	SSES Total
IGD-20 Test	1	.559**	-.102*	.130**	.016	-.114*	-.018	-.271**
IGCS	.559**	1	-.046	.145**	.118**	-.035	.064	-.122**
Relational Listening	-.102*	-.046	1	.267**	.390**	.589**	.803**	.223**
Transactional Listening	.130**	.145**	.267**	1	.318**	.230**	.651**	.042
Critical Listening	.016	.118**	.390**	.318**	1	.382**	.710**	.232**
Analytical Listening	-.114*	-.035	.589**	.230**	.382**	1	.716**	.208**
LSP-R Total	-.018	.064	.803**	.651**	.710**	.716**	1	.240**
SSES Total	-.271**	-.122**	.223**	.042	.232**	.208**	.240**	1

Fig. 1 Correlations Between IGD and Listening Styles and Speaking Self-Efficacy. **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). Note: IGD-20 Test: Internet Gaming Disorder Questionnaire, IGCS: Internet Gaming Cognition Scale, LSP-R: The Listening Styles Profile – Revised, SSES: Speaking Self-Efficacy Scale. Significance levels for correlations with IGD-20 were confirmed using Benjamini-Hochberg FDR correction (q < 0.05)

partial correlation. A statistically significant negative correlation was found between the IGD-20 Test total score and the SSES total score (r = -0.275, $p < 0.001$). When controlling for the SSES total score, the relationships between the IGD-20 Test and the sub-dimensions of listening styles were also examined using partial correlation. A significant positive correlation was found between transactional listening and the IGD-20 Test ($r = 0.148$, $p = 0.001$). After FDR correction for the partial correlation family (5 tests), this association remained significant ($q < 0.05$). No statistically significant relationship was found between the IGD-20 Test and the other listening sub-dimensions ($p > 0.05$).

Group comparisons based on gender, age, and grade level

In gender-based comparisons, male students had significantly higher scores on the IGD-20 Test (M = 50.63, SD = 11.47) and the Internet Gaming Cognition Scale

(M = 19.38, SD = 9.85) than female students (IGD-20: M = 44.20, SD = 11.43; Cognition: M = 13.94, SD = 8.93) (t(493) = 6.24, $p < 0.001$ and t(493) = 6.41, $p < 0.001$, respectively). The effect sizes were moderate (Cohen's d = 0.56 and 0.58). There was no significant gender difference in the total scores of the SSES ($p = 0.935$) and the LSP-R ($p = 0.679$). However, in transactional listening, a significant difference was found in favor of male students (t(493) = 2.21, $p = 0.027$, d = 0.20).

A statistically significant positive correlation was found between age and the IGD-20 Test total score (r(493) = 0.126, $p = 0.005$). This finding indicates a slight increase in IGD-20 scores with age. However, the Pearson correlation coefficient of 0.126 suggests that the relationship has a small effect size according to Cohen's criteria.

Analyses based on grade level showed a statistically significant difference in IGD-20 Test total scores (F(3, 491) = 2.908, $p = 0.034$). However, the effect size was small ($\eta^2 = 0.017$), indicating that the practical significance of the differences among grade levels is limited. The highest mean score was observed in 8th-grade students (M = 52.26, SD = 12.79). For the Internet Gaming Cognition Scale, the differences among grades were more pronounced (F(3, 491) = 9.101, $p < 0.001$), with a moderate effect size ($\eta^2 = 0.053$). Eighth graders (M = 23.83, SD = 8.60) had the highest scores on this scale, while sixth graders (M = 14.54, SD = 10.49) had the lowest. No statistically significant differences were observed in LSP-R and SSES scores across grade levels ($p > 0.05$).

Hierarchical and moderation regression analyses

To examine the unique contribution of communication skills beyond demographic factors and to test potential moderation effects by gender, a hierarchical regression analysis was conducted. This hierarchical ordering reflects a theoretically grounded progression from distal demographic characteristics (age, gender) to more proximal, modifiable psychosocial factors (communication skills). Demographic variables (age and gender) were entered in Step 1, followed by communication skills (speaking self-efficacy, relational, transactional, and analytical listening) in Step 2. Interaction terms (gender × transactional listening and gender × speaking self-efficacy) were added in Step 3 after centering the predictors to reduce multicollinearity.

As shown in Table 2, Step 1 (demographic variables) explained 8.1% of the variance in IGD symptoms ($R^2 = 0.081$, F(2, 492) = 21.727, $p < 0.001$). Age ($\beta = 0.090$, $p = 0.040$) and gender ($\beta = -0.258$, $p < 0.001$) were both significant predictors, with female students reporting lower IGD scores.

The addition of communication skills in Step 2 increased the explained variance to 17.3% ($R^2 = 0.173$), with a significant R^2 change of 0.092 (F(4, 488) = 13.618, $p < 0.001$). This indicates that communication skills explain an additional 9.2% of variance in IGD symptoms beyond demographic characteristics.

In the Step 2 model, speaking self-efficacy ($\beta = -0.257$, $p < 0.001$) and transactional listening ($\beta = 0.134$, $p = 0.002$) emerged as significant predictors. Age remained statistically significant ($\beta = 0.084$, $p = 0.044$), while gender remained significant ($\beta = -0.242$, $p < 0.001$). Relational listening ($\beta = -0.017$, $p = 0.739$) and analytical listening ($\beta = -0.074$, $p = 0.153$) were not significant. Collinearity diagnostics showed VIF values below 1.617, indicating no multicollinearity issues.

The addition of interaction terms in Step 3 (gender × transactional listening and gender × speaking self-efficacy) did not significantly increase the explained variance ($\Delta R^2 = 0.005$, $p = 0.228$). Neither interaction term was

Table 2 Hierarchical and Moderation Regression Analysis Predicting IGD Symptoms ($n = 495$)

Predictors	Step 1 (β)	Step 2 (β)	Step 3 (β)
Demographic Variables			
Age	0.090*	0.084*	0.081
Gender (Female vs. Male)	-0.258***	-0.242***	-0.249***
Communication Skills (Centered)			
Speaking Self-Efficacy	-	-0.257***	-0.184
Relational Listening	-	-0.017	-
Transactional Listening	-	0.134**	0.300*
Analytical Listening	-	-0.074	-
Interaction Terms			
Gender × Transactional Listening	-	-	-0.198
Gender × Speaking Self-Efficacy	-	-	-0.097
Model Summary			
R^2	0.081	0.173	0.172
ΔR^2	-	0.092***	0.005
F (df)	21.727 (2, 492)***	17.064 (6, 488)***	16.902 (6, 488)***

*$p < 0.05$, **$p < 0.01$, **$p < 0.001$

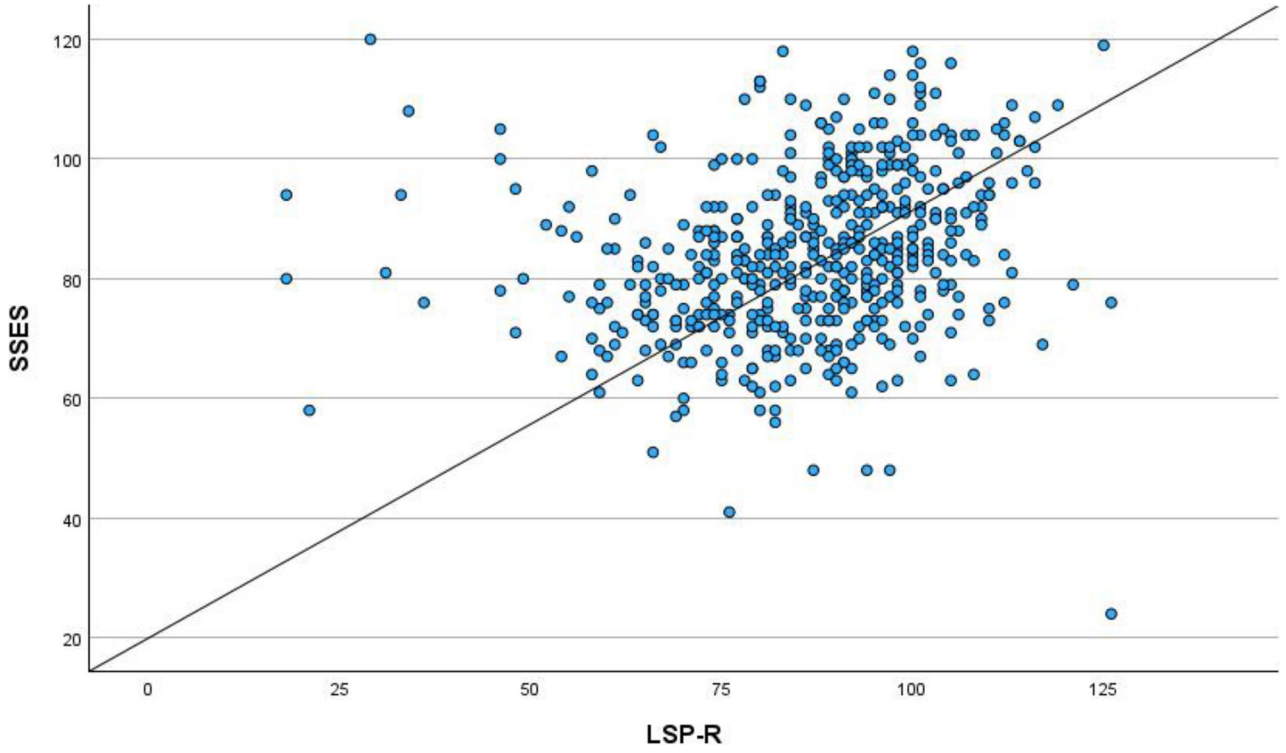


Fig. 2 Scatterplot of Listening Styles and Speaking Self-Efficacy Scores. Note: SSES: Speaking Self-Efficacy Scale, LSP-R: The Listening Styles Profile – Revised

statistically significant (gender × transactional listening: β = -0.198, $p = 0.132$; gender × speaking self-efficacy: β = -0.097, $p = 0.447$), indicating that the effects of communication skills on IGD did not differ by gender.

The relationship between listening styles and speaking self-efficacy

The scatterplot illustrating the relationship between the total scores of the LSP-R and SSES indicates a weak positive trend between the two variables. The data points in the plot show that students with high listening skills displayed a more consistent distribution in speaking self-efficacy scores, while those with lower listening scores exhibited greater variation (Fig. 2).

Discussion

In this study, IGD-20 scores of middle school students were examined in relation to their speaking self-efficacy and four different listening styles (relational, analytical, transactional, and critical listening). The findings indicate that IGD is significantly associated not only with digital gaming cognitions but also with speaking self-efficacy and various listening styles. Furthermore, the results reveal that the influence of verbal communication skills on IGD varies by sub-dimension.

The findings related to listening styles show that different forms of listening interact with IGD in different ways. *Relational listening* is a style based on sharing emotions, thoughts, and experiences in everyday social interactions. In this type of listening, the listener focuses on understanding and empathizing without judging the speaker, aiming to emotionally connect and experience the speaker's feelings [39, 40]. This empathic social bond strengthens the pursuit of face-to-face social support and prevents digital environments from being the sole source of social satisfaction. In this study, as relational listening scores increased, IGD-20 Test scores significantly decreased. In other words, students with relational listening skills exhibited fewer IGD symptoms. Recent findings generally indicate that the emotional bonds formed in face-to-face relationships reduce the likelihood of seeking satisfaction through digital games, thus lowering the risk of IGD. Various studies have shown that relational listening skills are strongly associated with social adjustment, self-esteem, and perceived emotional support [42, 43]. This sense of social support is a protective factor that reduces the risk of problematic internet use or developing IGD [44]. In a study conducted by Lo, Wang, and Fang (2005), it was found that individuals with strong social relationships gave more importance to offline friendships and used digital games for socialization purposes, but this usage did not reach problematic levels [45]. These results suggest that students with advanced relational listening skills are more likely to find satisfaction in real-life social interactions and are less inclined to resort to digital games. On the other hand, some studies

have emphasized that in-game social interactions can also provide a form of relational listening, indicating that digital gaming is not necessarily negative and may sometimes strengthen social bonds [46]. Therefore, the continuation of relational listening in digital contexts may complicate the model of its association with IGD. Notably, the protective role of relational listening identified in our study responds to the call for identifying specific protective factors against problematic internet use, an area noted as underdeveloped in theoretical models [32].

Analytical listening involves a tendency to thoroughly evaluate all arguments and possible data before responding to what the other person says. In this listening style, the individual approaches information critically and analyzes all perspectives before discussing the different dimensions of a topic. This process emphasizes reasoning and problem-solving skills [39, 40]. In this study, a significant negative relationship was observed between analytical listening scores and IGD-20 Test scores. Thus, students who could evaluate arguments more systematically exhibited fewer IGD symptoms. Analytical listening is closely related to critical thinking and cognitive flexibility [39, 40]. These cognitive skills can help students recognize the risks and fallacies within digital games [47]. Consequently, students may become more cautious in their gaming decisions by identifying potential dangers more quickly. This may support the negative relationship observed between analytical listening and IGD. On the other hand, some studies have not found a direct relationship between analytical listening and digital addiction but have suggested that awareness- and mindfulness-based interventions can help regulate digital game use [48–50]. These studies highlight that while the ability to systematically evaluate arguments and maintain awareness may be protective, it may not be sufficient on its own.

Transactional listening is a form of listening where the listener actively responds within an interactive setting, signaling that they are listening through verbal and nonverbal cues. Often equated with effective listening, this style includes body language, verbal affirmations, and relevant questions, sending the message, "I'm engaged, I understand you," to the speaker. It involves the active participation of both the listener and the speaker [39, 40]. According to the study findings, a significant positive relationship was found between transactional listening scores and IGD-20 Test scores. That is, students with transactional listening skills exhibited more IGD symptoms. Moreover, partial correlation results showed that even when controlling for speaking self-efficacy, the positive and significant relationship between transactional listening and IGD persisted. This finding stands in notable contrast to the established theoretical and pedagogical literature on transactional listening. Traditionally, this skill has been championed as a cornerstone of effective learning in academic settings [51] and, more profoundly, as a facilitator of cooperative friendship and democratic social relations in face-to-face interactions [52].

Although this may initially seem contradictory, it is understandable when considering the unique context of digital games, which provide immersive multiplayer communication platforms. In digital game environments, transactional listening may function primarily as a factor that strengthens social bonds among players. This social bonding may increase in-game friendship satisfaction and accessibility, potentially intensifying game engagement [53]. Additionally, in-game social interaction may reinforce addiction through a "reward and approval loop." As players receive more social validation, they are likely to continue gaming, which may increase IGD risk in some individuals [54]. Therefore, while transactional listening is theorized as a protective and prosocial communication skill in offline, democratic communities [52], it can become a factor that prolongs gaming time and increases IGD risk in the distinct social economy of digital gaming environments. This study suggests that the positive relationship between transactional listening and IGD may stem from the fact that this type of listening in digital settings provides a sense of in-game social connection, belonging, and "virtual community support". This sense of being heard and validated online can reinforce continued play, extending gameplay duration [53–55]. Moreover, students who engage in intensive online game interactions may temporarily show increased transactional listening skills due to their practice of online communication. This finding aligns with a compensatory use perspective, where the online gaming environment can serve as an alternative arena for exercising and receiving immediate social feedback for communication skills [31]. However, the correlational nature of this finding warrants caution. The positive association may reflect that individuals with such skills are more drawn to social games, that gaming cultivates these skills, or a reinforcing cycle between them. Longitudinal designs are needed to disentangle these possibilities.

Critical listening involves evaluating the speaker's message according to criteria such as consistency/inconsistency, logic/illogic, positive/negative, and truth/falsehood. During this process, the individual does not simply accept the information but instead questions it and analyzes its logical structure before reaching a conclusion. The listener remains highly attentive and refrains from drawing conclusions before the message is fully delivered [39, 40]. In this study, no statistically significant relationship was found between critical listening and IGD. In other words, even if students had strong skills in questioning the quality of information, this did not directly affect their level of digital game playing. Critical

listening is known to be related to the ability to distinguish accurate information and refute false cognitions [56]. This skill can make it easier to question distorted or manipulated information found in digital games. For example, a study conducted with high school students found that those with strong critical thinking tendencies developed higher risk perceptions toward digital games and made more cautious gaming decisions [57]. However, this awareness may not deter them from gaming. Other factors, such as unmet social needs, coping strategies, or lack of self-control, may play a more pivotal role in the development of addiction [54]. The absence of a significant relationship between critical listening and IGD in this study suggests that critical listening may not be a direct determinant in the development of IGD. In the literature, critical listening is often emphasized as a component of media literacy, particularly in distinguishing misinformation and addressing cognitive distortions [56, 58]. However, studies directly examining the relationship between digital game playing and critical listening are scarce. In conclusion, although critical listening may facilitate risk perception in digital games, other mediating variables may explain why study results differ from expectations.

On the other hand, a clearly negative relationship was found between participants' speaking self-efficacy scores and their IGD-20 Test scores. Moreover, partial correlation results showed that the negative relationship between IGD and speaking self-efficacy persisted even when listening styles were controlled. This indicates that as students' perceived competence in expressing themselves verbally and communicating with peers in face-to-face settings increases, their level of escape into or overuse of digital games decreases. Speaking self-efficacy includes emotional, content, metalinguistic, and interactional dimensions [41]. The emotional dimension involves affective responses toward speaking; the content dimension relates to clarifying the message and ensuring comprehension; the metalinguistic dimension refers to the conscious use of gestures, facial expressions, and body language; and the interactional dimension involves the ability to engage in two-way communication with listeners. When a student feels competent in these four areas, they are more likely to comfortably share their feelings and problems with peers or teachers and to feel satisfied with their real-life social experiences. This satisfaction may reduce the need to use digital games as an escape mechanism. Caplan (2006) demonstrated that individuals with social anxiety and low communication competence have an increased tendency toward problematic internet use, and that social competence has a protective effect [59]. Our result empirically supports the core tenet of models emphasizing real-life social competence deficits—such as the cognitive-behavioral model and CIUT —as a key vulnerability factor for IGD [28, 29]. Kuss and Griffiths (2012) also stated that individuals with strong self-expression skills are at lower risk of IGD [54]. Additionally, other studies have shown that strengthening communication skills reduces problematic digital gaming behavior [60, 61].

An important conceptual question is whether the observed associations reflect communication skills as distinct constructs or as proxies for broader social competence. The LSP-R was developed to capture four distinct listening orientations—relational, analytical, transactional, and critical—each reflecting different goals that listeners pursue in conversational contexts [39, 62]. Notably, while the four listening styles showed moderate inter-correlations in our sample (ranging from r = 0.23 to 0.59), their associations with IGD diverged: relational and analytical listening were negatively correlated, transactional listening positively, and critical listening showed no correlation. This divergence suggests that these subdimensions are not merely interchangeable indicators of a unitary 'good listening' construct but rather distinct communication orientations with different implications for digital behavior. Theoretical work on communication competence has long distinguished between specific communication skills and broader social functioning [63]. We acknowledge that listening styles and speaking self-efficacy are embedded within the broader construct of social competence. However, as Ropovik et al. (2023) noted in their large-scale meta-analysis, social factors in IGD research often show small and heterogeneous effects, suggesting that a more granular, communication-specific approach may reveal patterns masked by global social functioning measures [64]. Future research should include both global social competence and specific communication measures to disentangle their unique contributions and to establish the discriminant validity of these constructs in the context of IGD.

The hierarchical regression analysis revealed that individuals with higher speaking self-efficacy had lower levels of IGD, while those with higher transactional listening skills had higher levels, with communication skills explaining an additional 9.2% of variance beyond demographic characteristics. The final model explained approximately 17.3% of the total variance in IGD symptoms. While statistically significant, the practical significance of these findings should not be overstated. However, even small effect sizes can be meaningful in prevention contexts when targeting modifiable psychosocial factors at a population level.

The effect sizes observed were small to modest. Importantly, these modest effect sizes are consistent with the broader IGD literature. A comprehensive meta-analysis synthesizing 253 studies with over 210,000 participants reported that many well-established risk factors for IGD

(e.g., life satisfaction, education, self-esteem) show effect sizes as small as r = -0.13 to r = -0.24, with high heterogeneity across studies [64]. Similarly, another large-scale meta-analysis of 39 longitudinal studies with over 37,000 participants reported comparable modest effect sizes for risk factors such as depression (r = 0.18), anxiety (r = 0.21), and self-esteem (r = -0.19) [65]. While studies examining broader sets of psychological predictors have reported higher explained variance [66, 67], our model focused specifically on communication skills, which represent only one piece of the multifactorial puzzle of IGD.

IGD is a multifaceted condition likely influenced by a confluence of factors beyond the scope of this study, including personality traits (e.g., impulsivity, neuroticism), family dynamics, mental health comorbidities (e.g., ADHD, depression), game design elements, and broader cultural norms around gaming [68–71]. Thus, our model identifies specific communicative risk/protective factors rather than fully predicting IGD. The modest explanatory power confirms that IGD is multiply determined and that future research should integrate additional variables alongside communication skills.

Age and gender had significant effects on IGD and game-related cognitions, but play a more limited role in communication skills. The findings provide data for interventions aimed at understanding digital behaviors during adolescence in relation to age and gender. The current literature shows that males are at significantly higher risk for IGD than females. For example, in a study involving 3,075 Chinese adolescents, the prevalence of IGD was 19.2% in males and 7.8% in females [72]. Research also shows that age is an independent risk factor for IGD. A large-scale meta-analysis of 407,620 adolescents and young adults found that the prevalence of IGD was 8.8% (95% CI: 7.5–10.0) among adolescents and 10.4% (95% CI: 8.8–11.9) among young adults, suggesting that risk may vary with age [73]. Therefore, considering the evident effects of age and gender on IGD, it is important to develop preventive strategies for at-risk groups and to plan targeted interventions to mitigate these factors.

Among the strengths of this study is its examination of IGD not only in terms of young individuals' digital gaming habits but also in terms of communication dimensions such as listening styles and speaking self-efficacy. The investigation of listening styles by sub-dimensions adds a new perspective to a field largely dominated by cognitive factors in the literature. This approach broadens the literature by addressing IGD alongside social and communicative dimensions, not solely individual cognitive elements.

A methodological strength of the study is the exclusion of participants with known psychiatric disorders. This approach minimizes potential confounding effects of conditions such as ADHD, depression, and anxiety—which frequently co-occur with IGD—thereby strengthening internal validity and allowing for a clearer estimate of the unique associations between communication skills and IGD symptoms.

Furthermore, the data obtained from 495 students provide a robust sample at the middle school level, increasing the generalizability of the results within the studied population. The study used multidimensional statistical approaches—including correlation, partial correlation, group comparisons, hierarchical regression, and moderation (interaction) analyses—which enabled a comprehensive evaluation of the effects of listening styles on IGD from different perspectives. The application of Benjamini-Hochberg FDR correction for multiple comparisons further strengthens the methodological rigor of the findings.

Practical implications

The findings of this study carry significant implications for developing preventive strategies against IGD in educational settings. Based on our results, we propose the following evidence-based intervention strategies:

- *Enhancing Speaking Self-Efficacy*: The strong negative association between speaking self-efficacy and IGD suggests that interventions aimed at boosting adolescents' confidence in verbal expression, emotional sharing, and interactive communication could serve as a key protective factor. School curricula and counseling programs could incorporate structured activities, such as role-playing, group discussions, and presentation exercises, to target the emotional, content, and interactional dimensions of speaking.
- *Navigating Transactional Listening in Digital Contexts*: The positive link between transactional listening and IGD highlights a nuanced risk. While this skill is beneficial in face-to-face settings, it may deepen engagement in online multiplayer games due to the social rewards it affords. This indicates a critical need for media literacy education that helps students critically reflect on the nature, quality, and potential compulsivity of online social interactions versus real-world connections.
- *Fostering Protective Listening Styles*: Promoting relational and analytical listening skills—which were negatively correlated with IGD—through empathic listening exercises and critical evaluation tasks could help students derive greater satisfaction from offline relationships and think more systematically about gaming content and their own motivations.

Therefore, a holistic prevention strategy should move beyond merely limiting screen time. Instead, it should

focus on proactively building these specific communication competencies while integrating psychoeducation about healthy digital habits. Such an approach, potentially implemented through targeted school-based programs, could more effectively address the psychosocial roots of problematic gaming.

Limitations and recommendations

Among the key limitations of the study is the fundamental inability to determine causal relationships between variables due to its cross-sectional design. For example, it cannot be clearly established whether IGD reduces listening skills or whether poor listening skills increase IGD. The observed associations, while informative, should be interpreted as correlational rather than causal. Due to the cross-sectional design, no causal inferences can be drawn. Alternative directional models (e.g., IGD leading to reduced communication engagement, or bidirectional relationships) are equally plausible. Our use of predictive language (e.g., "predictors") is statistical in nature and does not imply temporal or causal precedence.

Additionally, since all data and scale responses were based on students' self-reports, the findings are subject to well-known limitations of this method. In particular, social desirability bias could affect reporting of sensitive (IGD) or positive (communication skills) traits, and recall bias may influence gaming habit accounts. The sole reliance on self-reports also precluded multi-informant data (e.g., from parents or teachers) that could have offered more objective validation.

Participants with known psychiatric disorders were excluded to control for potential confounding effects of conditions (e.g., ADHD, depression, anxiety) known to co-occur with IGD. While this strengthens internal validity, it may limit generalizability to clinical populations where IGD often presents with comorbidities. Future studies should specifically examine these relationships in clinical samples to test whether the observed associations differ in severity or pattern.

The regression model did not include potential confounders such as socioeconomic status, family functioning, academic performance, or total gaming time. These variables may influence both communication skills and IGD risk and should be included in future studies to test the robustness of our findings. Among these, total gaming time is particularly noteworthy as a potential confounder; future studies should measure objective gaming time to disentangle the unique contribution of communication skills from mere exposure to gaming.

Furthermore, the study was conducted with middle school students from the urban center of a single province in Türkiye. Cultural factors specific to the Turkish context, such as family dynamics, educational pressures, and the local gaming ecosystem, may influence the manifestation of both communication skills and IGD, potentially limiting the generalizability of the findings to other cultural settings. Future studies should explicitly test the model in diverse cultural contexts (e.g., comparing Asian, European, and North American samples) to examine the cultural specificity of these relationships.

Our sampling strategy also presents specific considerations. While we aimed for representativeness by including all public middle schools in the city center, we did not collect individual-level data on socioeconomic status. Although sampling from all public institutions likely captured a broad socioeconomic spectrum within that setting, the inability to control for or analyze the effects of socioeconomic status remains a limitation.

The current analysis focused on main effects. While we extended our analysis to include hierarchical regression and moderation (interaction) effects (gender × transactional listening and gender × speaking self-efficacy) in response to reviewer feedback, other potential moderators (e.g., age, family functioning) remain unexplored. Additionally, mediation models were not explored within the scope of this cross-sectional study. Future research should examine potential mediating mechanisms (e.g., social support, maladaptive cognitions, self-regulation) through which communication skills may influence IGD, using longitudinal designs to establish temporal precedence.

The extent to which transactional listening skills are associated with social satisfaction in digital gaming environments should be examined in more detail. Considering that transactional listening may increase IGD risk through in-game communication dynamics, potential harms and benefits of social interaction in digital platforms should be carefully balanced. Furthermore, students' interaction styles in virtual environments should be closely monitored. Building on the cross-sectional limitation, future studies should adopt longitudinal or experimental designs to more clearly observe the causal effects of changes in various listening styles and speaking self-efficacy on IGD.

Conclusion

In conclusion, this study reveals the predictive effect of verbal communication skills on IGD, while also demonstrating how this predictive effect differs across various sub-dimensions. More importantly, it makes two key contributions to the field:

1. *Theoretical Contribution*: By investigating distinct listening styles alongside speaking self-efficacy, it extends the understanding of IGD beyond individual cognitive factors to include fundamental, multidimensional social-communication

competencies. This novel approach addresses a significant gap in the literature.

2. *Practical Contribution*: The differential associations uncovered (e.g., the protective role of speaking self-efficacy vs. the nuanced risk linked to transactional listening) provide a concrete evidence base for designing targeted, skill-focused prevention programs in schools, moving beyond generic screen-time warnings.

The findings underscore that school-based programs should include interventions aimed at improving both listening and speaking skills, tailored to their specific roles in digital behavior. Supporting relational and analytical listening skills, as well as speaking self-efficacy, from an early age may provide a protective effect against IGD among students.

Abbreviations

APA	American Psychiatric Association
B	Unstandardized Regression Coefficient
β(Beta)	Standardized Regression Coefficient
CI	Confidence Interval
CIUT	Compensatory Internet Use Theory
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
FDR	False Discovery Rate
ICD-11	International Classification of Diseases, 11th Revision
IGCS	Internet Gaming Cognition Scale
IGD	Internet Gaming Disorder
IGD-20 Test	Internet Gaming Disorder Questionnaire (20-Item Version)
ILA	International Listening Association
LSP-R	Listening Styles Profile – Revised
η^2 (Eta-squared)	Effect Size for ANOVA
R^2	Coefficient of Determination
SD	Standard Deviation
SE	Standard Error
SPSS	Statistical Package for the Social Sciences
SSES	Speaking Self-Efficacy Scale
VIF	Variance Inflation Factor
WHO	World Health Organization

Acknowledgements
This study has been supported by the Recep Tayyip Erdoğan University Development Foundation(Grant number: 02025011017763).

Authors' contributions
Uğur Tekeoğlu conceptualized the study, secured ethical approval and resources, conducted the literature review, and drafted the original manuscript. Bekir Gökçe contributed to the methodology, performed the statistical analysis, and critically reviewed and revised the manuscript. Both authors read and approved the final version of the manuscript.

Funding
This study has been supported by the Recep Tayyip Erdoğan University Development Foundation.
(Grant number: 02025011017763)

Data availability
The data that support the findings of this study are openly available in figshare at [http://doi.org/10.6084/m9.figshare.29804294](http:/doi.org/10.6084/m9.figshare.29804294) .

Declarations

Ethics approval and consent to participate
The study was approved by the Ethics Committee of Recep Tayyip Erdoğan University (Approval No: 2024/184, Date: 08/05/2024). In accordance with the Helsinki Declaration, written informed consent was obtained from all participants aged 12 and older and from their legal guardians. All data were anonymized prior to analysis to ensure confidentiality.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 7 August 2025 / Accepted: 15 May 2026
Published online: 23 May 2026

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