



Original

The impact of a service-learning program based on social and emotional learning to prevent internet gaming addiction among adolescents



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ABSTRACT

In recent years, a substantial rise in the prevalence of internet gaming disorder has been observed, predominantly among adolescents. In this regard, social and emotional competencies have been shown to be protective factors against the development of internet gaming disorder. Nevertheless, research on social and emotional learning is limited regarding their impact on the prevention of internet gaming disorder. In light of the significance of integrating social and emotional learning into school instruction, this study utilized a service-learning approach to facilitate this integration. The objective was to estimate the impact of a service-learning program based on social and emotional learning on the levels of social and emotional competencies and the prevention of internet gaming disorder among Spanish adolescents. The study adopted a quasi-experimental design, with the sample divided into two groups: the intervention group ($n = 54$) and the control group ($n = 54$). The intervention group implemented a service-learning program on prevention measures against internet gaming addiction at their high school, receiving training in social and emotional competencies at the same time. The results indicate that the intervention group obtained a statistically significant improvement in social and emotional competencies and symptoms related to internet gaming disorder in comparison to the control group following the completion of the program. The obtained effect size indicates a large impact of the program. The present study proposes an innovative intervention that integrates service-learning and social and emotional learning to prevent video game addiction problems in high school students.

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El impacto de un programa de aprendizaje-servicio basado en el aprendizaje social y emocional para prevenir la adicción a los videojuegos en internet entre adolescentes

RESUMEN

El aumento sustancial en la prevalencia del trastorno por juego en internet en adolescentes ha generado un incremento en las investigaciones que se han desarrollado para determinar sus factores protectores, entre los que destacan las competencias sociales y emocionales. Sin embargo, la investigación sobre la efectividad del aprendizaje social y emocional para prevenir el trastorno por juego en internet es limitada. Dada la importancia de integrar el aprendizaje social y emocional en la instrucción escolar, este estudio ha utilizado el aprendizaje-servicio para facilitar esta integración. El objetivo ha sido determinar el impacto de un programa de aprendizaje-servicio basado en el aprendizaje social y emocional sobre las competencias sociales y emocionales y la prevención del trastorno por juego en internet en adolescentes españoles. El estudio ha adoptado un diseño cuasiexperimental, con la muestra dividida en dos: el grupo de intervención ($n = 54$) y el grupo

Palabras clave:

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de control ($n = 54$). El grupo de intervención ha implementado un programa de aprendizaje-servicio sobre medidas de prevención de la adicción a los videojuegos en su centro educativo, recibiendo simultáneamente entrenamiento en competencias sociales y emocionales. Los resultados indican que el grupo de intervención ha mejorado sus competencias sociales y emocionales y síntomas relacionados con el trastorno por videojuegos en comparación con el grupo de control. El tamaño del efecto obtenido indica un gran impacto del programa. Este estudio propone una intervención innovadora que integra el aprendizaje-servicio y el aprendizaje social y emocional para prevenir los problemas de adicción a los videojuegos en adolescentes.

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Introduction

Internet gaming disorder

Since the beginning of the COVID-19 pandemic, distance education and the restriction of out-of-home activities have resulted in a significant increase in internet gaming addiction rates, affecting both the general population (where prevalence is estimated at 57.50%) and children and young adults, who are considered the most vulnerable group (with a prevalence of 19%) (Darvesh et al., 2020; Rosendo-Rios et al., 2022). However, at the Spanish national level, approximately 3% of adolescents present clear symptoms of video game addiction, with 16% reporting problematic use (Andrade et al., 2021), while the *Observatorio Español de las Drogas y las Adicciones* (2024) reveals that 5.1% of Spanish students could have an internet gaming disorder (IGD).

Addictive behaviors may be engendered by any activity that fosters an insatiable desire for more. In this sense, video games are designed to promote compulsive use, as they instigate repeated behavior, reinforce use with rewards, and maximize the time spent with a product or service (Cramer, 2018; Rosendo-Rios et al., 2022). Video games have been shown to feature highly stimulating audiovisual effects, a high frequency of events, and the possibility of playing online in multiplayer mode, which has been demonstrated to encourage continued use and trigger problems related to video game addiction (Yildiz-Durak et al., 2022).

In this regard, IGD was incorporated into the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a non-substance addiction. IGD is characterized as the recurrent utilization of the Internet for gaming activities, resulting in clinically significant impairment or distress (American Psychiatric Association, 2013). The following symptoms are indicative of this disorder (American Psychiatric Association, 2013): (a) preoccupation with Internet gaming; (b) withdrawal symptoms upon interruption of gaming; (c) increasing time spent gaming; (d) unsuccessful attempts to regulate Internet gaming; (e) decreased interest in other hobbies and leisure activities; (f) continuous excessive use of Internet gaming despite the presence of psychosocial difficulties; (g) deception of others regarding the extent of use; (h) use of Internet gaming to alleviate negative mood; and (j) endangering significant relationships and educational or professional prospects.

Social and emotional competencies

Social and emotional competencies have been shown to be protective factors against the development of IGD (Agirkan, 2023; Ayllón-Salas et al., 2024; Rosendo-Rios et al., 2022; Şenol et al., 2023). The concept of social and emotional competencies is typically employed as an umbrella term encompassing a set of skills that facilitate the expression, regulation, and comprehension of thoughts, emotions, and behaviors in routine circumstances and interactions with others (Schoon, 2021). These competencies facilitate the integration of emotion, reflection, and behavior in the

context of everyday personal and social challenges, enabling the adaptation to changing circumstances (Durlak et al., 2015; Schoon, 2021). Social and emotional competencies are structured into five interrelated sets of competencies, comprising intrapersonal skills (e.g., self-awareness, self-control), interpersonal skills (social awareness, relationship skills), and task performance (e.g., responsible decision-making) (Collaborative for Academic, Social, and Emotional Learning, 2025; Domitrovich et al., 2017; Jagers et al., 2019; Jones et al., 2019; Mahoney et al., 2020; Oberle et al., 2016; van de Sande et al., 2019): (a) self-awareness involves recognizing one's own emotions and values and understanding their impact on behavior; (b) self-control refers to regulating emotions and behaviors, managing stress, and working toward personal goals, which supports resilience and adaptability; (c) social awareness is the capacity to empathize with others and understand diverse perspectives and social norms, fostering prosocial actions; (d) relationship skills involve building and maintaining healthy relationships, communicating effectively, and resolving conflicts constructively; and (e) responsible decision-making encompasses making ethical and constructive choices about personal and social behavior, which is vital for well-being and the prevention of risk behaviors.

Social and emotional learning interventions

Social and Emotional Learning (SEL) interventions that are centered on promoting these competencies are becoming increasingly important in education (Durlak et al., 2022). SEL can be defined as the process through which individuals of all ages develop and utilize the knowledge, skills, and dispositions necessary to form a strong sense of self, regulate their emotions, pursue meaningful personal and collective objectives, demonstrate empathy, build and sustain positive relationships, and make thoughtful, ethical choices in diverse social contexts (Collaborative for Academic, Social, and Emotional Learning, 2025; Durlak et al., 2011; Jagers et al., 2019; Mahoney et al., 2020; Osher et al., 2016; Taylor et al., 2017; Weissberg et al., 2015).

SEL interventions are grounded in Waters and Sroufe's (1983) conceptualization of competence, which defines competent individuals as those capable of "generating and coordinating flexible, adaptive responses to demands and to generate and capitalize on opportunities in the environment" (p. 80). In addition, SEL interventions are the result of multiple and separate lines of empirical research that have been driven by different theoretical frameworks. In this sense, interventions with SEL are supported by the following theories (Durlak et al., 2015; Osher et al., 2016; Tolan et al., 2016): (a) systems theories (Bronfenbrenner, 1979) posit that students' social and emotional development is shaped not only by individual characteristics but also by the multiple, interconnected contexts in which they are embedded (i.e., family, school, and peer groups); (b) theories on emotional intelligence, social development and social skills training (Goleman, 1995; Salovey & Mayer, 1990) delineate the core competencies students require to navigate social environments effectively and regulate their emotions; and (c) theories related to development, learning and behavior change (Bandura,

1977) explain the mechanisms through which these competencies are acquired and reinforced over time, emphasizing the critical role of modeling, practice, feedback, and reflection in real-world situations.

In light of these theoretical frameworks, the design and implementation of the SEL intervention must consider the specific content to be incorporated into the program, the specific strategies through which the program should promote change, and the context and participants in which the intervention will be implemented (Oliveira et al., 2021). Under these circumstances, SEL interventions are designed to foster a developmental trajectory in which individuals move from being primarily guided by external influences to increasingly acting in alignment with internalized beliefs and values (Durlak et al., 2011).

According to the specialized literature, effective SEL interventions should present the following characteristics to maximize their impact on adolescent (Collaborative for Academic, Social, and Emotional Learning, 2021; Durlak et al., 2011; Fernández et al., 2021; Mahoney et al., 2020; van de Sande et al., 2019; Yeager, 2017): (a) they should be universally applied, targeting the entire student population rather than focusing exclusively on at-risk groups; (b) instruction must be explicit, structured, and adapted to the developmental stage of adolescents; (c) skills should be systematically taught, modeled by educators, practiced in varied contexts, and applied by students; (d) social and emotional competencies should be integrated into the school curriculum and connected to everyday school activities as well as broader community experiences; (e) participatory and experiential activities (e.g., collaborative group work, problem-solving tasks, or service-learning) should be incorporated to promote reflection and the practical application of skills in authentic situations; (f) implementation should maintain high quality standards, with programs led by teachers or regular school personnel who must receive sufficient training and ongoing expert supervision; and (g) the focus should extend beyond skill acquisition to transforming beliefs and attitudes, while fostering a respectful, inclusive, and engaging school climate conducive to positive youth development.

From a practical perspective, in SEL interventions students participate in interactive activities such as group discussions, collaborative problem-solving, and reflection exercises that foster self-awareness, self-control, social awareness, relationship skills, and responsible decision-making. Content organization within SEL programs is frequently structured around thematic modules, each comprising a variety of targeted activities such as guided debates, brainstorming sessions, collaborative projects, and service-learning experiences (Collaborative for Academic, Social, and Emotional Learning, 2021; Corcoran et al., 2018; Wigelsworth et al., 2016; Yeager, 2017). These activities are systematically complemented by opportunities for self-reflection, feedback from both peers and educators, and assignments that encourage the extension of SEL practice into home and community settings (Collaborative for Academic, Social, and Emotional Learning, 2021; Corcoran et al., 2018; Wigelsworth et al., 2016; Yeager, 2017). Furthermore, SEL interventions incorporate strategies to foster supportive classroom environments, multimedia resources, experiential games, and group dynamics to cultivate a participatory and supportive learning environment, thereby promoting student engagement and the practical application of social and emotional competencies (Collaborative for Academic, Social, and Emotional Learning, 2021; Corcoran et al., 2018; Wigelsworth et al., 2016; Yeager, 2017).

Social and emotional competencies and internet gaming disorder

In our review of the literature, we have not identified SEL interventions that address IGD. However, there are several correlational studies (e.g., Agirkan, 2023; Ayllón-Salas et al., 2024; Rosendo-

Rios et al., 2022; Şenol et al., 2023) that provide evidence of the negative relationship between social and emotional competencies and internet gaming addiction, so it can be determined that social and emotional competencies could be a protective factor against this problem. Many studies have established causal relationships between SEL interventions and several improvements at the social, emotional, behavioural and school level among students, as confirmed by the systematic reviews that were developed to determine the impact of these interventions (i.e., Cipriano et al., 2023; Corcoran et al., 2018; Durlak et al., 2010, 2011; Jagers et al., 2019; Murano et al., 2020; Taylor et al., 2017; Wigelsworth et al., 2016). In this regard, the meta-review by Durlak et al. (2022) revealed that SEL interventions have a significant impact on the development of social and emotional competencies, prosocial attitudes and behaviors, self-regulation, conduct problems, emotional difficulties, and academic achievement among students.

IGD is characterized as an impulse control disorder, the main feature of which is the inability to resist an impulse, drive, or temptation to perform an act harmful to oneself or others (American Psychiatric Association, 2013). In this sense, lower levels of self-control (i.e., the ability to effectively manage behaviors, thoughts, and emotions) could contribute to the development of IGD (Rosendo-Rios et al., 2022). As posited by Mills and Allen (2020), the absence of self-control can lead to elevated levels of frustration, which, in turn, may result in maladaptive behaviors related to video gaming, which, in turn, could predict the severity of IGD. Conversely, social relationships with family members, friends, and colleagues can serve as a source of motivation for individuals to engage in responsible behaviors and avoid addictive tendencies. Consequently, social and emotional competencies are imperative in fostering the development of robust and healthy relationships, which in turn can prevent the onset of addictions, including IGD (Rosendo-Rios et al., 2022).

Social and emotional learning and service-learning

As recommended by the specialized literature, the intervention presented in this study methodically incorporated social and emotional competencies through a systematic, active, focused, and explicit training approach, integrating it with school instruction (Durlak et al., 2010, 2011; Fernández et al., 2021; Mahoney et al., 2020). The integration of SEL into school instruction has been facilitated through the implementation of service-learning, since the use of active methodologies, such as service-learning, is one of the interdependent components to integrate SEL with academic instruction (Collaborative for Academic, Social, and Emotional Learning, 2021). The rationale behind this approach is that service-learning is considered a methodological strategy capable of fostering the development of a wide range of social, personal and professional competencies essential for individuals (Furco & Billing, 2002). Service-learning provides an authentic context for students to apply social and emotional competencies as they address real-world challenges within their schools and communities (Fernández-Martín et al., 2024). Given that SEL emphasizes the practical application of competencies in meaningful situations, service-learning ensures that students not only practice but also internalize these skills through active engagement in projects that respond to community needs (Fernández et al., 2024). As with effective SEL interventions, service-learning should be integrated into the academic curriculum and accompanied by structured reflection activities, which are essential for consolidating learning and fostering deeper understanding (Fernández-Martín et al., 2024). Through sustained participation in service-learning programs, students systematically develop and reinforce social and emotional competencies in authentic settings, thereby enhancing both their

personal growth and their capacity to contribute positively to their communities (Chung & McBride, 2015).

Service-learning is defined as a methodological strategy that integrates academic learning with community service (Furco & Billing, 2002). In this line, service-learning “seeks to engage students in activities that combine both community service and academic learning” (p. 25). Consequently, service-learning employs an experiential approach, promoting the active involvement of students in the community and the application of academic knowledge in real-life contexts (Bringle & Clayton, 2021). The implementation of service-learning programs has been demonstrated to produce remarkable results in the development of social and emotional competencies (Celio et al., 2011), prosocial behaviors (Fernández-Bustos et al., 2024), well-being (Chiva-Bartoll et al., 2020), social behaviors (Fernández-Bustos et al., 2024), social well-being (Chiva-Bartoll et al., 2020), empathy (Chung & McBride, 2015), self-concept (Kuhns, 2011), communication skills (Chiva-Bartoll et al., 2020) and self-control (Welkowitz & Fox, 2000). Therefore, service-learning interventions offer a unique experience in which students can apply social and emotional competencies in real contexts (Chung & McBride, 2015). These experiences are of particular importance for adolescents, as they are a period of heightened susceptibility to external influences (Chung & McBride, 2015). Thus, participation in service-learning projects could have significant positive effects on social and emotional competencies, which, in turn, could contribute to a reduction in risk behaviors such as IGD. However, research on service-learning in secondary education continues to require research with experimental or quasi-experimental designs that provide rigor to the results associated with service-learning (Filges et al., 2022). Moreover, there is an absence of service-learning interventions designed to mitigate or prevent video game addiction problems in the adolescent population.

The present study

In addressing this research gap, the present study proposes a novel integration of service-learning and SEL, with the objective of generating substantial evidence concerning the impact of this intervention on the development of social and emotional competencies and the primary prevention of IGD. Therefore, this study aims to estimate the impact of this intervention on the levels of social and emotional competencies in the adolescent population and mitigating the potential risks of addiction to this activity. To this end, the following hypotheses were established: (H1) The participants of the intervention group will demonstrate statistically significant improvements in the levels of the different areas of social and emotional competencies in comparison to the participants of the control group following their participation in the program; and, (H2) The intervention group will exhibit a reduction in their activity with video games (i.e., number of hours of gaming per week), leading to a decrease in the levels of the different areas of internet gaming addiction in comparison to the adolescent students of the control group after the completion of the program.

Method

Participants

A total of 108 students from the first ($n = 56$) and second ($n = 52$) years of secondary education from a charter high school in the urban area of the city of Granada (Granada, Spain) participated in this study. The participants were divided into two groups: an intervention group and a control group. The intervention group consisted of 54 students (28 from the first year and 26 from the second year), 30 females and 24 males, with a mean age of 11.61

years (standard deviation [SD] = .63, age range = 11–13 years). The control group comprised 54 students (28 from the first year and 26 from the second year), with a mean age of 11.61 years (SD = .63, age range = 11–13 years), while their gender distribution was 24 males and 30 females. None of the participants had IGD, given that none exceeded the cut-off point established by Fuster et al. (2016) of 75 points out of 100 on the IGD-20 Test. In addition, the intervention group had 51 occasional, two regular, and one low-risk gamers, while the control group had 53 occasional and one low-risk gamers.

The sample selection procedure was based on a non-probability sampling type (Gertler et al., 2017; Vehovar et al., 2016) involving the following steps: (a) a high school, which had participated in the previous descriptive stage of the research project (for additional information on this stage of the research project, see Ayllón-Salas et al., 2024), was selected as the field of study due to its availability and geographical proximity; (b) a group information session with the school staff and teachers of the high school was carried out, and they were informed about the characteristics, conditions, and benefits of the intervention program, while teachers were invited to participate in the implementation of the intervention program; (c) the teachers-tutors of six classroom groups of first ($n = 3$) and second ($n = 3$) years of secondary education were interested in the development of the program, so, considering the limited financial, material, and human resources available, as well as the minimum sample size required for the study, two classroom groups of first year and another two classroom groups of second year were randomly selected; and (d) once the required institutional permissions were granted, all students from the two first-year and two second-year classroom groups selected were enrolled in the program after signing the agreements. In addition, the power analysis and the minimum total ($n = 102$) and group ($n = 51$) sample size were previously calculated.

Instruments

Sociodemographic, Academic, and Gaming Data Questionnaire. This instrument is an ad hoc self-report composed of eleven items with different response alternatives. The purpose of the instrument is to collect relevant sociodemographic information (i.e., age, sex, and nationality), academic information (i.e., school, grade, group, presence of specific educational support needs, previous grade repetition, previous change of studies, and previous dropout), and gaming information (i.e., number of hours of gaming per week) from the participants.

Internet Gaming Disorder-20 Test (IGD-20 Test) (Fuster et al., 2016). Like the original version (Pontes et al., 2014), it is a Likert-type scale consisting of 20 one to five point items (i.e., 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; and 5 = strongly agree) grouped into six dimensions: (a) *salience*: excessive preoccupation with the amount of time spent playing video games (e.g., I often lose hours of sleep due to long gaming sessions); (b) *mood modification*: using gaming as a coping mechanism to escape or alleviate negative emotional states (e.g., I never play video games to feel better); (c) *tolerance*: continued dedication of increasing amounts of time to gaming, even when aware of associated problems (e.g., over the last year I have significantly increased the number of hours I play video games); (d) *withdrawal*: experiencing irritability, nervousness, anxiety, sadness, etc., when not playing games (e.g., I feel more irritable when I am not playing); (e) *conflict*: loss of interest in other activities, deceiving others about gaming time, and jeopardizing significant relationships, jobs, or educational opportunities due to excessive gaming (e.g., I have lost interest in other hobbies because of gaming); and (f) *relapse*: unsuccessful attempts to control or reduce the time spent gaming, leading to a return to problematic levels (e.g., I would like to reduce my playing time but I find it difficult). It incorporates

Table 1
Psychometric properties of the Internet Gaming Disorder-20 test (Fuster et al., 2016)

Dimensions / Items	SFE	α	ω	CRI	AVE
<i>Salience</i>		.58	.54	.62	.36
1. I often lose sleep because of long gaming sessions	.61				
7. I usually think about my next gaming session when I am not playing	.47				
13. I think gaming has become the most time-consuming activity in my life	.68				
<i>Mood modification</i>		.73	.77	.64	.40
2. I never play games in order to feel better	.40				
8. I play games to help me cope with any bad feelings I might have	.98				
14. I play games to forget about whatever's bothering me	.92				
<i>Tolerance</i>		.81	.82	.67	.42
3. I have significantly increased the amount of time I play games over last year	.50				
9. I need to spend increasing amounts of time engaged in playing games	.54				
15. I often think that a whole day is not enough to do everything I need to do in-game	.85				
<i>Withdrawal</i>		.74	.74	.77	.54
4. When I am not gaming, I feel more irritable	.74				
10. I feel sad if I am not able to play games	.46				
16. I tend to get anxious if I can't play games for any reason	.93				
<i>Conflict</i>		.69	.62	.84	.52
5. I have lost interest in other hobbies because of my gaming	.65				
11. I have lied to my family members because the amount of gaming I do	.74				
17. I think my gaming has jeopardised the relationship with my partner	.68				
19. I know my main daily activity (i.e., occupation, education, homemaker, etc.) has not been negatively affected by my gaming	.67				
20. I believe my gaming is negatively impacting on important areas of my life	.85				
<i>Relapse</i>		.56	.61	.72	.47
6. I would like to cut down my gaming time but it's difficult to do	.81				
12. I do not think I could stop gaming	.55				
18. I often try to play games less but find I cannot	.68				

Note. SFE = standardised factorial saturation; α = Cronbach's alpha; ω = McDonald's omega; CRI = composite reliability index; AVE = average variance extracted.

diagnostic criteria for IGD from the DSM-5 and follows Griffiths' (2005) addiction model with six dimensions. Scores on this test range from 20 to 100 points, categorizing individuals into five types or subgroups of gamers: (a) occasional gamers (score below 45); individuals who engage in gaming infrequently; (b) regular gamers (score between 45 and 54); individuals who engage in gaming regularly but at a moderate level; (c) low-risk gamers (score between 55 and 64); individuals with a low risk of experiencing gaming-related problems; (d) high-risk gamers (score between 65 and 74); individuals with a higher risk of gaming-related issues; (e) disordered gamers (score above 75); individuals with scores indicating potential gaming disorder. The Spanish version showed satisfactory psychometric properties (Fuster et al., 2016). Indeed, in this study, the scale yielded a Cronbach's alpha (α) and a McDonald's omega (ω) between .54 and .82, a composite reliability index (CRI) between .62 and .84, and an average variance extracted (AVE) between .36 and .54 (Table 1). Furthermore, a six-correlated first-order factors Confirmatory Factor Analysis (CFA) was estimated (Table 1), with adequate fit indexes: Satorra-Bentler Chi-squared ($S-B\chi^2$) (118) = 193.84, $p < .00$, $S-B\chi^2/\text{degrees of freedom (df)} = 1.64$, Comparative Fit Index (CFI) = .98, Goodness of Fit Index (GFI) = .97, Root Mean Squared Error of Approximation (RMSEA) = .08 (90% Confidence Interval (CI) = .06-.10).

Social and Emotional Learning Scale (SEL Scale) (Fernández et al., 2022). It is a Likert-type instrument comprising 30 items with responses on a scale from one to four (1 = never or rarely; 2 = occasionally; 3 = often; and 4 = almost always or always). These items are organized into five domains of social and emotional competencies: (a) *self-awareness*: the ability to accurately identify one's emotions, thoughts, and values and how they influence behavior, including the ability to assess one's strengths and limitations with confidence, optimism, and a growth mindset (e.g., I can easily describe my emotions); (b) *social awareness*: the ability to understand other people's perspectives, regardless of their different backgrounds and cultures, involving the ability to express your own ideas respectfully and without putting down others (e.g., I can easily recognise how another person is feeling by their facial expressions, gestures, tone of voice, etc.); (c) *self-control*: skills for managing

emotions, thoughts, and behaviors in various situations, including setting and achieving school goals with self-discipline and motivation, using planning and organizational strategies (e.g., I know how to stay calm when I feel under pressure); (d) *relationship skills*: skills for building and maintaining positive relationships with different people, including the ability to communicate clearly, listen actively, and work well with others (e.g., I use appropriate verbal language when conversing with friends, family, classmates, etc.); and (e) *responsible decision-making*: skills to make constructive decisions about personal behavior and social interactions based on ethical standards, safety and social norms, including the realistic assessment of the consequences of various actions and consideration of personal well-being and that of others, as well as the identification of problems, proposal of solutions, and implementation of actions that contribute to improving the environment (e.g., when I have to make a decision or face a problem... I think of all possible options or coping strategies before I act or decide). The scores for each of the five areas range from one to five points, with higher scores indicating higher levels of social and emotional competencies. This scale is among the select instruments available for measuring social and emotional competencies in Spanish adolescents and young adults. The original scale showed satisfactory psychometric properties (Fernández et al., 2022). Likewise, in the sample of this study, the scale showed a α and a ω between .60 and .84, a CRI between .74 and .89, and an AVE between .37 and .58 (Table 2). In addition, a five-correlated first-order factors CFA was estimated (Table 2), with adequate fit indexes: $S-B\chi^2$ (395) = 859.46, $p < .00$, $S-B\chi^2/\text{df} = 2.18$, CFI = .93, GFI = .91, RMSEA = .10 (90% CI = .09-.11).

Design and procedure

A quasi-experimental research design with non-equivalent groups enhanced with matching or statistical control techniques was adopted to test the hypotheses of this study (Ato et al., 2013; Blasco & Casado, 2009; Gertler et al., 2017; Rossi et al., 2003). The study was conducted in accordance with the Ethical Committee of the University of Granada (3494/CEIH/2023) and the Declaration

Table 2
Psychometric properties of the Social and Emotional Learning scale (Fernández et al., 2022)

Social and emotional competencies / Items	SFE	α	ω	CRI	AVE
<i>Self-awareness</i>		.78	.80	.87	.58
1. I can easily describe my emotions	.80				
2. I understand my moods and feelings	.76				
3. I know how my emotions influence what I do	.69				
4. I am confident that I can successfully complete any school assignment	.67				
5. I try my best when doing difficult homework or schoolwork, as this is what allows me to improve	.86				
<i>Social awareness</i>		.60	.62	.74	.37
6. I can easily recognize how another person is feeling by their facial expressions, gestures, tone of voice, etc.	.67				
7. It is easy for me to understand why people feel the way they do	.68				
8. If someone close to me is sad or happy, upset or nervous, I have a pretty good idea why	.35				
9. I am respectful of anyone's ideas, even if they are different from mine	.58				
10. I find it easy to defend my ideas without putting anyone down	.70				
<i>Self-control</i>		.83	.84	.89	.46
11. I know how to stay calm when I feel under pressure	.50				
12. Whatever happens to me, I can keep calm	.55				
13. When I am angry with someone, I calm down and then talk to him/her about it	.51				
14. I am clear about my school goals	.60				
15. I am able to work effectively to achieve long-term school goals	.88				
16. I am disciplined (i.e. I follow certain routines to do my homework accurately)	.74				
17. I concentrate easily on the schoolwork I have to do	.76				
18. I carefully plan my homework according to my goals	.85				
19. I resist any temptation or distraction while doing my homework	.55				
20. If I commit to a school assignment, I do it. I know how to motivate myself	.73				
<i>Relationship skills</i>		.67	.70	.80	.45
21. I use appropriate verbal language when conversing with friends, family, classmates, etc.	.54				
22. I am confident in my ability to work as part of a team in class	.86				
23. I treat all members of my team in class in the same way, politely and respectfully	.65				
24. I offer help or help others when I think they need it	.68				
25. I get on well with my classmates	.58				
<i>Responsible decision-making</i>		.75	.75	.88	.58
26. When I have to make a decision or face a problem... I think of all possible options or coping strategies before I act or decide	.77				
27. When I have to make a decision or face a problem... I consider the advantages and disadvantages of each option or strategy before acting or deciding	.76				
28. When I have to make a decision or face a problem... I check that my decisions or actions are having positive results	.81				
29. I care about the welfare of my environment or community	.74				
30. I help members of my environment or community	.74				

Note. SFE = standardised factorial saturation; α = Cronbach's alpha; ω = McDonald's omega; CRI = composite reliability index; AVE = average variance extracted.

of Helsinki (World Medical Association, 2013). This research has been funded by the Fundación Pública Andaluza Centro de Estudios Andaluces (ROR: <https://ror.org/05v01tw04> and Crossref Funder ID 100019858), through project PRY127/22 entitled "Influence of video game addiction in the adolescent population of Andalusia in educational and family contexts". After signing the participation agreements, the classroom group was the unit of random assignment to either intervention or control conditions. Therefore, the final sample consisted of the intervention group, made up of a first-year classroom and a second-year classroom, and a control group, made up of a first-year class and a second-year classroom. In addition, it was confirmed that both groups were equivalent on some observable characteristics that may influence the results and/or be affected by the intervention (i.e., control or covariate variables) (Ato et al., 2013; Gertler et al., 2017):

- The variables nationality (Spanish), prior change of studies (none), and previous dropout (none) exhibited identical or analogous values across both groups.
- Other variables had identical proportions in both conditions, such as age (11 years = 46.30%, 12 years = 46.30%, 13 years = 7.40%), sex (male = 44.40%, female = 55.60%), grade

(first = 51.85%, second = 48.15%), presence of specific educational support needs (yes = 7.41%, no = 92.59%) and previous grade repetition (yes = 5.56%, no = 94.44%).

- The independent samples *t*-test did not yield statistically significant results, indicating that there are no differences between the intervention group and the control group in the study variables (Table 4).

The intervention plan was implemented during the first trimester of the 2024/2025 school year and was composed of the elements and characteristics of the SEL model (Durlak et al., 2010, 2011; Fernández et al., 2021; Mahoney et al., 2020). Therefore, a systematic, active, focused, and explicit training of a series of social and emotional competencies (i.e., self-awareness, social awareness, self-control, relationship skills, and responsible decision-making) was established, together with a series of changes in the immediate environment of the participants (i.e., positive school climate, sense of belonging, and security), all effectively integrated with school instruction during the tutoring timetable. The students were not informed about the purpose of the intervention, which was implemented as another tutoring activity. In this vein, the contents associated with the video game activity were addressed through a

service-learning project, with their corresponding evaluative processes, using tools aimed at promoting reflection, metacognition, and conscious learning of the participants (i.e., learning portfolio). Each student completed their portfolio during the final five minutes of each session, detailing what they had learned, how they had learned it, and why what they had learned was important, as well as listing their emotions during the session. The service-learning project was based on the PLACE model (i.e., an upscaled model that builds on evidence-based service-learning programs) (Centre for European Volunteering, 2022a) and was guided and supervised by the tutor-teacher of the classroom ($n = 2$) and a member of the research team during 15 sessions. The implementation of the service-learning project consisted of the following five stages.

The prepare stage (one session) involved training high school tutor-teachers to implement the service-learning model based on SEL and designing and planning the service-learning framework. The three-hour training session was structured into three sections (September 10, 2024), in which the following contents were delivered using an active and participatory methodology: (a) section one (one hour): description and use of the Service Learning Upscaling Social Inclusion for Kids (SLUSIK) Toolkit (i.e., service-learning protocol: a set of materials in which each phase of the PLACE model was presented in a structured manner) (Centre for European Volunteering, 2022b) and the CASEL Guide to School-wide SEL-Focus Area 3 Classroom (i.e., guidance and resources to promote SEL for students) (Collaborative for Academic, Social, and Emotional Learning, 2021), which were previously provided to participants' high school teachers at the end of the previous academic year (June 2024); (b) section two (one hour): selecting strategies to foster supportive classroom environments (i.e., establish classroom routines and structures, respond to student perspectives and needs, co-develop shared agreements and goals), explicit SEL instruction (i.e., direct instruction and activities to development self-awareness, social awareness, self-control, relationship skills, and responsible decision-making; workshops, debates, interviews, focus groups, collaborative projects, service-learning projects, self-care checklists, breathing exercises, emotional portfolio, reading and analyzing social stories), and integration of SEL and academics (i.e., aligning SEL and objectives of the tutoring plan, taking a student-centered approach and using interactive pedagogy, such as service-learning); and (c) section three (one hour): designing and planning the service-learning framework, identifying the types of community needs or activities (i.e., internet gaming addiction) that best support students' learning goals (i.e., objectives of the tutoring plan: promote healthy lifestyles, both physically and emotionally and socially, including addiction prevention and promoting general well-being; develop key competencies; develop self-awareness and self-esteem, helping students build an accurate image of themselves, their abilities, and their potential; promote the acquisition of study and work habits, teaching learning, organization, and personal planning techniques; enhance autonomy and responsibility, promoting independent task management and involvement in the learning process; promote student integration into the classroom and school life, creating an environment of coexistence, tolerance, and respect; foster social and coexistence skills, promoting active participation, cooperation, respect, and peaceful conflict resolution; provide guidance in academic and professional decision-making, providing information and support so that students can choose based on their interests, abilities, and personal situation) within the selected curriculum content (i.e., tutoring content: healthy lifestyles and personal, social and learning to learn competence –self-awareness; self-regulated learning; social awareness; social skills; decision-making).

The link stage (two sessions) involved connecting participating students with their high school community partner (i.e., guidance department) and selecting school community needs (i.e., inter-

net gaming addiction) that aligned with the learning objectives (i.e., objectives of the tutoring plan). On the one hand, in the first session (one hour), the high school counselor presented to the students the organization, objectives, and activities of the guidance department, as well as the most prevalent problems among the high school's students, highlighting internet gaming addiction. He also raised the need to study this problem at the high school and implement preventive measures, with students being responsible for their design and development, all as a tutoring activity. For this purpose, a research team specialized in online video game addiction (i.e., the research team or program staff) would collaborate with and guide the students. The research team introduced themselves and implemented with the students a non-formal learning method (i.e., "Motivation, fears & expectations: Storytelling") aimed at reflecting on the students' own attitudes, motivations, and expectations towards getting involved in this project and responding to student perspectives and needs (see Centre for European Volunteering, 2022b, p. 45). On the other hand, in the second session (one hour), classroom routines and structures were established, and shared agreements and goals were co-developed between tutor-teachers, program staff, and students. Finally, another non-formal learning method (i.e., "Problem tree: Investigating the issue") with the aims of acquiring a 360° understanding of the issue to address (i.e., internet gaming addiction), identifying causes and effects, and reflecting on possible solutions (see Centre for European Volunteering, 2022b, p. 55) was implemented.

The action stage (eight sessions) involved connecting classroom learning with real-life issues and affording participating students the opportunity to apply their knowledge to real-life challenges and opportunities, fostering a sense of responsibility and civic engagement within the school community. In this regard, the participating students determined the frequency of internet gaming activity of the students at their high school, identified and analyzed its possible causes and consequences, and proposed and developed various prevention measures against internet gaming addiction. In addition, this stage involved reflecting on the outcomes of their actions and the lessons learned from their experiences. In the first four sessions, the following non-formal learning methods were developed: (a) "My project canvas: Project designing activity" (two one-hour sessions), with the aims of learning what a canvas model is and its purpose, visualizing the project's main elements, and developing teamwork skills (see Centre for European Volunteering, 2022b, p. 59); and (b) "Action plan: Project designing activity" (two one-hour sessions), with the aims of linking activities to objectives, assigning responsibilities, and setting timeframes (see Centre for European Volunteering, 2022b, p. 61). In this regard, the students decided to study the frequency of internet gaming activity among students at their high school, identifying and analyzing its possible causes and consequences. To do so, they designed a questionnaire, an interview, and a focus group to be administered to a sample of third- and fourth-year students from the high school. Subsequently, based on the results, they would design a workshop against internet gaming addiction.

In the fifth session (one hour), the "World café: Meeting with community partner" non-formal learning method was implemented with the aims of presenting project ideas to high school community partners, developing persuasive skills, and exercising presentation skills (see Centre for European Volunteering, 2022b, p. 64). The sixth session (one hour) was devoted to analyzing the information collected using the instruments and drawing conclusions about the frequency of internet gaming activity, its causes, and consequences, while the seventh (one hour) and eighth (one hour) sessions focused on the design of a workshop on preventing internet gaming addiction. In addition, the "Five fingers: Personal reflection activity" non-formal learning method was implemented to allow students to reflect on their experience and to assess

Table 3
Discriminant validity of measurement models

Variables	1	2	3	4	5	6	7	8	9	10	11
1. <i>Salience</i>	a.60										
2. <i>Mood modification</i>	b.47***	a.63									
3. <i>Tolerance</i>	b.53***	b.38***	a.65								
4. <i>Withdrawal symptoms</i>	b.57***	b.46***	b.57***	a.73							
5. <i>Conflict</i>	b.41***	b.25**	b.25**	b.51***	a.72						
6. <i>Relapse</i>	b.58***	b.47***	b.60***	b.63***	b.47***	a.69					
7. <i>Self-awareness</i>	b.10	b.08	b.12	b.16	b.01	b.11	a.76				
8. <i>Social awareness</i>	b.23*	b.15	b.15	b.18	b.07	b.09	b.37***	a.61			
9. <i>Self-control</i>	b.18	b.16	b.10	b.24*	b.15	b.14	b.60***	b.35***	a.68		
10. <i>Relationship skills</i>	b.14	b.13	b.08	b.15	b.04	b.01	b.40***	b.52***	b.51***	a.67	
11. <i>Responsible decision-making</i>	b.20*	b.18	b.12	b.20*	b.02	b.08	b.45***	b.59***	b.55***	b.64***	a.76

Note. a = square root of AVE; b = Pearson correlation; *** $p < .001$. ** $p < .01$. * $p < .05$.

their learning achievements (see [Centre for European Volunteering, 2022b](#), p. 65).

In the celebrate stage (two sessions), participating students demonstrated their learning and achievements. The sixth session (one hour) was devoted to implementing the “Gallery walk: Preparing the final event” non-formal learning method with the aims of discussing the final event and developing teamwork (see [Centre for European Volunteering, 2022b](#), p. 67). In the seventh session (one hour), the students presented the outcomes of their efforts at a public event, which was open to the school community, including families, friends, and policymakers, and developed the workshop (four parallel sessions) on preventing internet gaming addiction with the third- and fourth-year students from the high school.

The effect stage (two sessions) involved evaluating the service-learning experience by the participating students. In this stage, participating students’ ideas were fully developed, allowing them to apply their learning effectively, resulting in reciprocal benefits. In this regard, in the first session (one hour), the “6 Thinking stickers: Project final evaluation” non-formal learning method was implemented with the aims of reflecting and thinking about the activities that took place during project design and implementation and assessing both group work and also individual contribution (see [Centre for European Volunteering, 2022b](#), p. 69). Finally, in the second session (one hour), a final report was prepared.

In parallel to the intervention plan, the monitoring plan to warrant the intervention program fidelity (i.e., actions aimed at monitoring possible deviations of the program) was implemented ([Fernández et al., 2019](#)). In this regard, a member of the program staff was included as a participant observer in the classroom sessions, and weekly follow-up sessions were held between the program staff and the tutor-teacher of the class. These follow-up sessions were mainly devoted to identifying and registering difficulties in the development of the program’s activities, as well as proposing and implementing solutions and improving planning and implementation for the next classroom sessions. Finally, with the evaluation plan of the results, pre- (September 16, 2024) and post-intervention (January 9, 2025) measurements were taken of the dependent variables to test for statistically and/or educationally significant effects ([Fernández et al., 2019](#)).

Data analysis

First, the power analysis and the minimum required sample size were calculated considering the expected effect size (.50), the associated probability (.05), and the desired levels of statistical power (.80) ([Soper, 2025](#)). Second, the initial analysis of the control and dependent variables was performed following the recommendations of [Tabachnick and Fidell \(2019\)](#): descriptive analysis and checking data distribution (i.e., asymmetry and univariate and multivariate kurtosis: Kolmogorov-Smirnov test and Mardia’s coef-

ficients of multivariate skewness and kurtosis), linearity, atypical, missing, and influential cases. In addition, the structures of the measures (i.e., the IGD-20 Test and SEL Scale) were examined by means of CFAs, and to determine reliability, α , ω , CRI, and AVE were also estimated. The Fornell-Larcker criterion was used to check the discriminant validity of measurement models. Likewise, third, baseline equivalence was evaluated through the independent samples t -test, i.e., intergroup (intervention vs. control) comparisons of students’ social and emotional competencies, IGD, and number of hours of gaming per week at the beginning (pretest) of the intervention. This analysis was also performed in the post-test, while the intragroup comparisons (pretest–post-test) of these same variables for each of the groups (intervention and control) were analyzed through paired samples t -tests. Finally, an analysis of covariance (ANCOVA) was performed for each study variable. In this case, for each variable, the post-test was added as a dependent variable, the pretest as a covariate, and the group as a fixed factor, calculating the effect size using partial η^2 . Subsequently, a post hoc analysis was performed using Bonferroni correction, and Cohen’s d was calculated to determine the effect size. In addition, this analysis was performed for each of the grades (i.e., first- and second-year). Statistical analyses were performed using JAMOV ([The jamovi project, 2022](#)).

Results

The correlation of each variable with the other variables is less than the square root of the AVE of that variable ([Table 3](#)). Therefore, the discriminant validity of the measurement models is confirmed.

The descriptive statistics for the intervention and control groups in the pretest and post-test are presented in [Table 4](#). The independent samples t -test did not yield statistically significant differences in the pre-test means of the intervention group as compared to the means of the control group in all variables, while in the post-test the independent samples t -test indicated statistically significant differences in all variables ([Table 4](#)). The paired samples t -tests revealed statistically significant differences between the intervention group’s pretest and post-test results regarding all variables except *salience*, and this analysis also showed statistically significant differences between the control group’s pretest and post-test results in all variables except *salience* and *mood modification* ([Table 4](#)).

The results of the ANCOVA for the variables of social and emotional competencies, IGD, and number of hours of gaming per week are presented in [Table 5](#). The results revealed statistically significant differences between the intervention and control groups on all the variables after controlling for pretest scores. In relation to the group variable, all variables except *salience* exhibited a moderate effect size. Specifically, *self-awareness* (partial $\eta^2 = .45$), *social awareness* (partial $\eta^2 = .40$), *self-control* (partial $\eta^2 = .31$), *relation-*

Table 4

Descriptive statistics, intergroup and intragroup comparisons on social and emotional competencies, IGD, and number of hours of gaming per week

Variables / groups		Pretest			Posttest			<i>t</i> pre-post intragroup
		<i>M</i>	<i>SD</i>	<i>t</i> intergroup	<i>M</i>	<i>SD</i>	<i>t</i> intergroup	
Social and emotional competencies								
<i>Self-awareness</i>								
Experimental	3.19	.44	.00	3.52	.27	8.83***	-5.29***	
Control	3.19	.49	2.93	.40		3.74***		
<i>Social awareness</i>								
Experimental	3.28	.46	.92	3.47	.34	6.74***	-3.65***	
Control	3.20	.54	3.03	.34		3.53***		
<i>Self-control</i>								
Experimental	3.09	.50	-.32	3.24	.28	3.71***	-3.66***	
Control	3.12	.51	2.99	.42		3.44**		
<i>Relationship skills</i>								
Experimental	3.57	.39	.00	3.64	.27	5.13***	-2.60*	
Control	3.57	.39	3.32	.37		4.40***		
<i>Responsible decision-making</i>								
Experimental	3.51	.48	1.40	3.60	.35	6.29***	-2.16*	
Control	3.39	.48	3.16	.37		4.07***		
IGD								
<i>Salience</i>								
Experimental	1.27	.52	-.32	1.17	.40	-2.13*	1.19	
Control	1.30	.50		1.37	.57		-.92	
<i>Mood modification</i>								
Experimental	1.77	.97	-.14	1.53	.69	-2.19*	3.38***	
Control	1.79	.85		1.86	.91		-2.00	
<i>Tolerance</i>								
Experimental	1.14	.42	-1.59	1.03	.15	-4.01***	2.44*	
Control	1.28	.51		1.35	.56		-2.66**	
<i>Withdrawal</i>								
Experimental	1.16	.47	.00	1.05	.20	-4.15***	2.23*	
Control	1.16	.42		1.34	.47		-3.64***	
<i>Conflict</i>								
Experimental	1.53	.48	1.78	1.29	.45	-2.59*	4.79***	
Control	1.37	.42		1.52	.48		-3.64***	
<i>Relapse</i>								
Experimental	1.28	.53	-.74	1.11	.27	-4.57***	3.07**	
Control	1.36	.67		1.54	.64		-2.73**	
IGD-20								
Experimental	27.44	8.65	-.05	24.80	7.44	-3.12**	4.15***	
Control	27.48	8.25		29.24	7.33		-4.59***	
Number of hours of gaming per week								
Experimental	2.42	2.47	.02	1.55	1.69	-3.95***	6.36***	
Control	2.41	2.62		3.56	3.34		-6.85***	

Note. *M* = mean; *SD* = standard deviation; *t* = *t*-test; ****p* < .001. ***p* < .01. **p* < .05.

ship skills (partial $\eta^2 = .27$), responsible decision-making (partial $\eta^2 = .33$), and number of hours of gaming per week (partial $\eta^2 = .46$) are highlighted.

The Bonferroni post-hoc results are presented in Table 6. The differences observed between the adjusted means of the intervention and control groups were statistically significant for all variables, which indicates that the intervention had a positive impact on the social and emotional competencies variables and the IGD. The effect size determined by Cohen's *d* showed a large impact for the self-awareness ($d = 1.79$), social awareness ($d = 1.62$), self-control ($d = 1.33$), relationship skills ($d = 1.21$), responsible decision-making ($d = 1.41$), mood modification ($d = -0.87$), tolerance ($d = -0.93$), withdrawal ($d = -0.96$), conflict ($d = -1.1$), relapse ($d = -1.08$), and number of hours of gaming per week ($d = -1.80$). In addition, salience demonstrated a moderate effect size ($d = -0.41$).

Regarding the first-year students, the results of the ANCOVA revealed statistically significant differences between the intervention and control groups on all the variables after controlling for pretest scores except for salience. The effect size showed a large impact for the self-awareness ($d = 1.57$), social awareness ($d = 1.92$), self-control ($d = 1.29$), relationship skills ($d = 1.28$), responsible decision-making ($d = 1.36$), mood modification ($d = -1.09$), tolerance ($d = -0.86$), withdrawal ($d = -0.74$), conflict ($d = -1.24$), relapse ($d = -0.68$), and number of hours of gaming per week ($d = -1.75$). Finally, the results of the

ANCOVA with second-year students yield statistically significant differences between the intervention and control groups on all the variables after controlling for pretest scores except for salience. The effect size showed a large impact for the self-awareness ($d = 2.12$), social awareness ($d = 1.32$), self-control ($d = 1.44$), relationship skills ($d = 1.12$), responsible decision-making ($d = 1.41$), mood modification ($d = -0.81$), tolerance ($d = -0.97$), withdrawal ($d = -1.22$), conflict ($d = -0.97$), relapse ($d = -1.51$), and number of hours of gaming per week ($d = -1.81$).

Discussion

The objective of this study was to explore the potential impact of a service-learning program on the levels of social and emotional competencies in the adolescent population, with the objective of facilitating self-regulation in the use of video games and mitigating the potential risks of addiction to this activity. To this end, the following conclusions can be drawn in relation to the hypotheses that were previously established.

First, the findings indicated that the intervention group demonstrated a statistically significant enhancement in all variables of social and emotional competencies. In comparison to the control group, the intervention group exhibited higher levels on all social and emotional competence variables at the conclusion of the intervention. Intragroup comparisons also reveal that the interven-

Table 5
ANCOVA results for social and emotional competencies, IGD, and number of hours of gaming per week

Variables		Sum of Squares	df	Mean Square	F	Partial η^2
Social and emotional competencies						
<i>Self-awareness</i>	Covariate (pretest)	1.38	1	1.38	12.9***	.11
	Group	9.25	1	9.25	86.7***	.45
	Error	11.20	105	.11		
<i>Social awareness</i>	Covariate (pretest)	5.86	1	5.86	96.5***	.48
	Group	4.26	1	4.26	70.1***	.40
	Error	6.38	105	.06		
<i>Self-control</i>	Covariate (pretest)	9.07	1	9.07	212.7***	.67
	Group	2.02	1	2.02	47.4***	.31
	Error	4.48	105	.04		
<i>Relationship skills</i>	Covariate (pretest)	3.87	1	3.87	54.8***	.34
	Group	2.8	1	2.8	39.7***	.27
	Error	7.41	105	.07		
<i>Responsible decision-making</i>	Covariate (pretest)	6.61	1	6.61	52.7***	.48
	Group	3.62	1	3.62	96.2***	.33
	Error	7.22	105	.07		
IGD						
<i>Salience</i>	Covariate (pretest)	2.07	1	2.07	9.34**	.08
	Group	1	1	1	.04*	.04
	Error	23.26	105	.22		
<i>Mood modification</i>	Covariate (pretest)	54.36	1	54.36	398.1***	.79
	Group	2.77	1	2.77	20.3***	.16
	Error	14.34	105	.14		
<i>Tolerance</i>	Covariate (pretest)	12.16	1	12.16	232***	.69
	Group	1.18	1	1.18	22.6***	.18
	Error	5.45	104	.05		
<i>Withdrawal</i>	Covariate (pretest)	4.44	1	4.44	48.7***	.32
	Group	2.26	1	2.26	24.6***	.19
	Error	9.54	105	.09		
<i>Conflict</i>	Covariate (pretest)	12.43	1	12.43	120.8***	.54
	Group	3.24	1	3.24	31.5***	.23
	Error	10.7	105	.11		
<i>Relapse</i>	Covariate (pretest)	12.41	1	12.41	97.8***	.49
	Group	3.93	1	3.93	31***	.23
	Error	13.19	105	.13		
Number of hours of gaming per week	Covariate (pretest)	610	1	609.74	486***	.82
	Group	110	1	109.95	.46	.46
	Error	132	105	1.25		

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

Table 6
Bonferroni post hoc results social and emotional competencies, IGD, and number of hours of gaming per week

Variables	Comparison	Mean	Adjusted Mean Difference	Cohen's d
Social and emotional competencies				
<i>Self-awareness</i>	Intervention	3.52	.59*** (.06)	1.79
	Control	2.94		
<i>Social awareness</i>	Intervention	3.45	.40*** (.05)	1.62
	Control	3.05		
<i>Self-control</i>	Intervention	3.25	.27*** (.04)	1.33
	Control	2.98		
<i>Relationship skills</i>	Intervention	3.64	.32*** (.05)	1.21
	Control	3.32		
<i>Responsible decision-making</i>	Intervention	3.56	.37*** (.05)	1.41
	Control	3.19		
IGD				
<i>Salience</i>	Intervention	1.18	-.19* (.04)	-0.41
	Control	1.37		
<i>Mood modification</i>	Intervention	1.53	-.32*** (.07)	-0.87
	Control	1.85		
<i>Tolerance</i>	Intervention	1.08	-.21*** (.04)	-0.93
	Control	1.30		
<i>Withdrawal</i>	Intervention	1.05	-.29*** (.06)	-0.96
	Control	1.34		
<i>Conflict</i>	Intervention	1.23	-.35*** (.06)	-1.1
	Control	1.58		
<i>Relapse</i>	Intervention	1.13	-.38*** (.06)	-1.08
	Control	1.51		
Number of hours of gaming per week	Intervention	1.54	-2.02*** (.22)	-1.80
	Control	3.56		

Note. Standard errors appearing in parentheses: * $p < .05$. ** $p < .01$. *** $p < .001$.

tion group showed improvements across all social and emotional variables, whereas the control group exhibited a decline in these competencies. The effect size results were elevated, indicating that the intervention exerted a large impact on the social and emotional competencies of the students. Consequently, the H1 can be accepted.

Second, the intervention group demonstrated a decrease in the number of hours of gaming per week and in the levels of the different areas of IGD in comparison to the adolescent students of the control group after the completion of the program. The intervention group showed reductions in IGD symptoms (except salience), IGD, and number of hours of gaming per week, while the control group showed increases in all of these variables. In this case, the size of the effect obtained by the time gaming and the IGD variables was negative, indicating that the intervention had the intended impact in reducing the number of hours of gaming per week and the symptoms related to IGD. Therefore, the H2 is confirmed.

Therefore, participation in the intervention has generated a positive and statistically significant impact for the students in all the variables of social and emotional competence, number of hours of gaming per week and symptoms related to IGD, despite the highly restrictive nature of the Bonferroni correction. The impact of the intervention remained consistent across different student grades. The results obtained by first-year and second-year students were similar. However, it is noteworthy that when the data was analyzed by course, the salience variable did not obtain significant results which could be due to the reduced size of the sample that increases the standard error and reduces the likelihood of detecting significant effects.

Concerning the effect size, the specialized literature (Hattie, 2009; Kraft, 2020; Ledesma et al., 2008) indicates that it should be considered due to its capacity to indicate the practical significance of the results (Cohen, 1988). In this regard, Cohen (1988) established that an effect size of 0.20 is considered small, 0.50 is medium, and above 0.80 is large. While these levels may be considered too demanding for the field of social sciences (Gignac & Szodorai, 2016), the results obtained in this study are noteworthy. Except for the salience variable, all the social and emotional, time gaming and IGD variables obtained large effect sizes, indicating that the intervention had a substantial impact on students. Consequently, the intergroup differences in these variables can be detected through simple observation (Coe, 2002), suggesting their practical relevance (Hattie, 2009; Kraft, 2020). In summary, the findings substantiate the intervention's effectiveness in enhancing students' social and emotional competencies, concurrently reducing the number of hours of gaming per week and symptoms associated with IGD in high school students, who are occasional, regular or low-risk gamers.

These findings are consistent with prior studies that aimed to determine causal relationships between service-learning interventions and improvements in the social and emotional domains of students, as evidenced by the first systematic reviews carried out on this topic in secondary education population (Celio et al., 2011; Conway et al., 2009). Nevertheless, the most recent systematic review by Filges et al. (2022) underscores the necessity for high-quality service-learning interventions, given the inconclusive nature of the available evidence concerning the impact of these interventions. Consequently, this study contributes to the growth of the scientific corpus on the systematic evaluation of service-learning-based interventions (Filges et al., 2022).

The efficacy of this intervention appears to be influenced by the incorporation of SEL, a model that has been extensively researched and demonstrated to be effective in enhancing students' social and emotional competencies (Durlak et al., 2010, 2011; Fernández et al., 2021; Murano et al., 2020). Intervention components such as explicit instruction of social and emotional competencies (i.e.,

using a step-by-step sequenced training approach to social and emotional competencies, emphasizing active forms of learning for students to practice new skills, focusing specific time and attention on skills training, and clearly defining goals) and their integration with school instruction (Durlak et al., 2010, 2011; Fernández et al., 2021; Mahoney et al., 2020) have been able to enhance the results obtained by the intervention. However, given the methodological complexity of service-learning due to the interaction between the various agents (i.e., teachers, students, and community partners), as well as the inherent multifaceted nature of this intervention, it is challenging to isolate the effects of the intervention's constituent elements.

The significance of the impact of this intervention stems from the vulnerability of adolescents to develop IGD during their critical period of cognitive development (Rosendo-Rios et al., 2022). In this regard, the present research addresses the need to enhance our understanding of the prevention of IGD, given the rising number of cases (Rosendo-Rios et al., 2022). Considering the lack of rigorous interventions integrating service-learning and SEL, it is recommended to persist in conducting systematically evaluated interventions to accumulate evidence regarding the impact of these interventions on enhancing social and emotional competencies, as well as the primary prevention of video game addiction.

Limitations

Conducting high-quality quasi-experimental studies is challenging; therefore, it is essential to consider the limitations of the present study. These limitations include the following: (a) the non-probabilistic sampling method; (b) the small sample size; (c) the use of self-reported instruments, in which some of the dimensions (i.e., salience, conflict, and relapse) and domains of social and emotional competencies (i.e., social awareness) that comprise them have yielded reliability indicators below those recommended; (d) the lack of short-term follow-ups (such as at 3 or 6 months); and (e) the lack of process evaluation (e.g., analysis of qualitative data derived from the monitoring plan and portfolios). These factors may have compromised the representativeness of the sample and the generalizability of the results, potentially introducing measurement biases, as well as limiting our understanding of the duration and trajectory of the intervention's effects and a better understanding of the quantitative results. However, it should be noted that these limitations are frequently unavoidable, particularly in the context of educational research, given the limited resources, time, and availability of high schools willing to participate in this type of intervention.

In this regard, even though the sample size is above the minimum required size, future research should prioritize the expansion of the sample, employing probability sampling to enhance the generalizability of the results. Additionally, given the multifaceted nature of service-learning and SEL, it is essential to control for other variables that may influence the intervention's outcomes to ensure replicability. It is also indispensable to establish short-term follow-up and develop a process evaluation of the program. We believe that future studies could benefit from an integration of rigorous quantitative and qualitative methodologies to develop a further in-depth understanding of the outcomes of the program.

Finally, we can derive some other recommendations to increase the effectiveness of future replications. One has to do with strengthening the financial, material, and human resources available for the development of the program. The allocation of more personal and economic resources to address the extra workload entails for teachers and students is necessary. Additionally, strategies for integrating SEL with academic instruction can be improved. Aligning SEL with tutoring objectives and content is not the best way to integrate SEL and academic instruction, but there was no other option.

A revision of the teachers' beliefs would help to facilitate the integration of SEL and academic instruction, since each content area or academic discipline connects closely to SEL. In addition, the impact of the program on the community and community partners should be determined, as well as isolating the effects of improvements in social and emotional competencies of the content addressed associated with internet gaming addiction (e.g., including another intervention group in which internet gaming addiction content is not addressed).

Educational/practical implications

This study has clear implications for high school practice. Consistent improvements in student social and emotional competencies, IGD, and number of hours of gaming per week were found in the intervention group of this study. Therefore, it is necessary to improve teacher training based on these types of innovative interventions, the benefits of which are based on empirical evidence. The use of active methodologies, such as service-learning, is one of the interdependent components to integrate SEL with academic instruction (*Collaborative for Academic, Social, and Emotional Learning*, 2021). In this way, the adequate training of teachers will be key in improving education, especially to promote social and emotional competencies among students. The promotion of social and emotional competencies contributes to prevent social, emotional, and behavioural problems and thus guarantees the performance or well-being among students in different spheres of life. Unlike other programs, the main innovation and contribution of this research, including its results, is the possibility of using a toolkit (*Centre for European Volunteering*, 2022b) and a guide (*Collaborative for Academic, Social, and Emotional Learning*, 2021) that are available to any teacher. Thus, the teachers could use the models, resources, non-formal learning methods, activities, etc., which make up an easy-to-implement program.

Conclusions

In conclusion, the present study proposes an innovative intervention that integrates service-learning and SEL to enhance social and emotional competencies, with the aim of preventing video game addiction problems in secondary school students. The results obtained were consistent with the hypothesized impacts, demonstrating the intervention's significant positive effects on social and emotional competencies, as well as symptoms related to IGD. Consequently, this research establishes the basis for a high-quality intervention, offering a model for future studies to replicate in different settings and enhance the evidence.

Declaración de contribución de autoría CRediT

All listed authors have contributed to the manuscript substantially and have agreed to the final submitted version. *Francisco D. Fernández-Martín*: conceptualization, investigation, funding acquisition, methodology, validation, formal analysis, data curation, supervision, writing – original draft, writing – review and editing, resources. *Patricia Ayllón-Salas*: conceptualization, investigation, writing – original draft, writing – review and editing, visualization, methodology, formal analysis, supervision. *Santiago Alonso García*: investigation, funding acquisition, methodology, software, formal analysis, project administration, supervision, resources. *Francisco-Javier Hinojo-Lucena*: investigation, funding acquisition, methodology, project administration, supervision, resources.

Ethical approval statement

The study was conducted in accordance with the Ethical Committee of the University of Granada (3494/CEIH/2023) and the Declaration of Helsinki (*World Medical Association*, 2013).

Declaration of generative AI in scientific writing

The authors declare that they have not used generative artificial intelligence (AI) and AI-assisted technologies in the writing process.

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Conflict of interest

The authors report there are no competing interests to declare.

Data availability statement

The access to data and study materials is under request to the authors.

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