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Association between Internet use patterns and Internet addiction among Peruvian adolescents

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Keywords:
Internet; dependency, psychological; adolescent behavior; semantics; addiction (source: MeSH-NLM).

ABSTRACT

Objective. To determine the association between types of Internet use and Internet addiction among adolescents, specifically analyzing its dimensions: excessive use, tolerance, withdrawal, and negative consequences. **Methods.** A cross-sectional mixed-methods study was conducted with 487 Peruvian secondary school students (aged 13-18 years), in which semantic content analysis predominated. Young's Internet Addiction Test (adapted version) was applied, along with the natural semantic networks technique (co-occurrence networks using KH Coder) to categorize types of Internet use. **Results.** High levels of addiction were not limited to leisure activities but also included academic uses, such as studying, virtual classes, and completing homework. High tolerance was associated with a wide range of academic, social, and recreational activities. High excessive use showed a simultaneous integration of academic, leisure, and social activities, reflecting hyperconnectivity. High withdrawal was mainly related to the interruption of social and entertainment activities, whereas high punishment levels were associated with negative consequences in academic, family, and psychological domains. **Conclusions.** An association was found between types of Internet use and the severity of Internet addiction among adolescents, with the intensity and compulsive nature of online activities being more determinant than total connection time. Tolerance, excessive use, withdrawal symptoms, and neglect of daily responsibilities are expressed through the progressive normalization of habits encompassing academic, leisure, and social activities, as well as through emotional dysregulation when connectivity is interrupted.

Asociación entre usos y adicción a Internet en adolescentes peruanos

Palabras clave:
Internet; dependencia psicológica; conducta del adolescente; semántica; adicción (fuente: DeCs-BIREME).

RESUMEN

Objetivo. Determinar la asociación entre los tipos de uso y la adicción a Internet en adolescentes, analizando específicamente sus dimensiones: uso excesivo, tolerancia, abstinencia y consecuencias negativas. **Métodos.** Se realizó un estudio transversal de métodos mixtos con 487 estudiantes de secundaria peruanos (13-18 años), en donde predominó análisis de contenido semántico. Se aplicó el test de adicción a Internet de Young (adaptado) y la técnica de redes semánticas naturales (redes de coocurrencia con KH Coder) para categorizar los usos de Internet. **Resultados.** Los niveles altos de adicción no se limitaron al ocio, sino que incluyeron usos académicos, como estudiar, clases virtuales y hacer tareas. La tolerancia alta se vinculó con una amplia variedad de actividades académicas, sociales y recreativas. El uso excesivo alto mostró integración simultánea de actividades académicas, de ocio y sociales, lo que refleja hiperconexión. La abstinencia alta se relacionó principalmente con la interrupción de actividades sociales y de entretenimiento, mientras que los castigos altos se asociaron con consecuencias negativas en ámbitos académicos, familiares y psicológicos. **Conclusiones.** Se encontró una asociación entre los tipos de uso de Internet y la magnitud de la adicción en adolescentes, siendo más determinante la intensidad y carácter compulsivo de las actividades en línea que el tiempo total de conexión. La tolerancia, el uso excesivo, los síntomas de abstinencia y el descuido de responsabilidades cotidianas se expresan en la progresiva normalización de hábitos, los cuales abarcan tanto actividades académicas como de ocio y sociales, así como en la desregulación emocional cuando se interrumpe la conectividad.

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INTRODUCTION

Internet use has become a central activity in the lives of adolescents, offering opportunities for learning, communication, and entertainment [1]. However, despite its pedagogical and social benefits, problematic Internet use has become an increasing concern in the field of mental health [2]. From a pedagogical perspective, Livingstone et al. [3] and Li et al. [4] argue that Internet use facilitates self-directed learning and the development of critical digital literacies, enabling access to diverse educational resources. Additionally, as Morita et al. [5] and Ehrenreich [6] note, Internet use also benefits adolescents socially by providing a setting similar to a "playground" where they can explore their identity and engage in dialogue with diverse groups. This interaction fosters interpersonal connection and emotional support while reducing feelings of isolation among vulnerable adolescents. Internet addiction involves loss of control over time spent online, the presence of withdrawal symptoms, tolerance, and the persistence of the behavior (thoughts, emotions, and actions) despite negative consequences on academic performance, family relationships, and psychological health [7–9]. Furthermore, the scientific literature associates it with behavioral addictions due to its neurobiological and symptomatic similarities [10,11].

On the other hand, problematic Internet use, by focusing on specific behaviors and their dysfunctional consequences [12], aligns better than Internet addiction with modern clinical classifications, such as the dimensional model of ICD-11. However, both approaches share fundamental limitations: methodological individualism that ignores structural determinants [13], a pathologizing bias that medicalizes everyday behaviors [14], and the inability to capture the constitutive ambivalence of digital experience (e.g., how Internet use may be simultaneously problematic and meaningful) [15].

Current prospective research no longer seeks merely to "improve" these constructs but to develop entirely new frameworks that examine person–technology–environment configurations as systems [16]. These frameworks recognize that what is labeled a "problem" may represent an adaptive strategy in contexts with limited alternatives [17], as demonstrated by ethnographic studies where intensive video game use functions as a stress-coping mechanism [18]. This paradigm shift requires moving beyond the pathologizing approach through methodologies capable of capturing the dual nature of digital practices [19], integrating objective usage data with evaluations of subjective meaning [20], as implemented in this study.

In the Peruvian context, the Instituto Nacional de Estadística e Informática (INEI) [21] reported in 2022 that more than 70% of the population aged six years and older used the Internet, primarily through mobile devices, alongside a rise in cases of problematic use. Similarly, Toro-Huamachuco et al. [8] reported that in the school context more than 40% of students present problematic Internet use, and between 4% and 6% reach clinical levels of addiction. In addition, Bausari [22] found that Peruvian adolescents with greater exposure to online activities exhibit patterns of negative automatic thoughts and lower self-regulation capacity, increasing vulnerability to compulsive use.

At the international level, Colonio [23] reported that more than 50% of the Latin American adolescents evaluated showed moderate to high levels of social media addiction, with TikTok, Instagram, and WhatsApp being the main spaces for interaction and emotional validation. Furthermore, Vilca et al. [24] and Estrada et al. [25] reported correlations between intensive Internet use and decreased academic performance, as well as higher levels of anxiety and difficulties in social interaction.

Adolescents constitute a vulnerable group due to developmental factors such as impulsivity, the search for social approval, and limited emotional regulation [26,27]. Internet addiction may negatively affect not only emotional health but also young people's social behavior, particularly during the early stages of adolescence [28–30]. Therefore, this study seeks to contribute evidence that may support the design of preventive strategies and interventions aimed at mitigating the impact of this issue among adolescents, since understanding these associations is key for effective prevention and treatment [31].

In other words, despite substantial evidence regarding the negative effects of Internet addiction, a gap remains in understanding how specific patterns of Internet use are differentially associated with the concrete dimensions that constitute this phenomenon [9,32,33]. This study aimed to address this gap by investigating the association between Internet uses and Internet addiction among adolescents. Specifically, the study analyzed the association between types of Internet use and the following dimensions: (1) excessive use; (2) tolerance; (3) withdrawal; and (4) negative consequences.

METHODS

Study type and area

This was a basic study with a non-experimental cross-sectional design and a mixed-methods approach. It was conducted in three public educational institutions located in the district of San Martín de Porres, Lima, Peru, during the second semester of 2023.

Population and sample

The population consisted of 18,419 adolescent secondary-school students enrolled in public educational institutions in San Martín de Porres [34]. Ideally, if a statistically representative probabilistic sampling had been intended, an adequate sampling frame ensuring randomness and population coverage would have been required. This would have involved public access to institutional registries, enrollment lists, administrative records, or updated databases of these students.

However, due to the lack of access to such information, the sample was selected through non-probabilistic purposive sampling and included 487 secondary-school students from three public educational institutions (252 females and 235 males), ranging from the second to the fifth year of secondary education. The mean age was 14.71 years (SD = 1.20). The inclusion criteria were: adolescent secondary-school students aged 13 to 17 years who provided informed assent and whose parents or guardians provided informed consent, as well as 18-year-old students who provided informed consent. The exclusion criteria included responses showing a constant response pattern, students enrolled through "inclusive education," and students who did not attend on the days when data collection took place.

The study data were protected through security measures applied during and after data collection. Surveys were administered through Google Forms while avoiding the recording of direct identifiers. At no point were students' names or identity documents requested, and the email address used to complete the form was not retained. Access to the database was restricted exclusively to the principal investigator through a secure institutional account with password protection and two-factor authentication. Additionally, the information was stored using coded identifiers for each participant in an encrypted digital environment with periodic backups, ensuring confidentiality, integrity, and exclusive use of the data for academic and scientific purposes.

Variables and data collection instruments

The variable Internet addiction was assessed using the Internet Addiction Test (IAT). The instrument was originally developed by Young [2] and later adapted to the Peruvian context by Matalinares et al. [35]. The variable comprises four dimensions: withdrawal, tolerance, excessive use, and negative consequences. These were measured using 19 items with a five-point Likert-type scale evaluating the frequency of behaviors associated with Internet use, ranging from "never" to "always". Regarding validation, the Peruvian adaptation demonstrated reliability of $\alpha = 0.870$ with adequate—if not excellent—confirmatory factor analysis fit indices ($\chi^2/df = 4.44$, RMSEA = 0.041, NFI = 0.919, and CFI = 0.935). These indicators confirm the validity of the proposed model and support its appropriateness for use with adolescents.

Internet use was measured using the natural semantic networks technique developed by Figueroa et al. [36]. Participants were asked to complete the following incomplete sentence with one word: "Since the beginning of the pandemic, I mostly use the Internet to _____," repeated five consecutive times. Data analysis was performed using the text-mining and content-analysis software KH Coder [37]. To categorize Internet uses through lexical co-occurrence analysis, the Jaccard algorithm was applied independently by each coauthor of the study (inter-rater reliability), yielding a Cohen's Kappa of 0.80. This procedure allowed the identification of five categories of Internet use: academic use (studying, doing homework, virtual classes, researching), passive leisure (watching videos, watching series, listening to music, YouTube, distraction), active leisure (playing and entertainment), social use (communicating, chatting, social networks, video calls), and functional use (shopping, delivery services, advertising, staying informed, searching for information).

Data collection techniques and procedures

Permission for data collection was requested from the principals of the participating educational institutions. The study objectives and its importance for developing preventive measures against Internet addiction were explained, and the institutions were offered access to the study results. Once authorization was obtained, coordination began to obtain informed consent from parents or guardians. Additionally, arrangements were made with each classroom tutor to determine the time when researchers would visit the classroom to conduct data collection during the tutoring session. The schedule varied depending on each classroom's timetable.

At the agreed time, one of the researchers visited each classroom and shared the Google Form link with the students through the WhatsApp group managed by the classroom tutor. The following instructions were provided: "Nowadays, more and more people use the Internet daily. In order to understand the characteristics of its use, we present this questionnaire containing several questions related to this topic. It will only take a few minutes to complete. Your participation is voluntary and anonymous. If you wish to withdraw from the study after accepting, the information you have already entered will be omitted. All information will be treated confidentially and anonymously, making it impossible for anyone to identify you. In addition, responses will be analyzed collectively." Participants were given approximately 20 minutes to complete the questionnaire, after which the researchers thanked both the teacher and the students for their participation.

Data analysis

Data were collected using a Google Form in which all questions were mandatory. Records with unanswered questions were automatically excluded. The questionnaire began with the incomplete sentence corresponding to the natural semantic networks (NSN) technique, followed by the instructions and questions of the Internet Addiction Test. During database review, a few participants were identified who tended to select the same response option for all items; these cases were excluded. Participants who reported ages outside the expected range were also excluded.

The qualitative component categorized Internet uses, while the quantitative component measured Internet addiction and analyzed the association between Internet addiction and its dimensions with the Internet use categories emerging from the co-occurrence networks.

For statistical analysis, responses to the Internet Addiction Test were coded on an ordinal scale (never = 0, rarely = 1, occasionally = 2, frequently = 3, very often = 4, always = 5). Dimension scores were calculated and analyzed quantitatively to evaluate their factorial structure and reliability. Although Matalinares et al. [35] validated the instrument in Lima students aged 15 to 19 years and established normative cutoff points for classifying addiction levels, those criteria were not applied in this study due to substantial changes in Internet use patterns and the time elapsed since validation. To facilitate bivariate analysis with categorical variables (types of Internet use), the scores for each dimension were categorized into three sample-based levels according to percentiles: low (≤ P25), medium (P25-P75), and high (≥ P75). As a robustness check, a sensitivity analysis using alternative categorization criteria (quartiles and quintiles) was performed, yielding similar associations. Therefore, the three-level classification was reported due to its greater interpretability and parsimony [38]. Microsoft Excel 365 and SPSS version 26 were used to calculate Cronbach's alpha, standard deviations, and means of the variables.

For the analysis of each lexical co-occurrence network generated by the text-mining and content-analysis software KH Coder 0.3, red squares represent the levels (according to the previously mentioned cutoff criteria) of the Internet addiction variable or each of its dimensions, while circles represent the words indicating the types of Internet use mentioned by participants. Within these circles, the frequency with which each word was mentioned is indicated by the diameter of the circle, while semantic proximity within the corpus is represented in the co-occurrence network by spatial closeness or by connections through lines between nodes.

Ethical considerations

This study was conducted in accordance with the ethical standards established by the Ethics Committee of the Universidad Nacional Mayor de San Marcos (UNMSM) [39], thereby ensuring methodological integrity and respect for participants throughout all phases of the research process. The conduct of this study was guided by the principles of probity, truthfulness, impartiality, transparency, independence, responsibility, competence, rigor, relevance, and freedom of research. Likewise, the bioethical principles of autonomy, justice, beneficence, and non-maleficence were observed, ensuring voluntary participation free from coercion through the use of informed consent or assent. In this way, the confidentiality of personal data was safeguarded, and the study was carried out transparently and without conflicts of interest. These guidelines were upheld throughout the research process and were approved by the ethics committee through Rectoral Resolution No. 012648-2023-R/UNMSM.

RESULTS

Consistency and structure of the instrument

The Internet Addiction Test showed satisfactory reliability (α = 0.885; ω = 0.890). Confirmatory factor

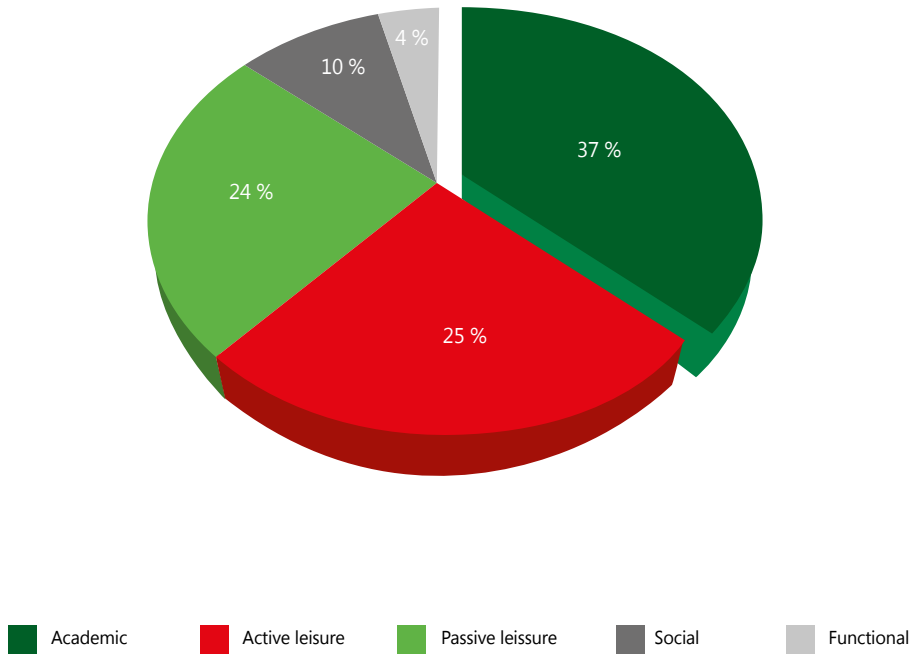

Figure 1. Percentage of words related to categories of Internet use in the data corpus

analysis indicated an adequate fit ($\chi^2/df = 2.95$; CFI = 0.896; TLI = 0.878; SRMR = 0.047; RMSEA = 0.063).

Addiction levels

The overall mean score was 26.61 (SD = 13.72). By dimensions, adolescents reported the following: withdrawal (M = 3.20; SD = 1.90), tolerance (M = 13.93; SD = 8.76), excessive use (M = 6.60; SD = 3.60), and negative consequences (M = 2.89; SD = 1.99).

Types of internet use

In our data corpus (see Figure 1), the categories of Internet use identified were as follows: the academic category, which still prevailed as one of the most frequent (37 %) at the time of data collection, confirming the role of digital space as a support for learning in the post-pandemic period. In second and third place were the active leisure (25 %) and passive leisure (24 %) categories, showing how entertainment remains a predominant reason for going online in this age group. These were followed by the social category (10 %), highlighting the importance for adolescents of maintaining bonds and communication in the virtual space. Finally, the functional category (4 %) was identified, reflecting the diversity of uses of the digital environment that this age group, as "digital natives," engages in.

Association between addiction dimensions and types of use

High addiction (see Figure 2) was strongly connected with academic activities, active leisure, and digital social activities, such as "studying," "virtual_classes," "doing_homework," "playing," and "social_media," suggesting that a high level of addiction is not restricted solely to entertainment activities, but also encompasses excessive use of educational or social platforms. In contrast, low addiction appeared associated with passive leisure activities, such as "listening_to_music," "watching_videos," "watching_movies," and "entertainment," which, although they involve digital consumption, seem more regulated and purpose-driven. Meanwhile, moderate addiction occupied an intermediate node connecting both academic activities ("studying," "researching") and active and passive leisure ("playing," "listening_to_music"), representing a transition between desirable and problematic use.

Likewise, peripheral words such as "leisure," "distract," "help," "WhatsApp," "chatting," and "watching_series"

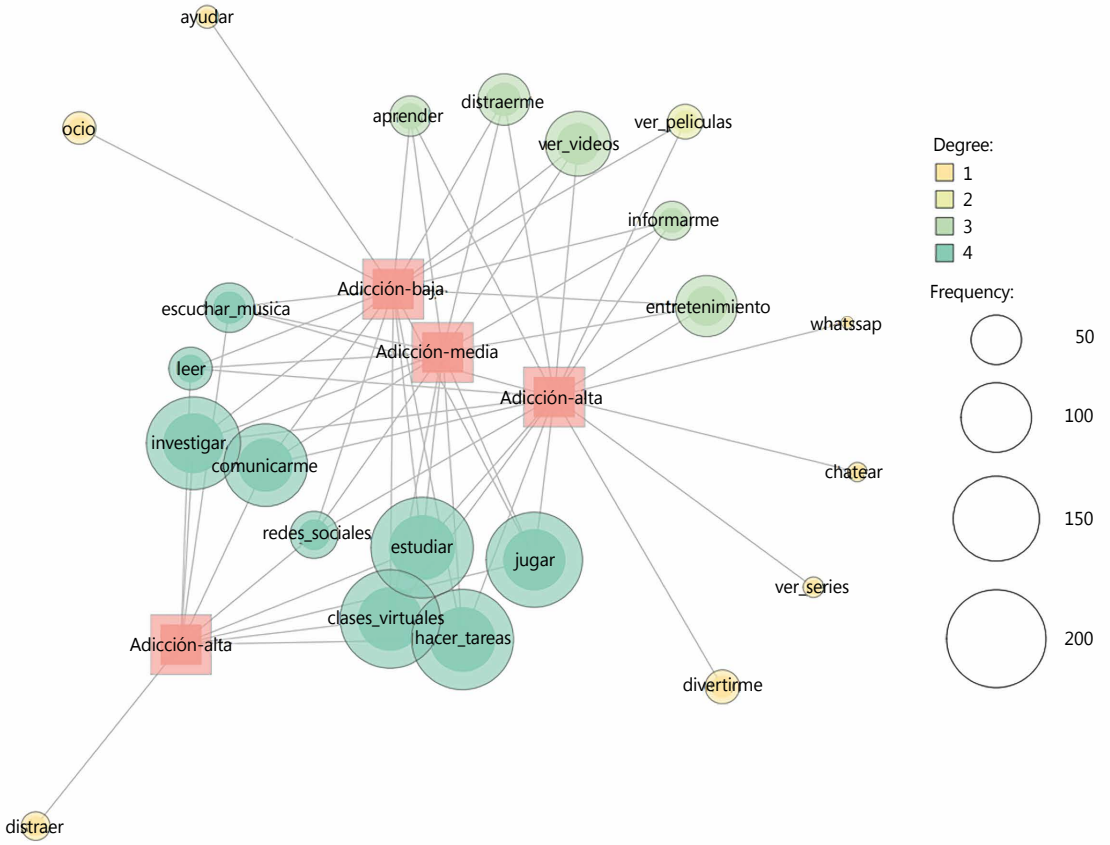

Figure 2. Co-occurrence network of Internet uses associated with level of Internet addiction

showed lower frequency and degree, indicating more individual or specific practices that are less articulated with the core of addiction. In summary, analysis of this network allows us to understand that levels of Internet addiction are not defined solely by the activity performed, but also by the intensity, frequency, and centrality of the connections: activities such as "studying" or "playing" may be part of all levels, but insofar as they cluster around high addiction, they reveal a more persistent and potentially problematic pattern of use.

"High tolerance" (see Figure 3) appears to be strongly associated with a broad range of activities, including both recreational activities (active and passive leisure) and academic and social activities: "studying," "virtual_classes," "doing_homework," "social_media," "listening_to_music," "entertainment," "watching_movies," and "having_fun." It is also connected with more specific social, passive-leisure, and functional uses, such as "TikTok," "WhatsApp," "chatting," "watching_series," "distracting_myself," or "shopping," which, although less frequent, indicate a tendency toward intensive and varied Internet use, characteristic of those who tolerate prolonged sessions.

For its part, "medium tolerance" brings together mixed-type activities: "researching," "communicating," "distracting_myself," "reading," and "watching_videos," which represent a point of balance between academic use and digital leisure. This level appears to be in transition, as it is associated both with functional practices ("staying_informed," "searching_for_information") and with active-leisure dynamics ("playing," "having_fun").

In contrast, "low tolerance" is related to peripheral functional activities such as "helping," "cooking," and "searching_for_information," showing less intensive, more occasional use that is, in many cases, complementary to everyday life. Here, the Internet does not appear as the central axis of academic or socialization activities, but rather as an occasional resource.

In summary, the network reveals that high Internet tolerance is associated with an almost total integration of digital platforms into the academic, social, and entertainment spheres, whereas low tolerance limits use to more sporadic practices and everyday functional activities. Medium tolerance functions

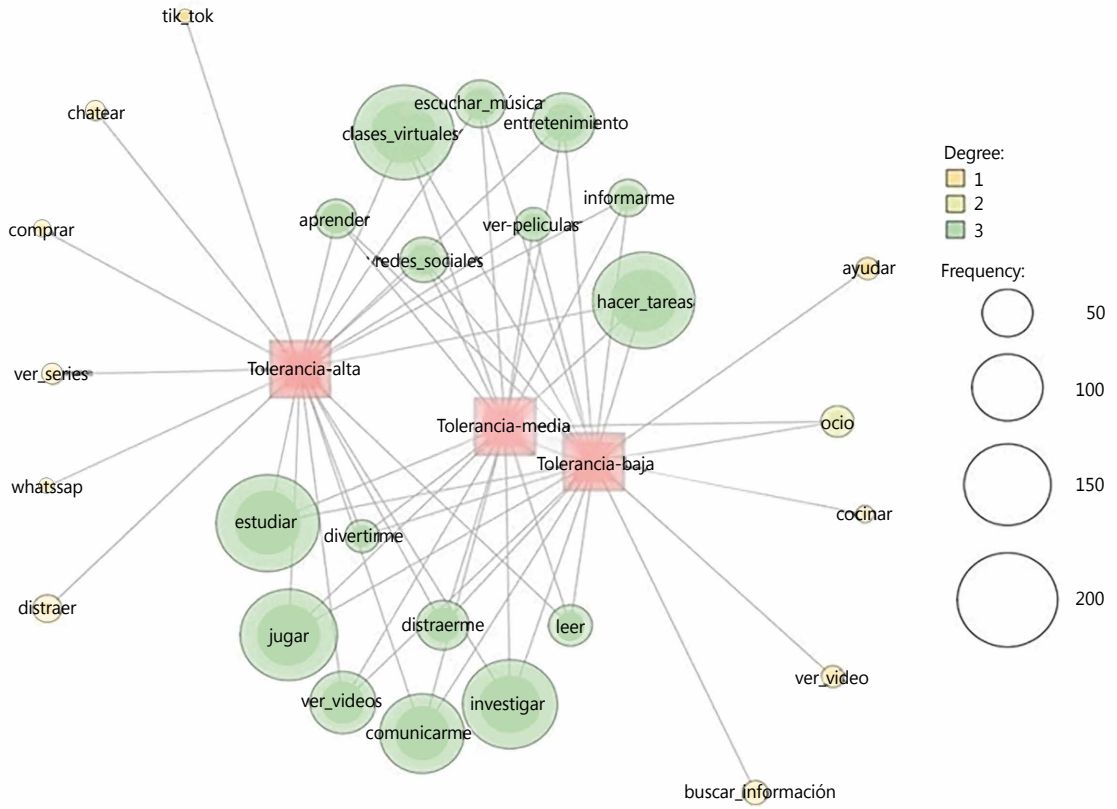

Figure 3. Co-occurrence network of Internet uses associated with the "tolerance" dimension of Internet addiction

as a bridge, connecting activities of an academic and recreational nature. This pattern suggests that tolerance for Internet use does not depend solely on the type of activity performed, but also on the degree of breadth and frequency with which these practices are interconnected in users' lives.

"High excessive use" (see Figure 4) concentrates a significant number of links with academic, active/passive leisure, and social activities. Among the most prominent are "playing," "researching," "distracting_myself," "watching_video," "shopping," "TikTok," "having_fun," and "chatting." This suggests that intensive Internet use implies the simultaneous integration of productive functional activities ("researching," "studying"), social activities ("TikTok," "chatting"), and leisure activities ("watching_video," "distracting_myself," "having_fun"), reflecting a pattern of hyperconnectivity in which the boundary between the academic and the recreational becomes blurred.

In the case of "medium excessive use," a balanced network is observed, connecting academic, social, and leisure practices ("virtual_classes," "doing_homework," "social_media," "listening_to_music," "watching_movies"), which indicates that this level of use is associated both with fulfilling academic responsibilities and with seeking entertainment. This node acts as a bridge between regulated and intensive consumption.

On the other hand, "low excessive use" is related to peripheral activities such as "leisure," "video_conferences," "Netflix," "teaching," and "advertising," which appear with low frequency and a lower degree of connection. These practices suggest an occasional and selective consumption of the Internet, more oriented toward specific functional and leisure needs than toward constant integration into the daily routine.

Taken together, the analysis shows that high excessive use implies a centrality of the Internet in almost all areas of the user's life (academic, social, leisure, and even functional), whereas medium use combines these dimensions in a more balanced way, and low use maintains a profile restricted to

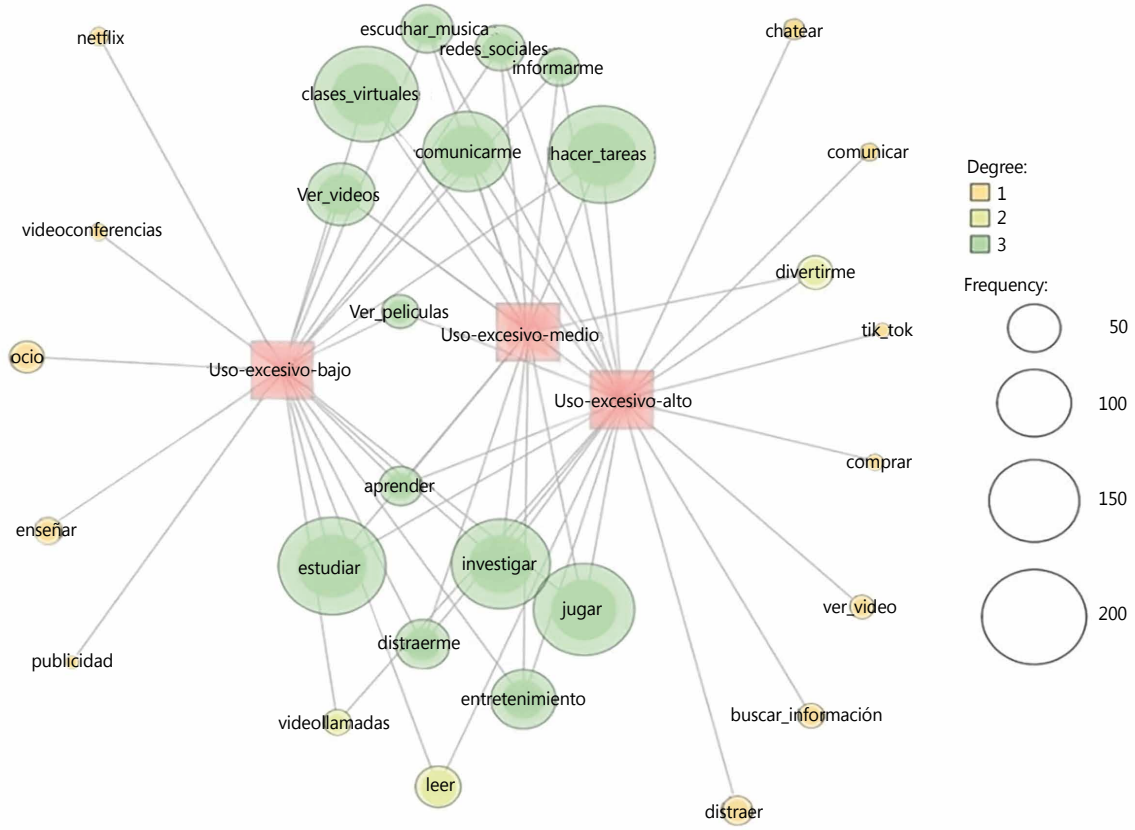

Figure 4. Co-occurrence network of Internet uses associated with the "excessive use" dimension of Internet addiction

occasional activities. This network confirms that the differentiating factor is not solely the type of activity performed, but also the breadth, diversity, and frequency of activities, which build a pattern of progressive dependence on the Internet.

High withdrawal (see Figure 5) was associated with a large number of activities, mainly social and leisure-related, and only tangentially functional: "chatting," "watching_series," "WhatsApp," "TikTok," "video_calls," "communicating," "relaxing," "Facebook," "searching_for_information," and "drawing." This suggests that individuals with high withdrawal more explicitly recognize those activities they would stop engaging in if they did not have Internet access, many of which are linked to leisure, instant communication, and social media.

In the case of moderate withdrawal, connections appeared with academic and leisure activities: "researching," "learning," "reading," "doing_homework," and "listening_to_music." These practices reflect an intermediate level, in which withdrawal does not imply a total loss of social activities or active leisure, but rather an impact mainly on academic, functional, and passive leisure activities.

By contrast, low withdrawal was linked to more dispersed activities, such as "video_conferences," "teaching," "watching_videos," "helping," "leisure," and "socializing," which were perceived as less central and more functional in nature. This pattern indicates that those reporting low withdrawal exhibit less subjective dependence on the Internet, since activities similar to those mentioned may also take place outside the digital environment.

Taken together, this network shows that high withdrawal is associated with difficulty giving up practices related to entertainment and digital socialization, whereas moderate withdrawal reflects an impact on academic, functional, and passive leisure domains, and low withdrawal is related to more functional, practical, and occasional uses. The overall pattern suggests that the perception of withdrawal is not determined by the absence of the Internet itself, but by the degree to which it is integrated into the social, academic, and recreational spheres of daily life.

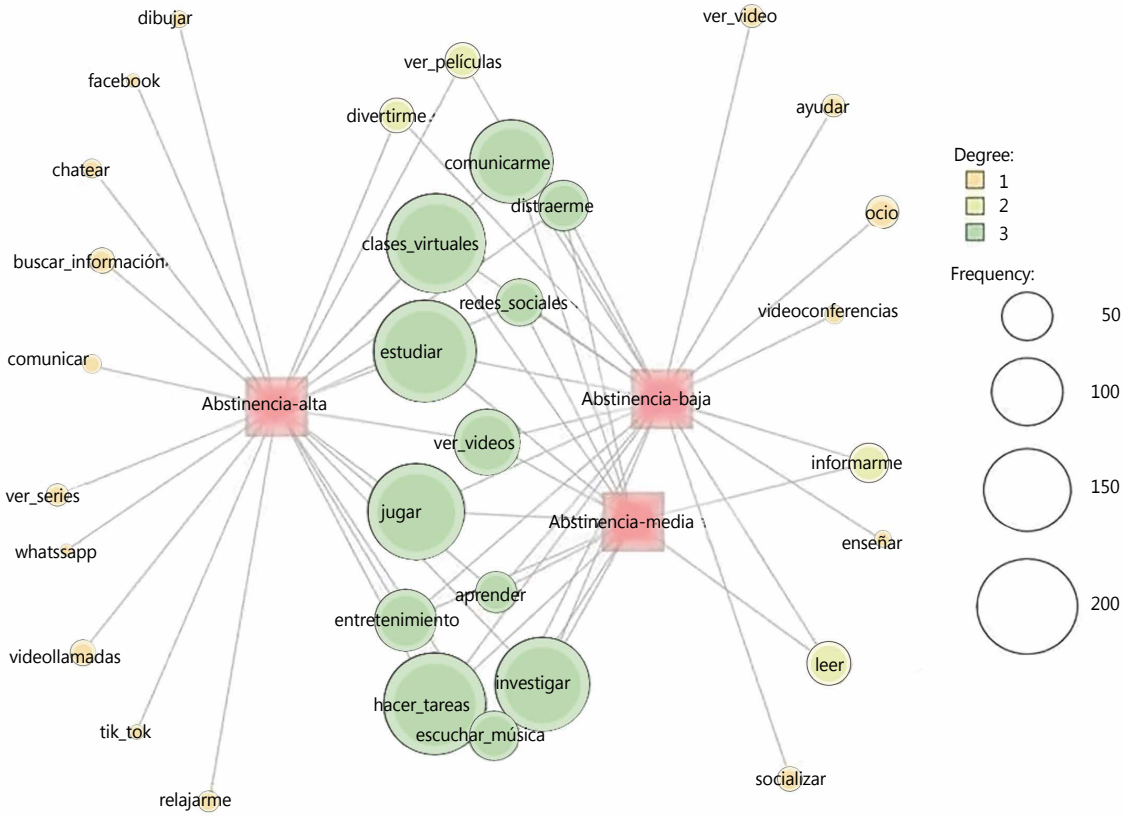

Figure 5. Co-occurrence network of Internet uses associated with the "withdrawal" dimension of Internet addiction

High punishment levels (see Figure 6) concentrated a wide diversity of activities, including academic, recreational, and social ones. These included "virtual_classes," "studying," "doing_homework," "social_media," and "playing," together with more marked social, leisure, and functional practices such as "TikTok," "Facebook," "WhatsApp," "watching_series," "watching_anime," "watching_TV," "watching_news," "distracting_myself," "drawing," "working," and "shopping." This suggests that high levels of punishment are associated with a broad range of digital uses, reflecting that students recognize negative consequences when their intensive Internet use interferes with multiple areas of daily life.

For their part, moderate punishment levels were connected mainly with functional and passive leisure activities: "communicating," "staying_informed," "researching," "watching_videos," and "watching_movies." This pattern indicates that, at a moderate level, punishment is not associated with such a broad range of activities, but rather with those that, although useful, may become a cause of sanction due to the time invested in them, as well as with leisure activities because of the distraction they generate.

In contrast, low punishment levels were linked to more specific and peripheral practices such as "socializing," "helping," "having_fun," "reading," "listening_to_music," and "distracting_myself." These activities were less frequent and, because they do not represent intensive use, were less associated with disciplinary consequences or sanctions.

Taken together, this network reveals that high punishment levels are related to broad and diversified Internet use encompassing both academic and recreational domains, showing that students perceive a greater risk of sanction when their digital consumption interferes with several areas of life. Moderate punishment levels are centered on academic activities that may be poorly managed in terms of time, whereas low punishment levels reflect more specific practices with lower impact. The overall pattern suggests that the perception of punishment is directly associated with the degree of diversification and intensity of use, rather than with the specific activities themselves.

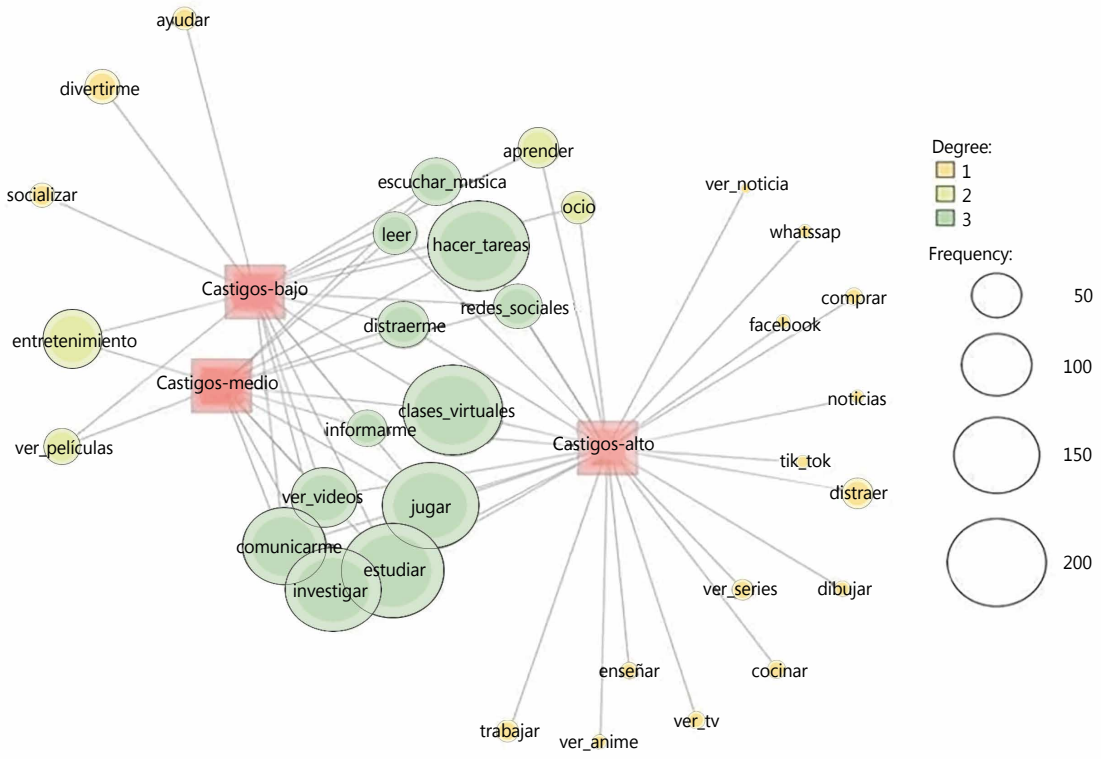

Figure 6. Co-occurrence network of Internet uses associated with the "punishment" dimension of Internet addiction

DISCUSSION

This study provides a nuanced understanding of Internet addiction in adolescents through semantic network analysis, which makes it possible to visualize the structure and magnitude of the associations between the dimensions of Internet addiction and specific digital uses. The results are consistent with the existing literature and deepen understanding of how different types of use are related to the clinical dimensions of the phenomenon.

First, analysis of the network corresponding to high addiction reveals that this level is not associated exclusively with leisure or entertainment activities, but also prominently includes academic activities such as studying, virtual_classes, and doing_homework, together with digital social practices such as social_media. This finding suggests that problematic Internet use in Peruvian adolescents extends beyond the recreational sphere and into the educational domain [10], which may reflect a pattern of hyperconnectivity strengthened by the digitalization of education, especially in the post-pandemic context. This result is consistent with previous research highlighting the overlap between academic and recreational use, as well as the difficulty of establishing clear boundaries between these two spaces [2]. The intensity and centrality of these connections indicate that addiction depends not so much on the type of activity itself, but rather on its frequency, persistence, and central role in the adolescent's life [7].

Regarding high tolerance, this dimension was observed to be linked to a very broad spectrum of activities encompassing academic, social, and recreational domains. Words such as studying, playing, social_media, TikTok, watching_series, and having_fun appeared highly connected, reflecting progressive habituation to prolonged sessions involving multiple types of use. This pattern supports the conceptualization of tolerance as the need to increase time spent online in order to achieve the same level of satisfaction or to avoid discomfort [9]. The fact that tolerance is not limited to pleasurable activities but also includes academic tasks suggests a normalization of extended Internet use across different areas of life [2]. Moderate tolerance, in turn, acts as a transitional state combining functional and recreational uses, whereas low tolerance is associated with sporadic and utilitarian activities, thus confirming an intensity gradient consistent with the severity of use [33].

With regard to high excessive use, the network shows an almost total integration of the Internet

into adolescent life, with simultaneous connections to active leisure activities (playing, having_fun), social activities (chatting, TikTok), and academic activities (researching, studying). This result reflects a pattern of hyperconnectivity in which the boundaries between productive and recreational activities become blurred, facilitating loss of control over time spent online [40]. This finding is consistent with reports identifying excessive use as a central predictor of addiction, particularly in adolescent populations exposed to high academic and social demands in digital environments [41]. Moderate excessive use shows a more balanced profile, whereas low use is restricted to occasional activities, suggesting that addictive risk increases with the diversity and intensity of uses more than with the total amount of time invested [7].

The dimension of high withdrawal appears associated mainly with digital socialization and leisure activities, such as chatting, TikTok, WhatsApp, and watching_series, indicating that the perception of deprivation is related to the interruption of social connectivity and immediate entertainment [42]. This result highlights the role of the Internet as a central mediator of adolescent social relationships and its function as a regulator of mood [43]. Those reporting high withdrawal would experience anxiety or discomfort when unable to access these communication and leisure activities [9]. Moderate withdrawal, by contrast, is linked more closely to academic and functional activities, whereas low withdrawal is associated with replaceable or dispensable uses, reinforcing the idea that psychological dependence varies according to the degree of Internet integration into daily life [22].

Finally, the high punishment network shows a diversity of connections with activities that are both academic and recreational, suggesting that adolescents recognize negative consequences when Internet use interferes with multiple areas of life, including school performance, family participation, and self-regulation [28]. This result is consistent with previous studies reporting associations between Internet addiction and academic problems, family conflict, and impaired psychological well-being [41]. Moderate punishment levels, in turn, are concentrated in activities that may generate distraction or procrastination, whereas low punishment levels are linked to specific, low-risk uses, indicating that the perception of sanction or negative consequence is directly related to the intensity and diversity of use [7].

Taken together, these findings reinforce the idea that Internet addiction is a multidimensional and multifaceted phenomenon that cannot be reduced to a single type of activity or pattern of use [30]. Rather, its severity depends on the convergence of factors such as tolerance, withdrawal, excessive use, and negative consequences, mediated by the specific digital practices that play a central role in adolescent life [35]. These results provide evidence to complement the design of preventive and therapeutic interventions that address not only screen time but also the quality, diversity, and centrality of Internet use in this population, including cognitive-behavioral programs that have shown effectiveness in reducing time spent online in favor of other activities that improve psychosocial well-being [44].

The design of this study, based on semantic network analysis, has the limitation of not allowing causal relationships to be established, but only associations between concepts. In addition, the sample consisted solely of Peruvian adolescents and was obtained through non-probabilistic purposive sampling, thereby limiting the possibility of estimating sampling error and restricting the generalizability of the results to sociocultural contexts other than the one studied. External variables such as socioeconomic status, family support, or mental health were also not explored, although these may influence the relationship between digital use and addiction. Therefore, future research should include studies with broader samples from different sociocultural contexts, incorporating personal and family variables that may act as risk or protective factors. Likewise, preventive programs should be implemented in schools to promote balanced and conscious Internet use, together with therapeutic interventions addressing specific dimensions of addiction (tolerance, withdrawal, excessive use, and punishment). Finally, pedagogical strategies are needed to integrate technology in a regulated manner and to foster critical digital literacy among adolescents and families so they can distinguish between functional, recreational, and addictive uses.

Conclusions

A substantial association was identified between patterns of Internet use and Internet addiction in adolescents. Overall, the severity of addiction appears to be linked less to total time spent online than to the intensity and compulsive nature of specific forms of use. In terms of tolerance, the perceived need for better software, improved hardware, or longer periods of Internet use seems to evolve from occasional engagement to the normalization of habits that incorporate both academic and recreational

activities. By contrast, with regard to excessive use, spending more time online than originally intended does not appear to depend exclusively on the type of activity performed, whether leisure-related, social, or academic.

Similarly, withdrawal symptoms—that is, adolescents' difficulties in emotional regulation when Internet access is unavailable—seem to become more pronounced when social connectivity and digital entertainment are disrupted; in other words, when peer interaction and leisure activities are interrupted. Finally, in relation to negative consequences, the perception of neglecting daily responsibilities extends across multiple domains, including academic, family, and psychological spheres. This finding is consistent with the literature describing the relationship between Internet addiction and overall well-being.

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ALQP: data curation, results analysis, software, supervision, validation, writing – review and editing, and final review of the article.

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