

Mobile phone dependence and low physical activity in university students Dependencia al móvil y la baja actividad física en estudiantes universitarios

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Abstract. The technological revolution has brought several positive aspects to the development of society, however, it has also generated various challenges associated with the so-called technoaddictions, among which is the dependence on the mobile phone, a type of technological addiction that limits the integral development of young students, among which is a decrease in physical activities. For this reason, the research aimed to determine the influence of mobile phone dependence on low physical activity in Peruvian university students. A quantitative, explanatory-causal research was followed, with a non-experimental design, which had as universe the National University of the Altiplano of Puno, with a student population for the academic period 2023-I of 18480 students, of which 384 were selected from a criteria-based sampling, to whom two instruments were applied. The results show that the influence of both Cox and Snell's Pseudo R2 test and Nagelkerke's dependence on mobile has an 86% impact on the low rate of physical activity. The conclusions highlight the urgent need to implement awareness-raising strategies and programs in educational institutions and universities to promote a balanced use of mobile devices.

Keywords: mobile phones; dependence; addiction; physical activity; university students

Resumen. La revolución tecnológica, ha traído para el desarrollo de la sociedad varios aspectos positivos, sin embargo, también ha generado diversos desafíos asociados a las denominadas tecnoadicciones, dentro de los cuales se cuenta la dependencia al teléfono móvil, un tipo de adicción tecnológica que limita el desarrollo integral de los jóvenes estudiantes, dentro de las que se cuenta, una disminución en las actividades físicas. Por esta razón la investigación tuvo como objetivo determinar la influencia de la dependencia al móvil en la baja actividad física en estudiantes universitarios peruanos. Se siguió una investigación cuantitativa, explicativa-causal, con diseño no experimental, la cual tuvo como universo la Universidad Nacional del Altiplano de Puno, con una población estudiantil para el periodo académico 2023-I de 18480 discentes, de los cuales fueron seleccionados 384 a partir de un muestreo basado en criterios, a quienes se les aplicaron dos instrumentos. Los resultados reflejan que la influencia tanto para la prueba Pseudo R2 de Cox y de Snell y, de Nagelkerke, la dependencia al móvil incide en un 86% en la baja tasa de actividad física. Dentro de las conclusiones se destaca la necesidad urgente de implementar estrategias y programas de concienciación en instituciones educativas y universidades para promover un uso equilibrado de los dispositivos móviles.

Palabras clave: teléfonos móviles; dependencia; adicción; actividad física; estudiantes universitarios

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Introduction

In today's digital age, mobile devices have become a fundamental part of people's lives, and this phenomenon encompasses university students worldwide. The omnipresence of mobile phones in daily life is not only a result of technological advances but also a cultural change (Carpio-Fernández et al., 2021). The current generation of university students has grown in an environment where communication, entertainment and information are within reach, thanks to these multifunctional devices (Berraquero Rodríguez et. al., 2024; Olivencia-Carrion et al., 2016). Whether in the classroom, at home, on public transport or in leisure time, mobile phones have become inseparable companions (González-Cortés et al., 2020).

This growing dependence on mobile phones gives rise to substantial concerns about its impact on the health and well-being of the student population (González Cortijo, 2012). Beyond its usefulness, addiction to mobile devices can lead to significant problems (Denis-Rodríguez et al., 2017). University students, in particular, face constant pressure to stay connected, in terms of social networks and academic communication (Pedrero Pérez et al., 2012). Mobile dependence can cause adverse effects, such as loss of quality of sleep, increased anxiety, stress, and decreased concentration (Olivencia et al., 2016). All these factors can have a negative impact on their academic performance and overall well-being (Merino Pantoja et al., 2017).

An especially critical aspect of this concern lies in its interaction with physical activity. As college students devote

more time to their mobile devices, there is growing concern that they will decrease their participation in physical and outdoor activities (Cuenca-Soto et al., 2021; Leon Diaz et al., 2018). This decrease in physical activity can have far-reaching consequences on the overall health of students, including increased physical inactivity, the risk of sedentarism-related diseases and the loss of opportunities for social interaction and psychological well-being (Giakoni et al., 2021; Hall-Lopez & Ochoa-Martinez, 2020).

In a global context, the increasing reliance on mobile devices is a phenomenon that transcends borders and cultures. Today, mobile phones are an essential part of everyday life in virtually every corner of the world (Capa-Luque et al., 2022; Diaz Barahona, 2020). Instant access to information, social media and communication apps has redefined how people interact, work and relax (Vasconez Villavicencio, 2020). However, this technological breakthrough carries concerns about how it affects the health and well-being of people globally, regardless of their geographical location (Calderón Loeza & Sanchez Escobedo, 2021).

In Latin America, the penetration of mobile devices and their influence on the lives of university students is also notable (García-Santillan & Escalera-Chávez, 2020). Mobile phone adoption rates in the region have increased considerably over the past decade, and young people, including college students, have embraced this technology enthusiastically (Garrote-Rojas et al., 2018). The reliance on mobile devices manifests in how these young people connect with friends and family, seek information and participate in entertainment activities

(Fernández-Castillo et al., 2019; González Rivas et al., 2021). However, this technological enthusiasm is accompanied by concerns about how this dependence could impact their well-being, especially regarding physical activity and quality of life (Cuadrado Proano & Mejía Rubio, 2022).

In Peru, the widespread use of mobile devices among university students has followed the global and Latin American trend. Mobile phones are indispensable tools for both communication and access to educational and entertainment resources (Amador-Licono et al., 2020). However, in the Peruvian context, where young people's physical activity and well-being are public health concerns, the question arises of how mobile dependency could influence these aspects (Ruiz Rugel & Mendoza Calle, 2020). The need to understand the relationship between the use of mobile devices and physical activity becomes especially relevant to designing appropriate interventions that promote healthy lifestyles among university students in the country (Ruiz-Olivares et al., 2010). This study is relevant due to the growing importance of understanding the effects of technology and physical activity on the lives of college students. The findings of this research may have significant implications for the design of health and wellness programs in university settings and for policy decision-making that addresses mobile dependency and promotes physical activity.

Mobile dependency has become a growing concern in modern society, and university students, with their constant access to mobile devices, may be especially vulnerable to this addiction (Haro et al., 2022). At the same time, there has been a decline in the levels of physical activity in this population, which raises the question: Is there a relationship between mobile and physical activity in university students? This is why it was proposed to determine the relation between the dependence on mobile phones and low physical activity in Peruvian university students.

Material and method

The research developed from a quantitative approach (Inche et al., 2003), being of an explanatory-causal type (Ramos, 2015), because it sought to understand the intervening causes in the phenomenon of mobile and physical activity in university students with a non-experimental design-transversal because the variables were not manipulated in study (Miranda Beltrán & Ortiz Bernal, 2020), the independent variable being dependent on the mobile and the dependent variable physical activity.

The research was conducted as a study universe, understood as the complete construct of the research from which the population is derived (Hernández et al., 2014), the National University of the Altiplano, headquarters Puno, which is structured in a total of 36 Professional Schools. The study population (López-Roldán & Fachelli, 2015) was the totality of the students enrolled for the academic period 2023-I, which amounts to a total of 18480 students.

For sample selection, non-probabilistic criteria of type based on criteria were employed (Otzen & Manterola, 2017); for inclusion, it was considered: a) Age; b) Active Matrican; c) Smartphone use; d) Mobile internet access; e) Physical activity; f) Informed Consent; g) Availability for follow-up; h) No prior medical conditions; i) Language domain; j) Use of applications related to physical activity. For the exclusion, the decision was based on a) Participation in similar studies; b) Undiagnosed chronic diseases previously; c) Use of alternative intensive devices; d) Significant lifestyle changes; e) Acute psychological disorders; f) Recent medical or surgical interventions; g) Educational institution change plans; h) Incapacity to complete questionnaires or interviews; i) Severe time restrictions; j) Use of medications that affect physical activity. These criteria allowed a sample of 384 students to be composed. The characteristics of the population and sample are presented in Table 1.

Table 1.
Characteristics of the Population and Sample

Áreas	Nº	Vocational Schools	Population				Show by sex			
			Men		Women					
			F	%	F	%	N	n	M	W
ENGINEERING	1	Agronomic Engineering	327	1.77	167	0.90	494	14	5	9
	2	Agroindustrial EngineeringI	150	0.81	170	0.92	320	14	1	12
	3	Topographical and Agrimensura Engineering	421	2.27	82	0.44	503	12	2	10
	4	Economic Engineering	430	2.32	336	1.81	766	8	6	2
	5	Engineering of Mines	565	3.05	25	0.13	590	2	1	1
	6	Statistical and Computer Engineering	270	1.46	131	0.70	401	6	4	2
	7	Systems Engineering	506	2.73	79	0.42	585	19	17	2
	8	Electronic Engineering	397	2.14	16	0.08	413	11	4	7
	9	Chemical Engineering	173	0.93	167	0.90	340	15	8	7
	10	Metallurgical Engineering	297	1.60	46	0.24	343	14	7	7
	11	Ecological Engineering	434	2.34	86	0.46	520	11	5	6
	12	Civil Engineering	648	3.50	56	0.30	704	14	3	11
	13	Architecture and Urbanism	279	1.50	205	1.10	484	22	11	11
	14	Mathematical Physical Sciences	233	1.26	59	0.31	292	15	9	6
	15	Agricultural Engineering	304	1.64	111	0.60	415	4	2	2
	16	Electrical Mechanical Engineering	516	2.79	9	0.04	525	7	4	3
BIOMEDICE	17	Veterinary medicine and Zootechnics	399	1.83	252	1.36	651	8	4	4
	18	Nursing	84	0.45	417	2.25	501	13	12	1
	19	Biology	237	1.28	265	1.43	502	6	2	4
	20	Human Medicine	213	1.15	191	1.03	404	7	3	4
	21	Human Nutrition	93	0.50	356	1.92	449	21	10	11
	22	Dentistry	170	0.91	206	1.11	376	19	13	6
SOCIAL SCIENCES	23	Art	306	1.65	157	0.84	463	14	7	7
	24	Accounting Sciences	419	2.26	543	2.93	962	16	8	8
	25	Administration	281	1.52	343	1.85	624	18	9	9
	26	Social Work	51	0.27	550	2.97	601	5	3	2
	27	Sociology	223	1.20	262	1.41	485	6	3	3
	28	Tourism	159	0.86	241	1.30	400	3	1	2
	29	Anthropology	190	1.02	177	0.95	367	10	7	3

30	Science of the Social Communication	234	1.26	205	1.10	439	8	5	3
31	Secondary Education Science	366	1.98	292	1.58	658	16	8	8
32	Social Secondary Education	494	2.67	480	2.59	974	10	5	5
33	Physical Education	349	1.88	71	0.38	420	7	4	3
34	Primary Education	109	0.58	356	1.92	465	5	3	2
35	Initial Education	3	0.01	371	2.00	374	2	1	1
36	Law	321	1.73	349	1.88	670	2	1	1
TOTAL		10651		7829		18480	284		384

Source: Office of Information Technology and Telecommunications (OTI)-June 2023-I

Now, for data collection, we used the survey technique (García Ferrando, 1986), which is why two questionnaires were used (García Alcaraz et al., 2006), one for each variable, the first of Mariano Cholí (2010), called a mobile phone dependency, was composed of 22 items to evaluate with a Likert-type response scale, in which: 0 = Never; 1 = Rarely; 2 = Sometimes; 3 = Frequently; 4 = Many times. The second instrument was its own elaboration, called physical activity in university students, built based on ten items with a dichotomous response scale. Both instruments were subjected to a process of validation by expert judgment and, in addition, were subjected to reliability determination from Cronbach's internal alpha coefficient, which allowed for verification that the instruments were reliable at 0.86 and 0.79, respectively.

The statistical analysis of the research was based on inferential statistics, in which the goodness of adjustment of Kolmogorov-Smirnov (Romero Saldana, 2016) was used to determine the normality of the data, while for the determination of the relationship the method of the ordinal logistic regression was used (Pardo, A, & Ruiz, 2005), declaring that the significance of this one, was determined by $\alpha \leq 0.05$ for the contrast of hypotheses. It is essential to state that statistical processing was supported in Microsoft Excel software for the systematization of data, while SPSS version 25 helped to calculate the statistics.

Regarding the ethical aspects, the study was previously passed by the Institutional Committee of Ethics in Research of the National University of the Altiplano de Puno (CIEI UNA-Puno) on July 10, 2023 (Appendix A). In addition, the participation of the sample was performed under strict compliance with informed consent (Cañete et al., 2012), which was presented to each of the participants, who signed in a sign of conformity, understanding that the use of the data collected will have only investigative effects, which is why the anonymity and prohibition of spreading the results of the questionnaires in other means that were not the intended ones were guaranteed.

Results

The results of the data normality test are then presented based on the questionnaires applied.

Table 2. Kolmogorov-Smirnov goodness-of-fit test of the variables

Variables	Tests of normality		
	Kolmogórov-Smirnov		
	Statistical	Gl	Sig.
Mobile dependency	0,287	384	0,000 ^a
Physical activity	0,347	384	0,000 ^a

Nota: ^a Lilliefors corrected

The results presented in Table 2 show that, in both variables, a $p < 0.05$ was obtained; in this case, $p 0.000$, which is the reason why it is determined that the data of the variables do not present extreme values. Therefore, a logistic regression analysis was carried out in order to verify whether there is an influence of the dependence on the mobile in the development of physical activity

in Peruvian university students.

Table 3 shows the results from calculating the ordinal logistic regression among the variables in general.

Table 3. Ordinal logistic regression among the variables

Model	Logarithm of the verisimilitude -2	Chi-square	Gl	Sig.
Only intersection	702,329			
Final	486,826	221,503	42	,000

Función de enlace: Logit.

Ho: There is no direct influence between mobile dependency and the low physical activity rate in Peruvian university students.

Ha: There is a direct influence between the dependence on mobile phones and the low rate of physical activity among Peruvian university students.

In Table 3, the adjustment data is appreciated, where it is evident that the value of significance is < 0.05 ; in such a virtue, it is evident that the dependence on the mobile has a significant impact on the low rate of physical activity in Peruvian university students, so the null hypothesis is rejected and the alternative hypothesis is accepted. However, it is necessary to check the level of influence between the two variables, which is why Table 4 is presented.

Table 4. Pseudo R squared of the general hypothesis

Cox y Snell	,860
Nagelkerke	,860
McFadden	,270

Link function: Logit.

When viewing the results of the pseudo-R2 test of Cox and Snell (Table 4), it is concluded that the dependence on the mobile has an impact of 86% on the low rate of physical activity. Like the results found in the Pseudo R2 test of Nagelkerke, they indicate that the dependence on the mobile has an 86% on the low rate of physical activity.

The results of this study shed a significant light on the relationship between mobile and physical activity in university students. The findings backed by the Pseudo R2 tests of Cox and Snell and the results obtained through Nagelkerke's Pseudo R2 test reveal a solid partnership between mobile dependency and decreased physical activity.

Discussion

The digital revolution has transformed how we live and relate, and mobile devices have become constant companions in this new era (Zamudio-Castro, 2021). Among the populations that have embraced this technology enthusiastically are the Peruvian university students (Ojeda-Cabrera et al., 2017). However, behind this omnipresent technological presence, there is a deep concern: How does mobile dependency affect the well-

being of these young people and, in particular, their level of physical activity? The results of this study seem to shed light on this issue, showing that the dependence on mobile has an astounding 86% in the low rate of physical activity among university students of Peru. The data presented in Table 2, which indicate a significant association between the dependence on the mobile and the low rate of physical activity, are revealing. This finding supports the acceptance of the alternative hypothesis and, therefore, the rejection of the null hypothesis. In other words, it suggests that mobile dependency and decreased physical activity are significantly related in Peruvian university students. But the real surprise lies in the magnitude of this influence, which is revealed through the pseudo-R2 tests of Cox and Snell and the Pseudo R2 test of Nagelkerke (Table 3). These results indicate that the dependence on the mobile has an astounding 86% in the low rate of physical activity.

This raises a fundamental question: why and how does mobile dependency significantly impact the physical activity of Peruvian university students? Is it due to a preference for online interaction rather than outdoor activities? Or is it a result of the lack of time caused by the excessive use of mobile devices? This is where the discussion becomes crucial. Understanding the underlying mechanisms of this relationship is essential for developing effective intervention strategies (Albitres et al., 2021; Vargas-Murillo G, 2020).

The impact of mobile dependency on physical activity should not be underestimated. Lack of physical activity can have significant health consequences, increasing the risk of sedentarism-related diseases and affecting the overall well-being of students (Casimiro Urcos et al., 2021; Diaz Fernandez, 2021; Diaz Vera et al., 2021). In addition, physical activity is not only vital for physical health but also for mental health. It promotes the release of endorphins, reduces stress and improves concentration, which is especially relevant for college students facing a high level of academic stress (Blanco & Blanco, 2021; Parra Bernal & Rengifo Rodriguez, 2021).

The results of this study highlight the importance of addressing mobile dependency as a critical factor in promoting the health and well-being of Peruvian university students. Significant influence, which reaches an impressive 86%, on low physical activity highlights the need for specific preventive and intervention measures to balance the use of mobile devices and promote an active and healthy lifestyle in this population.

Universities and educational institutions should take this issue seriously and consider implementing awareness programs that encourage the balanced use of mobile devices (Thief-de-Guevara Moreno et al., 2019; Posso Pacheco et al., 2021). Education on the importance of physical activity and its mental and physical health benefits is also essential. Furthermore, it is crucial to carry out additional research to understand the underlying factors of this relationship better and, from there, design more effective intervention strategies (Alonso Roque et al., 2020; Piedra et al., 2013).

Ultimately, students' well-being and ability to reach their maximum academic and personal potential depend mainly on finding a balance between technology and physical activity (Cuenca-Soto et al., 2021; Moreno Pinzon, 2017). The results of this study highlight the need to address this balance with seriousness and urgency.

Conclusions

The results of this study have revealed a significant

relationship between the dependence on mobile and the low rate of physical activity in Peruvian university students. The positive association and the high magnitude of the influence of the dependence on mobile, which affects 86% of low physical activity, are surprising findings. These results underscore the importance of effectively addressing mobile dependency in this population and its impact on health and well-being.

The evidence presented in this study highlights the urgent need to implement strategies and awareness programs in educational institutions and universities to promote the balanced use of mobile devices. Universities should play an active role in educating students about the risks of mobile dependency and the benefits of physical activity, as well as providing resources and support to help them find a healthy balance.

The lack of physical activity among college students goes beyond health concerns. It also affects their psychological well-being and academic performance. Physical activity not only improves physical health but also reduces stress, improves concentration, and promotes a healthier mental environment. Therefore, addressing mobile dependency and encouraging physical activity is not only a matter of health but also a matter of academic success and overall well-being.

This study highlights the need for continuous research in this field to understand better the underlying mechanisms of the relationship between mobile and physical activity. By unravelling the reasons behind this partnership, we will be able to develop more effective interventions tailored to the specific needs of university students. The importance of finding a healthy balance between technology and physical activity cannot be underestimated in the current digital age, and this study is a step towards understanding and action.

Given the significant impact of mobile dependency on the physical activity of Peruvian university students, it is recommended that educational institutions and universities implement awareness and education programs. These programs should be designed to inform students about the risks of mobile dependency and promote the balanced use of mobile devices. These initiatives may include workshops, briefings and awareness campaigns that highlight the benefits of physical activity and the importance of switching off mobile devices on a regular basis. In addition, resources and support can be offered to help students develop strategies to reduce their dependence on mobile and encourage a more active life.

Physical activity must be promoted among university students as an integral part of their educational experience. Universities can play an active role in offering sports facilities, extracurricular activities related to physical activity and wellness programs. Encouraging participation in sports, group exercises, and outdoor activities can contribute significantly to countering the adverse effects of mobile dependency and improve the health and well-being of students. In addition, consideration should be given to the inclusion of education on the importance of physical activity and time management in the academic curriculum to inculcate healthy habits from the beginning of university life. These measures can help students find a healthy balance between technology and physical activity, which will benefit their comprehensive development and academic success.

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Informed consent of study participants

The original study was conducted following the ethical provisions of the Declaration of Helsinki (2013) and based on the guidelines of the Institutional Committee on Ethics in Research of the National University of the Altiplano de Puno (CIEI UNA-Puno) on July 10, 2023.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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