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Explanatory Model of Intrinsic Motivation in University Students

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SCIENTIFIC RESEARCH ARTICLE

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Explanatory Model of Intrinsic Motivation in University Students

Abstract

Despite numerous studies on intrinsic motivation and its relationship with individual and contextual variables, few investigations explore this relationship using a multivariate approach. This research employs an explanatory design with cross-sectional measures to empirically assess a model examining the direct and indirect associations between intrinsic motivation, achievement orientation, procrastination, school perception, and self-efficacy among 389 non-randomly selected Colombian university students who responded to the instruments via Google Forms. The resulting model demonstrates an adequate practical fitness. In this model, achievement orientation, school perception, and self-efficacy positively and directly influence intrinsic motivation, while procrastination negatively and directly influences self-efficacy. Furthermore, self-efficacy indirectly affects intrinsic motivation through the latent variable of procrastination. These findings support the design of interventions aimed at fostering intrinsic motivation and helping students develop time management and task-planning skills to reduce procrastination and enhance academic performance.

Keywords: intrinsic motivation, university students, procrastination, self-efficacy, achievement orientation, school perception.

Modelo Explicativo de la Motivación Intrínseca en Estudiantes Universitarios

Resumen

A pesar de los numerosos estudios sobre la motivación intrínseca y su relación con variables individuales y contextuales, pocas investigaciones exploran esta relación utilizando un enfoque multivariante. Esta investigación emplea un diseño explicativo con medidas transversales para evaluar empíricamente un modelo que examina las asociaciones directas e indirectas entre motivación intrínseca, orientación al logro, procrastinación, percepción escolar y autoeficacia en 389 estudiantes universitarios colombianos seleccionados de forma no aleatoria que respondieron a los instrumentos a través de *Google Forms*. El modelo resultante demuestra una adecuada adecuación práctica. En este modelo, la orientación al logro, la percepción escolar y la autoeficacia influyen positiva y directamente en la motivación intrínseca, mientras que la procrastinación influye negativa y directamente en la autoeficacia. Además, la autoeficacia afecta indirectamente a la motivación intrínseca a través de la variable latente de la procrastinación. Estos resultados apoyan el diseño de intervenciones dirigidas a fomentar la motivación intrínseca y ayudar a los estudiantes a desarrollar habilidades de gestión del tiempo y planificación de tareas para reducir la procrastinación y mejorar el rendimiento académico.

Palabras clave: motivación intrínseca, estudiantes universitarios, procrastinación, autoeficacia, orientación al logro, percepción escolar.

Introduction

The natural scenario caused by the COVID-19 pandemic spurred interest in researching various sociocultural, economic, physical, and psychological phenomena, which in a post-pandemic panorama brings short-term and long-term repercussions. Particularly in the educational sphere, the necessity to seek, generate, and integrate novel strategies to sustain and bolster student motivation and interest in their learning processes led to the excessive use of ICT tools and activities oriented towards achieving learning objectives.

Despite the literature indicating that new learning scenarios yield cognitive challenges and promote intrinsic motivation, researchers observed that during the pandemic and the readjustment to the post-pandemic setting, their usage produced a counterproductive effect (Cahyani, 2020; Condori et al., 2021). Potential factors contributing to these effects include disruptions in student and teacher learning expectations, excessive time allocation to academic tasks, and little demarcation from other areas of people's lives, alongside challenges in managing study habits and routines, and inadequate use of planning and self-management strategies (Lamanauskas et al., 2021; Yamin & Muzaffar, 2021).

Intrinsic motivation influences what, when, and how one learns, thus becoming a strategy conducive to the meaningful construction of knowledge, given that it entails a more enduring relationship between aspirations and the actions undertaken to achieve them (Calet & Dumitrache, 2016). Ryan and Deci (2000) define intrinsic motivation as involving interest (e.g., mastery, competence, and self-efficacy), enjoyment of an activity for its own sake, and exploration, all essential for cognitive and social development.

Prior studies compare the impact of individual factors on intrinsic motivation in ICT-mediated and traditional face-to-face learning environments. Findings indicate that intrinsic and self-motivation are higher in virtual learning contexts as long as they do not exceed the limits for academic task fulfillment. Intrinsic motivation, as a protective

factor, is attributed to generating positive outcomes associated with enthusiasm for learning. It enhances academic performance, strengthens commitment, reduces procrastination, and increases engagement and persistence in academic tasks (Cahyani, 2020).

Although numerous studies explore the relationship between intrinsic motivation and individual variables such as procrastination (Pelikan et al., 2021a), achievement orientation (Caso-Fuertes & García-Sánchez, 2006; Ramírez Gallego, 2022), self-determination (Malinauskas & Pozeriene, 2020), self-regulation (Ma et al., 2022; Xu et al., 2021), self-motivation (Afzal & Crawford, 2022), self-efficacy (Yapo et al., 2021), and academic performance (Echeverri, 2017; Navarro, 2016; Quispe, 2023; Stover, 2014). Only a few studies explore multivariate relationships to elucidate the role of this motivation in learning, considering both the individual and external factors affecting students.

This study seeks to evaluate a model assessing the direct and indirect relationships between intrinsic motivation, achievement orientation, self-efficacy, procrastination, and school perception among Colombian university students. Specifically, we hypothesize that achievement orientation (H1a), self-efficacy (H1b), procrastination (H1c), and school perception (H1d) directly influence intrinsic motivation. Additionally, we propose that procrastination negatively affects self-efficacy (H2a) and achievement orientation (H2b).

Intrinsic Motivation and Learning

Intrinsic motivation refers to an internal drive that propels a person to be competent and self-determined, leading to a sense of control over a situation and achieving success (Llanga et al., 2019). This inner force, rooted in the psychological needs of self-determination theory, relates to feelings of competence that regulate behavior during action. It arises through the interplay of components such as autonomy, competence, and relatedness (Ryan & Deci, 2000).

In the educational field, internalization processes exist to explain why someone performs an action or is willing to engage in it, even when external factors (e.g., grades, honor roll recognition) initially influence their actions. Biological, cognitive, and social interpretations explain this internalization process (Chóliz, 2004; Ryan & Deci, 2000). In learning, the student's participation activates biological conditions according to their homeostasis needs. This participation leads to evaluating the goal and determining the action to take, which leads to planning the process and objectives to achieve the goal. Cognitive aspects (such as prior knowledge, resources, or problem-solving strategies), contextual factors (including deadlines and task demands), and social factors (such as teacher-student relationships and peer interactions) can modify this biological condition. Emotional conditions also play a role, guiding the search for or avoiding emotions such as stress. The biological, contextual, social, and emotional conditions that form the student work together to guide behavioral tendencies, becoming a determinant in the eventual engagement in activities without the need for external rewards. Through this process, the transition from external to internal regulation occurs, as internal factors responsible for activating, directing, and maintaining a specific behavior sustain it over time (Caso & García, 2006; Ryan & Deci, 2000).

Intrinsic Motivation Studies During and Post Pandemic

Research on intrinsic motivation before, during, and after the COVID-19 pandemic has primarily been associated with variables such as procrastination (e.g., González et al., 2006; Ma et al., 2022; Pelikan et al., 2021a; Plikan et al., 2021b; Ramírez Gallego, 2022), self-determination (e.g., Afzal & Crawford, 2022; Gustiani, 2020; Malinauskas & Pozeriene, 2020; Pelikan et al., 2021a; Pelikan et al., 2021b), and self-regulation (e.g., Esparragoza, 2021; Martínez et al., 2022; Pelikan et al., 2021a; Xu et al., 2021). Some of these studies analyzed how

university students maintained their motivation and positive attitudes, while others examined the effects of online, remote, and in-person teaching modalities on perceptions of performance and motivation for learning (e.g., Lazcano et al., 2022). Additionally, some studies compared the effects of teaching methods such as flipped learning and the jigsaw technique (for multiple conflict resolution) on motivation (e.g., Haftador et al., 2021). Furthermore, some investigations examined the association between intrinsic motivation and psychological well-being (e.g., Andrén & Pettersson, 2020; Yamin & Muzaffar, 2021).

Method

This explanatory study employed a cross-sectional design to evaluate a model examining the direct and indirect relationships between intrinsic motivation, school perception, achievement orientation, procrastination, and self-efficacy among Colombian university students.

Participants

The non-probabilistic sample included 389 Colombian university students (64.3% women, 35.7% men) aged 18 to 55. Participants were enrolled in technical programs (8%), undergraduate degrees (79.2%), and postgraduate degrees (12.9%) across various fields of knowledge. Participants voluntarily consented to participate, completing the online instruments, and providing informed consent following the stipulations outlined in Resolution 008430 of 1993 from the Colombian Ministry of Health concerning research involving human subjects, as well as the principles established in Law 1090, which governs psychology practice in the Colombian territory. The inclusion criteria required participants to be actively engaged in academic activities under remote learning modalities (Hodges et al., 2020). Those who did not fully complete the instruments were excluded.

Instruments

This research used an online survey assessed intrinsic motivation, school perception, achievement orientation, procrastination, and self-efficacy. The survey, designed using Google Forms, included an informed consent form and a sociodemographic profile comprising 11 closed and open-ended items, aimed to collect data on age, sex, education level, and time dedicated to physical activity during the previous week. The instrument allowed a comprehensive understanding of the participants' history and physical activity habits. Additionally, the study employed the scales for intrinsic motivation, achievement orientation, self-efficacy, procrastination, and school perception proposed by Aguilar et al. (2002).

The *intrinsic motivation scale* comprises nine items assessing the students' satisfaction regarding their curriculum and field of knowledge. Cronbach's alpha coefficient was .74, with a mean of 49.11 and a range of 26-63. The *achievement orientation scale* comprised nine items measuring the tendency to set and strive to achieve high goals. Cronbach's alpha was .76, with a mean of 39.16 and a range of 22-53. The *self-efficacy scale* included six items concerning the students' competency assessment to complete their studies and pursue their profession successfully. Cronbach's alpha was .78, with a mean of 23.35 and a range of 10-30. The *procrastination scale* consisted of nine items assessing the tendency to postpone completing tasks and academic duties. Cronbach's alpha was .72, with a mean of 26.50 and a range of 10-43. The *school perception scale* evaluated students' perceptions of their teachers,

peers, and school. Cronbach's alpha was .74, with a mean of 25.08 and a range of 22-13

Procedure

The online questionnaire was distributed via email, detailing the study's objectives, completion instructions, researcher information, and a Google Forms link. Participants provided informed consent before accessing the survey.

Data Analysis

Structural equation modeling was used to evaluate the proposed theoretical model, identifying structural weights for latent (intrinsic motivation) and observed (school perception, achievement orientation, procrastination, and self-efficacy) variables. Goodness-of-fit was assessed using statistical measures, including IBBAN, IBBANN, IAC, and RMSEA. Descriptive statistics characterized the sample. Analyses were conducted using SPSS v.21 and EQS v.6.

Results

This section first presents the results of the descriptive analysis, which provides an overview of the score distribution for each variable. Subsequently, the resulting model is discussed, exploring potential relationships among these variables. Table 1 displays the mean values, standard deviations, skewness, kurtosis, range, minimum, and maximum values obtained for each scale. These results indicate that, on average, students exhibit a moderate level of self-efficacy ($M = 15.14$), though responses show considerable variability ($SD = 3.24$).

Table 1.
Description of the variables measured

Variable	N	Range	Minimum value	Maximum value	Mean	SD	Asymmetry	EE	Kurtosis	EE
Self-efficacy	389	19.00	5.00	24.00	15.14	3.24	-0.13	0.1	0.05	.24
Procrastination	389	40.00	8.00	48.00	27.07	8.42	.03	.12	-.23	.24
Achievement orientation	389	20.00	4.00	24.00	19.18	3.16	-.85	.12	1.84	.24

Intrinsic motivation	389	25.00	5.00	30.00	24.36	3.56	-.81	.12	1.87	.24
School perception	389	20.00	4.00	24.00	18.96	4.10	-1.0	.12	.89	.24

A confirmatory factor analysis (CFA) conducted using structural equation modeling (SEM) reveals that the first-order latent variable of school perception has become an independent latent variable that is not influenced by any other variable (exogenous). Moreover, intrinsic motivation is a dependent variable that receives a direct and positive effect from achievement orientation, self-efficacy, and school perception. Additionally, procrastination has an indirect and negative effect on intrinsic motivation through self-efficacy.

The structural model only exhibits practical goodness-of-fit ($\chi^2 = 521$ (222 df), $p = .00$; IB-BANN = .92, CFI = .93, and RMSEA = .05 [CI .05, .06]). The relationship model explains 57% of the variability in intrinsic motivation, suggesting that this model has the same explanatory power as the saturated model, which interrelates all variables. Model reliability indices were adequate ($\alpha = .64$ and the reliability coefficient $RHO = .84$).

The resulting structural model indicates that intrinsic motivation among the sampled students receives a direct and positive effect from achievement orientation (structural weight of .67), school perception (structural weight of .18), and self-efficacy (structural weight of .14). In turn, self-efficacy receives a direct and negative effect from procrastination (structural weight of -.53). Lastly, intrinsic motivation receives an indirect effect from procrastination through self-efficacy.

The first-order latent variable of school perception is constituted by the observed variables: "How many of your teachers regularly attend online or remote classes" (factor loading of .66), "How many of your teachers are punctual in online or remote tutoring" (.72), "How many of your teachers genuinely strive to make their online classes understandable to most students" (.85), and "How many of your teachers encourage student participation to express doubts and questions online or remotely" (.81). The

latent variable of self-efficacy consists of the manifest variables: "I believe that some subjects in my current degree program are challenging for me" (.70), "I believe that certain aspects of the profession I am currently studying for are difficult for me" (.84), and "I believe that I lack certain specific skills required in my degree program" (.71).

The achievement orientation dimension is composed of the observed variables: "Once I start something, I don't give up until I succeed" (.76), "When I encounter a challenging task, I persist until I master it" (.84), "I enjoy achieving things that pose a challenge to me" (.66), and "When I have to complete an assignment or task, I invest the time and effort needed to do it well" (.74). The latent variable of procrastination is constituted by the manifest variables: "When I have to do an assignment or task, I postpone it as much as possible" (.74), "In general, I overthink things before starting to work on them" (.80), "I usually struggle to finish school assignments on time because I start them late" (.78), "I frequently interrupt the completion of a complex or difficult task" (.75), "In general, I think a lot before starting to work on things" (.77), "I am somewhat apathetic towards completing my assignments and things that interest me" (.69), and "When I have to do a difficult task, I postpone it as much as possible" (.83).

Intrinsic motivation is constituted by the observed variables: "Several courses have sparked my desire to delve deeper into certain topics" (.61), "Several subjects have stimulated my interest in knowledge and learning" (.67), "In courses, I primarily strive to learn and acquire new knowledge" (.77), "In topics that interest me, I don't limit myself to reading what the professor assigns; I try to delve deeper and expand my information" (.67), and "I want to learn as much as possible" (.69). The similar factorial loadings between observed variables and

the defining factor indicate convergent construct validity (Bentler, 2006; Corral et al., 2001)

A positive covariance (.20) between school perception and achievement orientation was identified, along with a negative covariance between achievement orientation and procrastination (-.55). Additionally, a negative covariance between school perception and procrastination was estimated (-.16), indicating divergent construct validity as theoretically anticipated (Bentler, 2006; Corral et al., 2001).

Following the confirmatory factor analysis, an internal consistency analysis was conducted to estimate the reliability of the scales with the items

from the resulting model for intrinsic motivation. The scales were found to be reliable, with alpha values of .79 for self-efficacy, .91 for procrastination, .83 for achievement orientation, .81 for intrinsic motivation, and .85 for school perception.

Table 2 reveals a moderate correlation between intrinsic motivation and achievement orientation, as well as weak negative correlations between self-efficacy and procrastination and between procrastination and intrinsic motivation.

The structural model explains 57% of the variance in the relationship between intrinsic motivation and self-efficacy, goal orientation, school perception, and procrastination (Figure 1).

Table 2.
Correlations

Variable	1	2	3	4	5
1. Self-efficacy	-				
2. Procrastination	,374**	-			
3. Achievement orientation	-,258**	-,453**	-		
4. Intrinsic motivation	-,252**	-,377**	,593**	-	
5. School perception	-,183**	-,126*	,165**	,279**	-

The model demonstrates an acceptable goodness-of-fit, with statistical values of $\chi^2(265) = 635$, $p = .05$, and practical indices of IBBANN = .91, CFI = .92, and RMSEA = .06 (90% CI [.05, .06]). The model's reliability indices were $\alpha = .66$ and $RHO = .84$, indicating that it possesses the same explanatory power as the saturated model, which accounts for all variable interrelations.

Discussion

This study aimed to test a model designed to understand the possible direct and indirect relationships between intrinsic motivation and variables such as achievement orientation, procrastination, and school perception among Colombian university students. The data analysis highlights the complexity of intrinsically motivated academic behavior, which considers skill development,

positive motivational states, and self-regulation (Castañeda et al., 2012). These aspects may influence university students' performance, as observed in the sample analyzed.

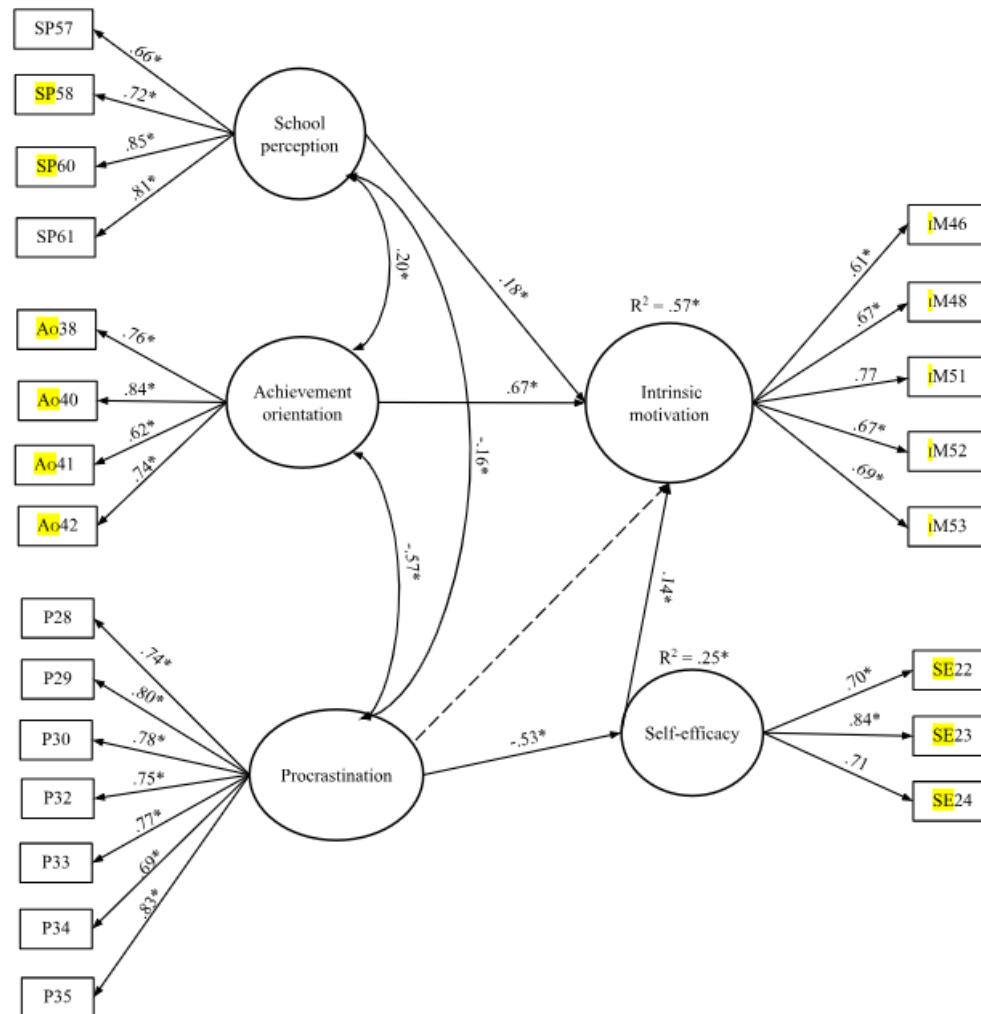
The results indicate that achievement orientation, school perception, and self-efficacy positively affect intrinsic motivation, while procrastination indirectly affects self-efficacy. This finding suggests that when students procrastinate, this behavior affects their self-efficacy (the perception of the need for regular action and the achievement of academic goals) and, consequently, their intrinsic motivation.

Students' challenges in the ERE context may have adversely affected self-efficacy. One challenge was difficulty in resolving questions during classes, which is more easily managed in face-to-face interactions between students and teachers (Yamin & Muzaffar, 2021). Another challenge was related to

perceived differences in teacher support and demands compared to traditional education (Mullen & Tallent-Runnels, 2006). A third challenge was the need for teacher training in online instruction, which complicated the teaching-learning process and potentially undermined students' self-efficacy (Zaharah & Kirilova, 2020). These challenges created obstacles to students' perceptions of their ability to meet academic demands, negatively impacting their intrinsic motivation.

In the ERE context, where intrinsic motivation is crucial for academic engagement and performance, a positive correlation was observed between achievement orientation and self-efficacy. Students with higher achievement orientation tend to employ deeper learning strategies, increasing their desire to demonstrate competence in academic tasks (Kadioglu & Uzuntiryaki-Kondacki, 2014).

Figure 1. Structural Model of Intrinsic Motivation among university students.ote: The factorial loadings are significant at $p < .05$. Goodness-of-fit indices: $\chi^2(265) = 635$, $p = .00$; IBBANN = .91, CFI = .92, RMSEA = .06 (.05, .06). The dotted line indicates a non-significant relationship. N = 389.



It is essential to highlight that intrinsic motivation serves as a protective factor for academic performance in both face-to-face and ERE settings, particularly during periods of adjustment and transition, such as confinement. This aspect is relevant as it influences students' commitment, reduces procrastination tendencies, and strengthens their engagement and perseverance in academic tasks (Cahyani et al., 2020). In both educational settings, teacher plays a crucial role as mediators of interest in academic tasks (Bautista et al., 2023). This is especially relevant in ERE, underscoring the importance of faculty adaptation to new technologies in the meaningful learning process. Enhancing digital pedagogical competence and instructional design skills among educators could help address the identified challenges and foster a more effective and motivating online learning environment.

The proposed model accounts for a greater proportion of variance in the relationship between intrinsic motivation, self-efficacy, achievement orientation, school perception, and procrastination compared to other models that have studied these variables in situations before the health emergency (Aguilar et al., 2002). This finding highlights the importance of considering the impact of changes in the educational environment on students' intrinsic motivation. In this sense, this study enables us to infer that, irrespective of context in which the variables we measured, there persists a direct and positive relationship between self-efficacy and achievement orientation (Aguilar et al., 2016; Pintrich & García, 1991), as well as a negative relationship between procrastination and self-efficacy (Aguilar et al., 2002; Tuckman, 1991). This understanding highlights the relevance of individual variables in the perception of performance.

However, we must recognize that we cannot generalize the scope of these results to other educational and cultural contexts. Therefore, we should consider the study's possible limitations include the lack of control over external variables such as participants' socioeconomic status, type

of educational institution, access to technological resources, and family support. Considering these additional variables in future research could provide a more comprehensive understanding of the factors influencing Colombian university students' intrinsic motivation.

Also, it would be beneficial to incorporate extrinsic and social motivation variables in future research to obtain a more complete understanding of the factors that influence students' intrinsic motivation, particularly in remote learning environments. Additionally, one could explore how to adapt educational strategies to foster intrinsic motivation in students in these contexts.

Conclusion

This study contributes to understanding intrinsic motivation among Colombian university students. It suggests that fostering intrinsic motivation depends on factors such as school perception, achievement orientation, self-efficacy, and reducing procrastination. The findings indicate that these variables can inform interventions aimed at promoting intrinsic motivation and improving students' academic performance by emphasizing time management skills and task planning.

Furthermore, the relevance of conducting future research that compares the variables analyzed in this study in school situations is pointed out, especially in situations with different levels of academic load, for example, low demand vs. high demand. This approach would expand the study's scope and provide direction for further research.

The study acknowledges the importance of considering the context in which we collected the data, especially during confinement due to the health emergency, which may have influenced response quality due to various factors. Challenges associated with the transition to online methodologies are highlighted, such as excessive academic load, prolonged sedentary study periods, increased autonomy in academic work, emotional imbalances, questionnaire length, and distractions from concurrent activities. These aspects provide

a more complete vision of the possible limitations of the study.

One of the identified limitations of the use of a non-random sample, which restricts the generalizability of findings beyond the studied population. Future studies should implement probability sampling techniques to enhance the external validity of results.

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