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Psychometric properties of the research attitude index (IAI) in a population of Peruvian university students

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***Abstract*---**The aim of the study was to evaluate the psychometric properties of the Research Attitude Index (IAI) in a sample of Peruvian university students. The sample consisted of 1188 students, 56.6% of

whom were female and 43.4% male, ranging in age from 17 to 60 years old. After the factor analyses (exploratory and confirmatory), the three factors or dimensions of the instrument were consolidated, and reliability was calculated using Cronbach's alpha, finding good internal consistency. In addition, the Kaiser-Mayer-Olkin (KMO) validity was found, all values being adequate to verify the psychometric quality of the instrument.

***Keywords*---**attitudes toward research, reliability, validity, university students.

Introduction

For three decades, the most important universities worldwide have been building a model that places research as the main institutional asset. The main quality assessment systems consider that a university is academically mature, and enters into a logic of permanent improvement of its reputation, when it is found that it produces institutionalized processes that ensure an extended and daily practice of research (Jensen, 2005). These elite universities develop research, communicate their results and capitalize on them, but also use these spaces by linking them to the training of their students (Polster, 2007; Schwartz, Lederman & Crawford, 2004).

A large part of Latin American universities have progressively aligned themselves with this approach, moved, in some cases, by government regulations, in others, also pushed by the market (Masía-Montenegro, 2018). Most of them declare in their training programs that research is one of the most important components and that it has a transversal presence in the curriculum (Criollo, Romero & Fontaines-Ruiz, 2017; Moreno Bayardo, 2005). However, it seems that this alignment is more associated to an intention expressed in the discourse than to an academic management conducive to an integrated and quality formative research model (Canales, 2011). Much of this mismatch between intention and reality -and this is the situation of Peruvian universities-, is explained by a formal and conceptual teaching that is unable to show evidence of research activities (Sánchez Puentes, 2015). We refer to a teaching by teachers who, for the most part, do not have the necessary skills to guide their students through experiential experiences aimed at strengthening research skills and favorable attitudes towards research. Even in those subjects where the purpose is the development of those skills and attitudes (De las Salas, Perozo & Lago, 2014; Ruiz & Torres, 2005). Therefore, without university environments favorable to research, little can be expected in positive attitudes. Even more so, if we understand that these attitudes are not innate conditions in the student, nor beliefs incorporated in other times and spaces, but learning from university life itself that result from what the university can offer them (Ortega, Veloso & Samuel, 2018).

In this study we define attitudes as learned and relatively lasting organizations of beliefs and feelings about "something", which are formed from people's lived experiences and predispose them towards certain responses or reactions (Eiser, 1989; Rodríguez & Mora, 2016; Rodríguez & Caurcel, 2020; Rodríguez, Caucel,

Gallego, & Navarro, 2021). They are mental dispositions that mediate and influence the meanings, representations and learning in general that people construct about objects, facts or experiences that are part of their environment (Rojas, Méndez, & Rodríguez, 2012). In this sense, attitudes can be predictive instances of future behaviors, so that if we know the attitudes of certain groups towards certain situations, it is possible to infer about their predispositions and even anticipate their potential behaviors in relation to new approaches to these situations (Kennedy, Quinn, & Taylor, 2016; Estrada, 2012).

In that sense, the possibility of anticipating the incidence of attitudes in real behaviors is sustained only in the evaluation of those attitudes that are presumed to be linked (Arellano Torres, Gaeta González, Peralta López, & Cavazos Arroyo, 2019). In relation to the above, assessing and knowing students' attitudes toward research is key to anticipating how and how much they would be willing to engage in university research experiences (De las Salas, Perozo, & Lugo, 2014; Nobigrot-Kleinman, Nobigrot-Streimbleinsky, & Galván-Huerta, 1995). Rawal et. al (2021), Poongodi M et. al(2022), Poongodi M et. al (2021), Dhiman P et.al (2022), Sahoo S.K et.al (2022), K.A et. al(2022) , Dhanraj R.K et. al (2020), Yan Zhang et.al (2020), Md Hossain et. al (2021), Md Nazirul Islam Sarker et. al (2021) ,Y. Shi et. al (2020), Guobin Chen et. al (2020), Poongodi M et. al (2019), Poongodi M et. al (2020)This anticipated benefit has motivated different Latin American universities and researchers to invest in the development of attitude assessment instruments supported by different theoretical and methodological approaches, as well as to execute validation studies of their psychometric properties. However, these studies left an important gap by incurring in methodological errors at the time of design or validation: questionnaires built on other instruments or only on the literature review, without taking into account the ideas, prejudices and beliefs of the students where they were intended to be applied, use of very small samples or excessively heterogeneous large samples, even technical reports that do not report validity indexes (Barrios & Ulises, 2020; Aldana de Becerra; Babativa Novoa, Caraballo Martinez & Rey Anacona, 2019; Ortega, Veloso & Samuel, 2018). In the Peruvian case, the situation is similar, but with the addition that the studies are concentrated in health sciences or graduate students (Ramos, 2019).

This study seeks to fill that gap with a proposal for the validation of the Research Attitude Index (IAI). An instrument that observes three dimensions: the institutional context, the quality of training and the intrinsic motivations of the student, and that has demonstrated methodological consistency in studies conducted in other contexts (Rojas, Méndez & Rodríguez, 2012). The main purposes are: 1. To evaluate the psychometric properties of the IAI in a sample of university students. 2. To raise a baseline on attitudes towards research in this group; and, 3. To fill the gaps in local research in this field.

Method

Design

An instrumental, non-experimental study was conducted (Montero & León, 2007). In the present study, the psychometric properties of the Research Attitude Index (IAI) scale were evaluated.

Participants

The sample consisted of 1188 students from undergraduate universities in Peru between the ages of 17 and 60, 56.6% of whom were women and 43.4% were men and 35.1% were women. They live in the capital Lima and 64.2% in other departments, and it was also observed that more than 51.2% of the students study and work (See Table 1).

Table 1
Sociodemographic characteristics of university students

Sociodemographic characteristics		N	%
Sex	Woman	673	56,6%
	Man	515	43,4%
Age	17 - 24 Years	738	62,1%
	25 - 60 years old	450	37,9%
Place of Origin	Lima capital	418	35,2%
	Other departments	764	64,3%
Current year of study	1st year	203	17,1%
	2nd year	339	28,5%
	3rd year	278	23,4%
	4th year	181	15,2%
	5th year	124	10,4%
	6th year	63	5,3%
Main occupation	Studio only	580	48,8%
	Study and work	608	51,2%
Main source of career funding	Shareholders' equity	365	30,7%
	Credit/loan	48	4,0%
	Scholarship or similar	59	5,0%
	Parents/family members	614	51,7%
	Others	102	8,6%
Study day	Mixed	694	58,4%
	Diurnal	362	30,5%
	Nocturna	132	11,1%

Instrument

Initially, the theoretical explorations of the general construct and by dimensions were carried out. After a process of evaluation by expert judges, content validity was determined and thus the psychometric verification of the theoretical construct was carried out. The Research Attitude Index (IAI) finally consists of a total of 19 items, from which three dimensions are derived, which were subjected to exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). From this, three factors were obtained as follows 1) Self-assessment incidence (IAE) with 7 items. 2) Teachers' incidence (PI) with 5 items and 3) Institutional incidence (IINT) with 7 items (See Table 2).

Table 2
Composition of the Research Attitude Index IAI

Indicators	Items	Formula
Research Attitude Index (IAI)	All variables combined (19 items)	Σxi/76 *100
Incidence Self-Assessment (IAE)	1. I am satisfied with the academic and scientific level of my career.	Σxi/28 *100
	2. I have the ability to present research projects according to the standards of my university.	
	3. I know the research groups at my university.	
	4. I participate in scientific events organized by my university.	
	5. I believe that there is a good environment for research at my institution.	
	6. I consider research training to be very important for my professional life.	
	7. Being young and inexperienced I consider it an obstacle to do scientific research.	
Incidence Professors (IP)	8. My professors have confidence in my abilities to conduct scientific research.	Σxi/20 *100
	9. The professors require me methodological standards for the presentation of academic papers.	
	10. My professors present their own scientific research work in class.	
	11. My teachers are well prepared in scientific and technological research.	
	12. The professors in my career give me good advice on how to conduct research.	
Institutional Impact (IINT)	13. In my career, scientific research is encouraged	Σxi/28 *100
	14. At my university there are academic or economic incentives for students to conduct scientific research.	
	15. My university is concerned with updating scientific knowledge	
	16. At my university I have the infrastructure for scientific research.	
	17. In my regular courses I am taught the process of scientific research.	
	18. In my university there are regular calls for research projects.	
	19. The national government promotes the quality of education in university institutions.	

Data analysis

To determine reliability, the Crombach's Alpha test was used, while to determine construct validity, the Exploratory Factor Analysis was used through its KMO and Bartlet test indexes, using the SPSS version 22 statistical program.

Ethical Aspects

The present study respected all the ethical principles of human research of the declaration of Helsinki, such as autonomy, fairness, and confidentiality. Likewise, it did not represent any harm to the participants.

Results

Exploratory Factor Analysis

The exploratory factor analysis (EFA) with Varimax rotation allowed the identification of the Kaiser-Mayer-Olkin sample adequacy values (KMO = .949), which are close to the value 1, confirming that the use of factor analysis is pertinent. Likewise, the significance measure of Bartlett's test of sphericity ($_{Bartlett}$ = .000, which determines that there are significant correlations in the instrument and confirms the pertinence of the factor analysis. When analyzing the AFE, the instrument saturates three factors that explain 45%, 7.54% and 6.77% respectively. For the analysis, values higher than ,4 were extracted in order to have a better identification of the values, likewise, all the items of the instrument were accepted due to the values obtained.

Table 3.
Factor structure analysis of the research attitude index

Research Attitude Scale (IAI) Items	Component		
	1	2	3
15.	,791		
16.	,754		
18.	,754		
11.	,735		
12.	,727		
5.	,692		
14,	,678		
17.	,648	,455	
10.	,635		
1.	,610		
13.	,547	,512	
19.	,534		,444
6.		,755	
2,		,700	
8.		,613	
9.	,488	,579	
4.			,807
3.			,746

7.			,479
Own value	8,56	1,43	1,28
Variance	45,08	7,54	6,77

Reliability analysis

The reliability values obtained both in the dimensions and in the general scale of the IAI are within an adequate range since they are higher than the minimum criterion of .70.

Table 4
Reliability of the research attitude index and dimensions

Dimensions	Cronbach's alpha	N of elements
Self-Assessment (IAE)	,737	7
Incidence Professors (IP)	,838	5
Institutional Impact (IINT)	,876	7
Research Attitude Index (RAI)	,925	19

Cut-off points for clinical levels

The central tendency measures were identified as mean, standard deviation, minimum and maximum values obtained, and the values are presented in order to establish the low, medium and high levels of the research attitude index, and its dimensions: 1. 2. Faculty incidence (PI). 3. Institutional incidence (IINT).

Table 5
Levels of the research attitude index and dimensions

		IAI	IAE	IP	IINT
Levels	Under	57 - 67	57 - 67	60 - 74	53 - 67
	Medium	68 - 77	68 - 74	75 - 84	68 - 78
	High	78+	75+	85+	79+
N	Valid	1188	1188	1188	1188
	Lost	0	0	0	0
Media		68,2	66,65	71,48	67,32
Standard deviation.		14,14	13,38	16,43	16,82
Minimum		25,00	25,00	25,00	25,00
Maximum		100,00	100,00	100,00	100,00

Discussion

The present study aimed to analyze the psychometric properties of the Research Attitude Index (IAI) scale with a sample of Peruvian university students. The results found in the factor analysis allowed to verify the continuity of the same

items and grouping of the three dimensions: self-evaluation, teachers' incidence and institutional incidence, due to the good level of internal consistency that correlated positively and statistically significantly.

Regarding construct validity at the exploratory level, the IAI obtained an excellent value (KMO = ,949; Bartlet = 0.00). For the KMO value is considered adequate when it exceeds 0.80 and Bartlet's test is adequate when its values are less than 0.05 (Taherdoost, Sahibuddin & Jalaliyoon, 2014). Also, because all items saturated with adequate scores no items were eliminated from the questionnaire retaining the initial 19 items proposed. Barrios and Ulises (2020) in Mexico conducted a similar study where validity was obtained through construct validity, being organized into two factors that explain 30.24% of the variance, finding an acceptable validity of the questionnaire of an instrument that assesses attitudes towards research. However, since it does not cover the dimensions that we believe are the axis for a good understanding of the construct of the research attitude index, it is important to consider our study.

Regarding the reliability of the instrument, a Cronbach's alpha value of 0.92 was obtained, which indicates an excellent internal consistency coefficient, since a value of 0.70 or higher is considered a good internal consistency (Quero, 2010). The value found is higher than the version of Rojas, Méndez and Rodríguez, (2012) who obtained a Cronbach's alpha of 0.882 in university students in Colombia. Likewise, good internal consistency was found in the dimensions Self-Evaluation (.737), Teacher Incidence (.838), and Institutional Incidence (.876). These values guarantee that what we are measuring is really being measured as accurately as possible.

Limitations and strengths

In terms of limitations, all those inherent to studies of this nature are accepted, which are expressed below in the form of needs or prospective. The need to diversify the study sample, achieving better and higher levels of representativeness of the population. Additional need to also increase the population, in order to make the instrument a powerful index for any student branch in the country. Even transcend the barriers of the country, and continue its validation in related contexts, close and even distant, at least in the same language. It can be translated into other languages and be validated also in other countries with different languages.

Methodologically, it is fair to recognize that although the canons of instrument validation are met, the cross-sectional design of the data collection does not allow verification of the test-retest reliability of the IAI, with the advantages that this would have entailed. In any case, except for future adaptations derived from the above, the instrument merits immediate use to measure the dependent variable for which it has been constructed and to begin to take actions to optimize it, by planning its development, given its transcendence, as justified at the beginning of this work. Institutions, organizations and research groups are encouraged to undertake this task in order to definitively link the research, development and innovation trinomial.

Conclusion

It is concluded that the psychometric properties of the Research Attitude Index (IAI) in Peruvian university students present adequate indicators of validity and internal consistency. Likewise, the instrument will be very useful to be used in future studies that seek to know aspects of the training of Peruvian university students.

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