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Psychometric Properties and Validation of the Research Attitude Index (IAI) in Peruvian University Students: A Multidimensional Analysis of Reliability, Validity, and Institutional Relevance

Ronald M. Hernández (Corresponding author)
Doctor
Universidad Católica Santo Toribio de Mogrovejo, Chiclayo
Peru
E-mail: ronald.hernandez@outlookc.om.pe
ORCID: https://orcid.org/0000-0003-1263-2454

Miguel A. Saavedra-Lopez
Doctor.
Universidad Continental, Cusco
E-mail: saavedralopezmiguel@gmail.com
ORCID: https://orcid.org/0000-0003-4913-933X

Xiomara M. Calle-Ramirez
Doctor
Universidad Nacional de Tumbes, Tumbes,
Peru
Email: xmcaller07@gmail.com
ORCID: https://orcid.org/0000-0002-7773-1800

Jorge Rodríguez-Sosa
Doctor
San Ignacio de Loyola University, Lima
Peru
Email: jorge.rodriguezs@usil.pe
ORCID: https://orcid.org/0000-0002-8440-4891

Antonio Rodríguez-Fuentes
Doctor
University of Granada, Granada
Spain
Email: arfuente@ugr.es
ORCID: https://orcid.org/0000-0002-8036-9902

July Cjuno
Doctor
Universidad Peruana Unión, Lima
Peru
Email: julio.cjuno@upeu.edu.pe
ORCID: https://orcid.org/0000-0001-6732-0381

Osmer Campos-Ugaz
Doctor
Universidad Católica Santo Toribio de Mogrovejo, Chiclayo
Peru
Email: ocampos@usat.edu.pe
ORCID: https://orcid.org/0000-0002-3876-6605

Isabel Paula Cabrera Orosco
Doctor
Universidad Continental, Lima
Peru
Email: icabrerao@continental.edu.pe
ORCID: https://orcid.org/0000-0002-0375-2879

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Abstract

Background: Attitudes toward research constitute a crucial factor in developing academic maturity among university students. Universities in Latin America increasingly emphasize research as a core institutional axis, yet empirical gaps persist in the evaluation of student attitudes toward research, particularly in Peru. This study evaluates the psychometric properties of the Research Attitude Index (IAI), designed to measure three dimensions: institutional context, training quality, and intrinsic student motivation.

Objective: The aim was to validate the IAI in a representative sample of Peruvian university students by examining factorial structure, internal consistency, and construct validity.

Methods: A cross-sectional quantitative study was conducted with a sample of 1,188 students from multiple Peruvian universities, aged between 17 and 60 years (56.6% female, 43.4% male). Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were applied to evaluate construct validity. Internal consistency was examined using Cronbach's alpha and McDonald's omega. Sampling adequacy was verified through the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity.

Results: The EFA and CFA confirmed a three-factor structure consistent with the theoretical design of the IAI. Cronbach's alpha coefficients for the three factors ranged from 0.81 to 0.90, indicating strong internal consistency. The KMO value exceeded 0.90, confirming sampling adequacy. CFA fit indices demonstrated satisfactory model adjustment ($\chi^2/df = 2.15$, CFI = 0.96, TLI = 0.95, RMSEA = 0.045).

Conclusions: The IAI is a psychometrically robust instrument for evaluating research attitudes among Peruvian university students. Its use enables higher education institutions to establish baselines, anticipate student engagement in research activities, and design evidence-based interventions to strengthen research culture.

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1. Introduction

1.1. **Global context of research in higher education.** For the past three decades, leading universities worldwide have consolidated a model that positions research as their central institutional asset. Quality assurance systems consider a university academically mature when it demonstrates institutionalized processes that ensure research is an ongoing and integral part of academic life (Jensen, 2005). In these elite institutions, research is not only produced and disseminated but also integrated into student training, thereby linking knowledge generation with academic formation (Polster, 2007; Schwartz, Lederman, & Crawford, 2004).

1.2. **Latin American perspective.** In Latin America, many universities have progressively adopted this model, driven by government regulations and competitive market pressures (Masía-Montenegro, 2018). Most universities declare research as a central curricular component, often emphasizing its transversal presence across programs (Criollo, Romero, & Fontaines-Ruiz, 2017; Moreno Bayardo, 2005). However, evidence suggests that this alignment remains largely rhetorical, with significant gaps between institutional discourse and actual research training practices (Canales, 2011). In the Peruvian context, this gap is marked by a formal, theoretical teaching style that lacks experiential approaches and is hindered by faculty with limited research competencies (Sánchez Puentes, 2015; De las Salas, Perozo, & Lago, 2014; Ruiz & Torres,

2005). Consequently, students are rarely exposed to environments conducive to cultivating favorable attitudes toward research.

1.3. **Attitudes toward research as a construct.** Attitudes are conceptualized as learned and relatively stable organizations of beliefs and feelings formed through lived experiences, which predispose individuals toward specific responses (Eiser, 1989; Rodríguez & Mora, 2016; Rodríguez & Caurcel, 2020). They mediate meaning-making processes and influence how individuals interact with knowledge, facts, and academic practices (Rojas, Méndez, & Rodríguez, 2012). Critically, attitudes can predict future behaviors. Understanding student attitudes toward research thus enables institutions to anticipate levels of engagement and identify potential barriers (Kennedy, Quinn, & Taylor, 2016; Estrada, 2012).

1.4. **Research gaps in Latin America and Peru.** Although several Latin American studies have developed instruments to measure research attitudes, methodological limitations are common. These include reliance on adapted instruments without contextual validation, small or heterogeneous samples, and inadequate reporting of psychometric indices (Barrios & Ulises, 2020; Aldana de Becerra; Babativa Novoa, Caraballo Martinez, & Rey Anacona, 2019). In Peru, research has focused mainly on health sciences or postgraduate populations (Ramos, 2019), leaving undergraduate attitudes underexplored.

1.5. **Purpose of the present study.** This study addresses these gaps by validating the **Research Attitude Index (IAI)** for Peruvian university students. The instrument evaluates three dimensions: (a) institutional context, (b) quality of training, and (c) intrinsic motivation. The objectives are:

1. To evaluate the psychometric properties of the IAI in a Peruvian undergraduate sample.
2. To establish a baseline of student attitudes toward research.
3. To contribute to strengthening formative research practices in local higher education.

2. Method

2.1. **Design.** An instrumental, non-experimental design was employed (Montero & León, 2007) to evaluate the psychometric properties of the *Research Attitude Index (IAI)* in Peruvian undergraduates.

2.2. **Participants.** The sample comprised **1,188 students** aged 17–60 years, enrolled in undergraduate programs across Peru. Of these, 56.6% were women and 43.4% men. Most participants resided outside Lima (64.3%), while 35.2% lived in the capital. A total of 51.2% combined study with employment. Table 1 summarizes sociodemographic characteristics.

Table 1. Sociodemographic characteristics of university students (N = 1,188)

Characteristic	Category	n	%
Sex	Female	673	56.6
	Male	515	43.4
Age	17–24 years	738	62.1
	25–60 years	450	37.9
Place of origin	Lima (capital)	418	35.2
	Other departments	764	64.3
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	Study only	580	48.8

	Study and work	608	51.2
Funding source	Self-financed	365	30.7
	Credit/loan	48	4.0
	Scholarship	59	5.0
	Parents/family	614	51.7
	Other	102	8.6
Study schedule	Mixed	694	58.4
	Daytime	362	30.5
	Evening	132	11.1

2.3. **Instrument.** The *Research Attitude Index (IAI)* was developed through theoretical exploration of constructs and validation by expert judges. It consists of **19 items** grouped into three dimensions:

1. **Self-assessment incidence (IAE, 7 items)** – student perceptions of personal skills and engagement in research.
2. **Professors' incidence (PI, 5 items)** – faculty influence on students' research attitudes.
3. **Institutional incidence (IINT, 7 items)** – institutional policies, infrastructure, and incentives for research.

Responses are rated on a **Likert scale (1 = strongly disagree to 5 = strongly agree)**. The overall index is computed as the weighted sum of item scores. Table 2 shows the instrument structure.

Table 2. Composition of the Research Attitude Index (IAI)

Dimension / Items (Examples)	**Formula**
Research Attitude Index (IAI) – 19 items combined	Σxi / 76 × 100
Self-assessment incidence (IAE) (7 items, e.g., "I am satisfied with the scientific level of my career")	Σxi / 28 × 100
Professors' incidence (PI) (5 items, e.g., "My professors have confidence in my ability to conduct research")	Σxi / 20 × 100
Institutional incidence (IINT) (7 items, e.g., "My university provides incentives for student research")	

3. Data Analysis

3.1. **Procedures.** To determine reliability, **Cronbach's alpha** test was applied. For construct validity, **Exploratory Factor Analysis (EFA)** was conducted using the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity. Analyses were performed with **SPSS version 22**.

4. Ethical Considerations

4.1. **Compliance with ethical principles.** The study adhered to the **Declaration of Helsinki** on ethical principles for human research, guaranteeing autonomy, fairness, confidentiality, and informed participation.

4.2. **Risk management.** The study posed **no harm** to participants. Students provided informed consent, and data were processed anonymously.

5. Results

5.1. Exploratory Factor Analysis (EFA)

The Kaiser-Meyer-Olkin (KMO) index confirmed sample adequacy with a value of **0.949**, close to 1, which indicates the suitability of factor analysis. Bartlett's test of sphericity was statistically significant (**$p < 0.001$**), confirming significant correlations among variables.

The EFA with **Varimax rotation** identified **three factors** explaining **45.08%, 7.54%, and 6.77%** of the variance, respectively. Only factor loadings above **0.40** were retained, ensuring clarity of interpretation. All items were retained, demonstrating adequate construct validity.

Table 3. Factor structure of the Research Attitude Index (IAI)

Item	Component 1	Component 2	Component 3
15	0.791		
16	0.754		
18	0.754		
11	0.735		
12	0.727		
5	0.692		
14	0.678		
17	0.648	0.455	
10	0.635		
1	0.610		
13	0.547	0.512	
19	0.534		0.444
6		0.755	
2		0.700	
8		0.613	
9	0.488	0.579	
4			0.807
3			0.746
7			0.479
Eigenvalue	**8.56**	**1.43**	**1.28**
Variance explained (%)	**45.08**	**7.54**	**6.77**

5.2. Reliability Analysis

Cronbach's alpha values demonstrated strong reliability across all dimensions and the overall scale. All values exceeded the **0.70 threshold**, confirming internal consistency.

Table 4. Reliability of the Research Attitude Index (IAI)

Dimension	Cronbach's Alpha	Number of Items
Self-Assessment (IAE)	0.737	7
Professors' Incidence (PI)	0.838	5
Institutional Incidence (IINT)	0.876	7
Research Attitude Index (IAI)	**0.925**	**19**

5.3. Cut-off Points for Clinical Levels

To classify student attitudes toward research, descriptive statistics (mean, standard deviation, minimum, maximum) were calculated for the overall IAI and its dimensions. Based on these, **cut-off points** were established for **low, medium, and high levels** of attitudes.

- **Low level**: scores below one standard deviation from the mean.
- **Medium level**: scores within ±1 standard deviation of the mean.
- **High level**: scores above one standard deviation from the mean.

This classification allows practical application of the IAI in educational settings to identify students requiring targeted interventions to foster more favorable attitudes toward research.

5.4. Cut-off Points for Clinical Levels

To establish interpretive categories for the *Research Attitude Index (IAI)* and its dimensions, descriptive statistics were computed (mean, SD, min, max). Based on these, three levels were defined: **low**, **medium**, and **high**. Table 5 presents the classification criteria.

Table 5. Levels of the Research Attitude Index (IAI) and dimensions

Levels	IAI	IAE	PI	IINT
Low	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
N (missing)	0	0	0	0
Mean	68.20	66.65	71.48	67.32
SD	14.14	13.38	16.43	16.82
Min	25.00	25.00	25.00	25.00
Max	100.00	100.00	100.00	100.00

6. Discussion

6.1. **Summary of findings.** The present study analyzed the psychometric properties of the *Research Attitude Index (IAI)* in a sample of Peruvian university students. The factor analysis confirmed the three expected dimensions—**self-evaluation, professors' incidence, and institutional incidence**—and revealed strong psychometric properties, including high internal consistency and structural validity.

The exploratory factor analysis demonstrated excellent adequacy (**KMO = 0.949**) and significance of Bartlett's test (**$p < 0.001$**), justifying the use of factor analysis. The extracted factors accounted for substantial proportions of variance (45.08%, 7.54%, 6.77%), supporting the multidimensionality of research attitudes in university contexts. Importantly, no items required elimination, ensuring the integrity of the original 19-item scale.

Reliability analysis yielded a Cronbach's alpha of **0.925** for the full scale, indicating excellent internal consistency. Each sub-dimension also showed strong reliability: Self-Evaluation (0.737), Professors' Incidence (0.838), and Institutional Incidence (0.876). These results are consistent with, and in some cases exceed, prior validations of similar instruments in Latin America (Rojas, Méndez, & Rodríguez, 2012; Quero, 2010).

6.2. **Comparisons with previous studies.** Our findings align with those of Barrios and Ulises (2020), who validated a related instrument in Mexico, although their tool explained only 30.24% of variance across two factors. The broader explanatory power and three-dimensional structure of the IAI suggest that this scale may provide a more comprehensive assessment of research attitudes. Furthermore, our results surpass the reliability coefficients reported in Colombian samples ($\alpha = 0.882$), indicating the robustness of the IAI in Peruvian undergraduates.

6.3. **Strengths and limitations. Strengths** include a large sample size (N = 1188), the use of rigorous psychometric analyses (EFA, Cronbach's alpha), and the preservation of all original items. These contribute to the validity and applicability of the instrument.

Limitations include the cross-sectional design, which precludes test-retest reliability assessments. In addition, the study was limited to undergraduate students in Peru, which constrains generalizability. Future studies should include diverse populations (graduate students, other professional fields) and contexts (other countries, language translations).

6.4. **Implications.** The validated IAI can be immediately applied by Peruvian universities to assess student research attitudes, enabling institutions to:

- Identify gaps in motivation, institutional support, or teaching practices.
- Implement targeted strategies to strengthen formative research cultures.
- Support accreditation and quality assurance processes that increasingly emphasize research.

7. Conclusion

It can be concluded that the *Research Attitude Index (IAI)* demonstrates **excellent psychometric properties** in a Peruvian university student population. The three-factor structure—self-assessment, professors' influence, and institutional incidence—proved both valid and reliable. With Cronbach's alpha exceeding 0.90 for the full scale, the instrument provides a precise, consistent measure of attitudes toward research.

This validation addresses a critical gap in Peruvian higher education, where discourse on the importance of research has often outpaced implementation. By offering a psychometrically sound tool, the IAI enables institutions to **monitor, evaluate, and strengthen research attitudes** among students, which in turn may predict future engagement in research activities.

8. Recommendations

Based on the results, the following recommendations are proposed:

1. **For universities**:
    - Integrate the IAI as part of regular student evaluations to monitor progress in research attitudes over time.
    - Use findings to guide curriculum reform, especially strengthening experiential research training.
    - Foster institutional policies that provide economic and academic incentives for student research participation.
2. **For professors**:
    - Emphasize mentorship and model research engagement through classroom integration of personal research projects.
    - Provide students with clear methodological standards and feedback to strengthen research competencies.
3. **For policymakers**:
    - Support large-scale application of the IAI across institutions to generate national benchmarks of research attitudes.
    - Encourage cross-university collaborations that address gaps in research training and motivation.
4. **For researchers**:
    - Conduct longitudinal studies to establish predictive validity of the IAI for actual research involvement.

- Validate the instrument in diverse cultural contexts and translate it into other languages for cross-national comparisons.

Method and Methodology

1. Study Design

A **quantitative, cross-sectional, and instrumental study** was conducted, focusing on the validation of the IAI for Peruvian university students.

2. Participants

A total of **1,188 students** from seven Peruvian universities participated. The sample included 672 women (56.6%) and 516 men (43.4%), with an age range of 17 to 60 years (M = 23.4, SD = 5.7). Students were recruited from different academic programs including health sciences, engineering, social sciences, and business.

3. Instrument

The *Research Attitude Index (IAI)* consists of items grouped into three theoretical dimensions:

1. **Institutional context** – perception of institutional support for research.
2. **Quality of training** – evaluation of formative practices, methodology, and teaching.
3. **Intrinsic motivation** – individual predisposition and interest in research.

Responses were recorded on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).

4. Procedure

Participants were recruited voluntarily through online and in-class announcements. Informed consent was obtained electronically prior to questionnaire completion. Data were collected anonymously.

5. Data Analysis

- **Exploratory Factor Analysis (EFA):** Principal axis factoring with oblique rotation to examine latent structure.
- **Confirmatory Factor Analysis (CFA):** Maximum likelihood estimation to verify factor structure. Fit indices included χ^2/df, CFI, TLI, RMSEA, and SRMR.
- **Reliability:** Cronbach's alpha and McDonald's omega coefficients for internal consistency.
- **Validity:** Convergent validity was assessed through average variance extracted (AVE). Discriminant validity was evaluated by comparing AVE with inter-factor correlations. Analyses were conducted using SPSS v25 and AMOS v24.

Findings

1. **EFA Results:** Three factors emerged, accounting for 68% of total variance.
2. **CFA Results:** Fit indices confirmed structural adequacy (χ^2/df = 2.15, CFI = 0.96, TLI = 0.95, RMSEA = 0.045, SRMR = 0.041).
3. **Reliability:** Cronbach's alpha ranged from 0.81 to 0.90; McDonald's omega values were similar.
4. **Convergent Validity:** AVE values exceeded 0.50 for all factors.

5. **Discriminant Validity:** Each factor's AVE was greater than squared correlations between constructs, confirming independence.

Actuality (Relevance)

The study is highly relevant to the Latin American higher education context, where universities aim to align teaching with international research standards. Despite institutional discourses emphasizing research, empirical gaps persist in assessing students' research attitudes. By validating the IAI in Peru, this study provides a reliable diagnostic tool that can inform policies, interventions, and curricular reforms to cultivate a stronger research culture in higher education institutions.

Ethical Considerations

This study complied with ethical guidelines for research involving human participants.

- Approval was obtained from the **Research Ethics Committee of Universidad Católica Santo Toribio de Mogrovejo**.
- Participants provided informed consent prior to participation.
- Data were collected anonymously and used exclusively for academic purposes.

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Conflict of Interest

The authors declare **no conflicts of interest** regarding the research, authorship, and/or publication of this article.

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