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# Development and validation of the motivation to publish scale-scientific articles (EMP-AC) for Peruvian university students

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**Objective:** To design and validate the motivation to publish scale-scientific articles (EMP-AC) for Peruvian university students.

**Methods:** This was an instrumental study in which 653 health, business, humanities and engineering students from private and state universities in the 3 regions of Peru participated. The scale was designed in 5 stages following international standards. The internal structure was assessed through both an Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA).

**Results:** The content analysis by expert judges also supported the representativeness of the items related to the construction. The internal structure of the 13-item scale was confirmed through the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) which showed a structure of three factors: commitment, behavior, and intentional state as initially proposed. Previous analyses of goodness of fit indices were satisfactory ( $\chi^2(167)=276.93$ ,  $p < 0.001$ ; CFI=0.95; TLI=0.93; RMSEA=0.07 [0.06–0.08]; SRMR=0.06).

**Conclusion:** The EMP-AC shows initial evidence of validity and reliability; therefore, it can be applied in the study of the motivation to publish scientific articles by Peruvian university students.

## KEYWORDS

motivation, scientific publication, scientific dissemination, research, Perú

## 1. Introduction

The publication of scientific articles is a key aspect for the development of research skills and the promotion of university scientific production (Mamani-Benito, 2021). University students can play an important role in research productivity in an institution (Griffin and Hindocha, 2011). Conducting research during university training offers a series of positive outcomes, including the development of critical thinking skills, the ability to evaluate literature, learning about teamwork, gaining experience in writing, and practicing communication of data with the scientific community (Houlden et al., 2004). Additionally, it has been shown that

participation in both organized and extracurricular research during university training supports a positive attitude towards research in students' future careers (Griffin and Hindocha, 2011). In a highly competitive job market, the evaluation of the publication of scientific articles has become an important indicator of professional and personal development of researchers (George and Moreira, 2009). Research is crucial for social progress and its success depends on its quality and dissemination through publication (Bedeian et al., 2009; Lambovska and Todorova, 2021). Publication contributes to the dissemination and practical application of the most valuable ideas and, as a result, increases the public's desire for research. Universities have been perceived as stakeholder organizations (Osterloh and Frey, 2013), highlighting the importance of scientific article publication for all stakeholders. For researchers, publication influences their tenure, professional advancement, professional recognition, and rewards (Miller et al., 2011). For society, high-quality publications remain the main tool for describing individual and national contributions to science and society (Lambovska and Todorova, 2021).

The motivation to publish scientific articles among Peruvian university students is a relevant topic, considering the low proportion of research results that are published in scientific journals in this country (Castro-Rodríguez et al., 2020). However, the new university law N°30,220, driven in 2014 by the Ministry of Education, positions research as a fundamental pillar of academic training in undergraduate programs, giving greater importance to the completion of research work to obtain a professional degree (Ministerio de Educacion, 2014; Mayta-Tristán, 2016). Motivation for research plays an important role in this scenario, representing the internal state that activates, directs, and orientates a student's interest and behavior towards the application of the scientific method, generating an impulse in the determination to achieve goals related to student scientific production (Carranza et al., 2022). Research in Latin America has demonstrated a relationship between motivation and investigative capacities in the university context (Ortuño-Soriano et al., 2013; Veytia and Contreras, 2018; Zhang et al., 2022).

The theory of achievement motivation is an important framework for understanding the motivation to publish scientific articles among Peruvian university students. According to this theory, motivation is presented as an achievement need, meaning that people who constantly strive to improve or who strive for excellence are driven by desires for perfection, victory, and distinction (Anderman, 2020). In the context of higher education, it is assumed that students have the need to achieve success and avoid failure, so students with high achievement needs feel an intense drive towards the attainment of goals that represent a certain challenge (Tao et al., 2023). Achievement-oriented motivation guides efforts in terms of persistence, direction, and intensity towards the goals set by a student, including the exercise of scientific research and the writing of scientific manuscripts to be presented at scientific events (Nordsteien et al., 2017; Lüftnegger et al., 2019). To achieve these challenges, an intentional state, commitment, and appropriate behavior are necessary that demonstrate the student's interest and dedication towards their research (Lüftnegger et al., 2019). Achievement motivation, combined with research skills acquired throughout university education, can be a powerful combination that drives the publication of scientific articles (Houlden et al., 2004).

The Peruvian context shows a high production of academic works with research results that are presented and evaluated at university

events such as student scientific days (SUNEDU, 2021). However, once evaluated, students usually do not have the interest to adapt them to a scientific article format or submit them to an indexed journal (Corrales-Reyes et al., 2018, 2021; Carranza-Esteban et al., 2020). This is what motivates the study of students' intention to publish research results. Although there are measures to evaluate research motivation, these are not focused on the intention to publish scientific articles, but on general motivation for research (Núñez et al., 2006; Ortuño-Soriano et al., 2013; Carranza et al., 2022; Hosseini and Bahrami, 2022). Some studies, both in professors from the United States and Canada (Deemer et al., 2010) and in professors from Iran (Hosseini and Bahrami, 2022), have revealed psychometric properties of self-report measures. In addition, some alternatives have been designed for students, such as the inventory of Lin et al. (2014), to evaluate the motivation to write research articles among Taiwanese graduate students and the scale of research motivation in university students designed and validated by Carranza et al. (2022).

The importance of evaluating the intention to publish a scientific article must be taken into consideration. This requires specific measurement, as the motivation for research and the intention to publish have different indicators. While motivation for research may only be driven by academic demands, publishing involves an intentional state, commitment, and behaviors aimed at writing and publishing scientific manuscripts (Espinoza, 2020).

Given the lack of specific tools, the objective of the present research is to develop and validate a scale of motivation to publish scientific articles in Peruvian university students.

## 2. Materials and methods

### 2.1. Design and participants

The study is classified as instrumental research, as the psychometric properties of a psychological measurement instrument are analyzed (Ato et al., 2013). Under nonprobabilistic convenience sampling, 653 university students of both sexes (61.4% women) between 18 and 38 years of age ( $ME = 21.33$ ,  $SD = 3.79$ ) voluntarily participated (Table 1). The majority of the students were female (61.4%), from the health faculty (34.3%), in their third year (30.5%), living on the coast (35.2%), and came from private universities (69.4%).

### 2.2. Instrument design

The instrument was designed in five stages. First, theoretical indicators related to the construct of motivation to publish scientific articles were sought. For this, research published in the last 10 years (2011–2021) was considered, prioritizing the SciELO digital library and the Scopus database. In this way, few studies were found, but the results were significant (Ortuño-Soriano et al., 2013; Lin et al., 2014; Carranza et al., 2022; Hosseini and Bahrami, 2022; Zhang et al., 2022). In this case, for SciELO, terms such as “Motivation for scientific publication,” “Motivation for publishing scientific articles,” and “Motivation for writing scientific articles” were applied, under a strategy recommended by Curioso et al. (2008), i.e., using Boolean terms in the Google search engine, taking into account the libraries

TABLE 1 Demographic characteristics of the university students.

Variable	Frequency	Percentage
<b>Gender</b>		
Female	401	61.4
Male	252	38.6
<b>Faculty</b>		
Health	224	34.3
Business	163	25.0
Engineering	149	22.8
Humanities	117	17.9
<b>Year</b>		
First year	159	24.3
Second year	101	15.5
Third year	199	30.5
Fourth year	109	16.7
Fifth year	85	13.0
<b>Place of residence</b>		
Coast	230	35.2
Andes	222	34.0
Jungle	201	30.8
<b>Type of university</b>		
Private	453	69.4
State	200	30.6

for Argentina, Chile, Brazil, Colombia, Cuba, Spain, Costa Rica, Mexico, Paraguay, Portugal, Peru, Uruguay and Venezuela; in addition to SciELO Public Health, SciELO Social Sciences was also searched using terms such as “Motivation for research.”<sup>1,2</sup> To retrieve studies from Scopus, an advanced search with Boolean operators was applied (for example, “Motivation” and its relationship with the terms “Motivation for scientific publication” OR “Motivation to write scientific articles” OR “Motivation to publish scientific articles,” in the title, abstract and keywords fields).

Second, the construct was conceptually defined as the set of psychological processes that drive a certain commitment and intentional state that activates student interest, guiding their effort in intensity, direction and persistence, faced with the goal of publishing scientific articles. In this way, the variable was operationalized in 13 indicators distributed into 3 factors: commitment (Items 1–3), behavior (Items 4–8), and intentional state (Items 9–13). Third, for each indicator, an affirmative item was proposed, with scaled response options in a Likert format: Strongly disagree, Disagree, Neither agree nor disagree, Agree and Strongly agree. Fourth, the first version of the scale (13 items) was evaluated by 6 experts (research professors certified by CONCYTEC), who rated the relevance, representativeness and clarity of the items. Finally, in the fifth phase, a pilot test was applied using the focus group technique recommended by [Muñiz and Fonseca-Pedrero \(2019\)](#); this

phase consisted of bringing together 25 students with characteristics similar to those of the study population. In this process, a group interview was conducted using the guidelines of a previously developed questionnaire. The instrument was evaluated in a focus group to gather opinions on its relevance, the clarity of its language, the degree of comprehensibility of the items, and any inconsistencies related to the measurement of the construct. The focus group meeting lasted 45 min and there were no significant conflicting feedback from the participants, confirming the apparent validity of the EMP-AC (see Appendix 1).

To evaluate validity based on its relationship with other variables, one contrasting instrument was used: the Research Motivation Scale (MOiNV-U; [Carranza et al., 2022](#)). This scale consists of 13 items that are divided into two factors and includes 5 response options ranging from “Strongly Disagree” to “Strongly Agree.” The internal consistency analysis performed in the current study showed adequate results, with a reliability coefficient of  $\alpha = 0.96$  (95% CI, 0.95–0.99).

## 2.3. Procedures

The research was conducted between May and June 2022. To comply with COVID-19 restrictions, a virtual format was generated through Google Forms. An invitation was sent to university students through institutional mail and social networks. Before answering the questions, informed consent was presented, communicating the purposes of the study and emphasizing that participation was voluntary and anonymous.

## 2.4. Ethical considerations

The research was approved by the ethics committee of Peruvian Union University (N°2022-CEUPeU-050).

## 2.5. Statistical analysis

The study was carried out in stages. Firstly, a descriptive analysis of the items was performed (mean, standard deviation, skewness, and kurtosis). Secondly, an exploratory factor analysis (EFA) was carried out after applying the Bartlett test and the Kaiser-Meyer-Olkin (KMO) coefficient. In this case, the unweighted least squares method with an oblique rotation and parallel analysis was used to determine the number of factors. Thirdly, the internal structure of the scale was examined through the CFA, for which the robust maximum likelihood estimation method (RML) was used, which has been shown to be suitable for ordinal variables. The goodness-of-fit measures followed the recommendations of [Hu and Bentler \(1999\)](#): Chi-squared ( $\chi^2$ ), Comparative Fit Index (CFI > 0.95), Tucker-Lewis Index (TLI > 0.95), Root Mean Square Error of Approximation (RMSEA < 0.08), Standardized Root Mean Square Residual (SRMR < 0.06). Additionally, the Weighted Root Mean Square Residual (WRMR < 1) designed for ordinal variables was incorporated.

In the first model, the magnitudes of the factor loads ( $\lambda$ ) were evaluated, being considered adequate when they exceeded the value of 0.70 ([Dominguez-Lara, 2018](#)). Additionally, to evaluate internal validity, the average variance extracted (AVE) per factor was calculated, with the objective of determining convergent validity (AVE > 0.50).

1 <http://www.scielo.cl>

2 <http://www.scielo.org.pe>

Interfactorial correlations ( $\varphi$ ) were also estimated according to conceptual affinity, to evidence discriminant validity through a comparison between the AVE and the square of the interfactorial correlations ( $\varphi^2$ ), expecting the first to be greater ( $AVE > \varphi^2$ ) (Fornell and Larcker, 1981). Finally, reliability was estimated using the omega coefficient ( $\omega$ ), which is assumed to be ideal when working with factor loads and assuming a cogenetic measure.

The descriptive analysis was performed in the SPSS statistical package version 24.0, the exploratory factor analysis in the Factor Analysis program version 12.0; and the confirmatory factor analysis with the free R program in version 4.2.0; specifically, the RStudio environment was used in version 02.3. The libraries used were “lavaan” for the confirmatory factor analysis (CFA) and “semTools” for reliability estimation.

### 3. Results

#### 3.1. Content-based validity

Table 2 provides the results of the evaluation by the 6 experts who analyzed the relevance, representativeness and clarity of the items of the EMP-AC. The items received a favorable evaluation ( $V > 0.70$ ). Regarding relevance, Items 3, 7, 12 and 13 were more important than the others ( $V = 1.00$ ; 95% CI: 0.89–1.00). Items 1, 4 and 7 were the most representative ( $V = 1.00$ ; 95% CI: 0.89–1.00), and Items 3, 6, 8 and 10 were the clearest ( $V = 1, 00$ ; 95% CI: 0.89–1.00). All lower limit (LI) 95% CI values were appropriate, and all the V coefficients were statistically significant. Therefore, the EMP-AC has evidence of content-based validity.

#### 3.2. Exploratory factor analysis

Prior to the Exploratory Factor Analysis (EFA), a descriptive analysis (mean, standard deviation, skewness, and kurtosis) of the 13

items of the EMP-AC was carried out. In this case, it was found that item 13 is the one with the highest average score ( $M = 3.73$ ). The skewness and kurtosis values do not exceed the  $\pm 1.5$  range (Pérez and Medrano, 2010), and all items have communalities greater than 0.30, therefore, they were considered in the EFA. The Kaiser-Meyer-Olkin ( $KMO = 0.94$ ) index and the Bartlett test ( $7293.4$ ;  $df = 78$ ;  $p = 0.000$ ) were significant. Then, considering the unweighted least squares method with prominent oblique rotation, a parallel analysis was used to determine the factors, which revealed that there are three underlying factors to the 13 items. Finally, the rotated solution of Factor 1 (Behavior) explains 15.3% of the total variance, Factor 2 (Intentional state) explains 0.33.0%, and Factor 3 (Commitment) explains 0.24.1%. All items have saturations  $> 0.37$  (Table 3).

#### 3.3. Confirmatory factor analysis

The 13-item factor structure with 3 factors proposed by the EFA was subjected to CFA. When applying CFA to analyze the internal structure of the construct, goodness of fit indices were examined, and the results were satisfactory ( $\chi^2 (167) = 276.93$ ,  $p < 0.001$ ;  $CFI = 0.95$ ;  $TLI = 0.93$ ;  $RMSEA = 0.07 [0.06–0.08]$ ;  $SRMR = 0.06$ ) (Figure 1). Additionally, the convergent validity was evidenced by the presence of AVEs that are higher than 0.50 and strong in each factor. On the other hand, the internal discriminant validity is appreciated by the difference between the AVEs and the shared variance between factors ( $AVE > \varphi^2$ ), with the exception of the factor related to behavior and intentional state (Table 4).

#### 3.4. Validity based on the relationship with other questionnaires

Table 5 shows the calculation of the correlation coefficients between EMP-AC and MoINV-U. The obtained values indicate a direct and statistically significant correlation ( $r = 0.650$ ,  $p < 0.01$ ).

TABLE 2 Aiken’s V for the evaluation of the relevance, representativeness and clarity of the items of the EMP-AC.

Item	Relevance (n=6)				Representativeness (n=6)				Clarity (n=6)			
	M	SD	V	95% CI	M	SD	V	95% CI	M	SD	V	95% CI
Item 1	2.90	0.32	0.97	0.83–0.99	3.00	0.00	1.00	0.89–1.00	2.90	0.32	0.97	0.83–0.99
Item 2	2.90	0.32	0.97	0.83–0.99	2.60	0.52	0.87	0.70–0.95	2.80	0.42	0.93	0.79–0.98
Item 3	3.00	0.00	1.00	0.89–1.00	2.60	0.52	0.87	0.70–0.95	3.00	0.00	1.00	0.89–1.00
Item 4	2.80	0.63	0.93	0.79–0.98	3.00	0.00	1.00	0.89–1.00	2.80	0.42	0.93	0.79–0.98
Item 5	2.90	0.32	0.97	0.83–0.99	2.90	0.32	0.97	0.83–0.99	2.80	0.42	0.93	0.79–0.98
Item 6	2.90	0.32	0.97	0.83–0.99	2.90	0.32	0.97	0.83–0.99	3.00	0.00	1.00	0.89–1.00
Item 7	3.00	0.00	1.00	0.89–1.00	3.00	0.00	1.00	0.89–1.00	2.90	0.32	0.97	0.83–0.95
Item 8	2.80	0.42	0.93	0.79–0.98	2.90	0.32	0.97	0.83–0.99	3.00	0.00	1.00	0.89–1.00
Item 9	2.90	0.32	0.97	0.83–0.99	2.90	0.32	0.97	0.83–0.99	2.80	0.42	0.93	0.79–0.98
Item 10	2.80	0.63	0.93	0.79–0.98	2.80	0.63	0.93	0.79–0.98	3.00	0.00	1.00	0.89–1.00
Item 11	2.70	0.67	0.90	0.74–0.97	2.90	0.32	0.97	0.83–0.99	2.70	0.48	0.90	0.74–0.99
Item 12	3.00	0.00	1.00	0.89–1.00	2.60	0.52	0.87	0.70–0.95	2.80	0.42	0.93	0.79–0.98
Item 13	3.00	0.00	1.00	0.89–1.00	2.90	0.32	0.97	0.83–0.99	2.70	0.67	0.90	0.74–0.99

Therefore, this result shows the convergent validity of the EMP-AC.

### 3.5. Reliability

Regarding reliability, an excellent value was obtained for Factor 1 ( $\omega=0.88$ ), for Factor 2 ( $\omega=0.90$ ), and for Factor 3 ( $\omega=0.94$ ), and the WRMR result was 0.514.

## 4. Discussion

The practice of writing scientific articles is not always developed at the university level (Lu, 2021). Because of this, the issue of motivation to publish scientific manuscripts is of vital importance, and from what is known, the topic has not yet received enough attention and needs to be explored (Lambovska and Todorova, 2021). In this regard, in various countries, it is often university professors who are under pressure to publish (Goyanes and Rodríguez-Gómez,

TABLE 3 Initial item analysis and exploratory factor analysis of the EMP-AC.

Item	M	SD	A	K	h	F1	F2	F3
1	3.37	1.11	-0.48	-0.28	0.79	0.61		
2	3.48	1.11	-0.64	-0.18	0.9	0.85		
3	3.7	1.05	-0.88	0.46	0.71	0.53		
4	3.39	1.1	-0.5	-0.29	0.71		0.37	
5	3.17	1.11	-0.31	-0.55	0.82		0.76	
6	3.15	1.11	-0.29	-0.6	0.85		0.91	
7	3.25	1.1	-0.47	-0.49	0.92		0.7	
8	2.91	1.15	-0.07	-0.84	0.92		0.87	
9	3.5	1.12	-0.66	-0.17	0.75			0.89
10	3.39	1.13	-0.55	-0.34	0.78			0.77
11	3.63	1.08	-0.77	0.09	0.72			0.95
12	3.45	1.08	-0.57	-0.14	0.64			0.82
13	3.73	1.09	-0.91	0.4	0.76			0.89
Variance %						15.3	33	24.1
<b>Inter-factors correlation</b>								
F1						1		
F2						0.61	1	
F3						0.73	0.49	1

M, mean; SD, standard deviation; A, asymmetry; K, kurtosis; h, communalities; F1, behavior; F2, intentional state; F3, commitment.

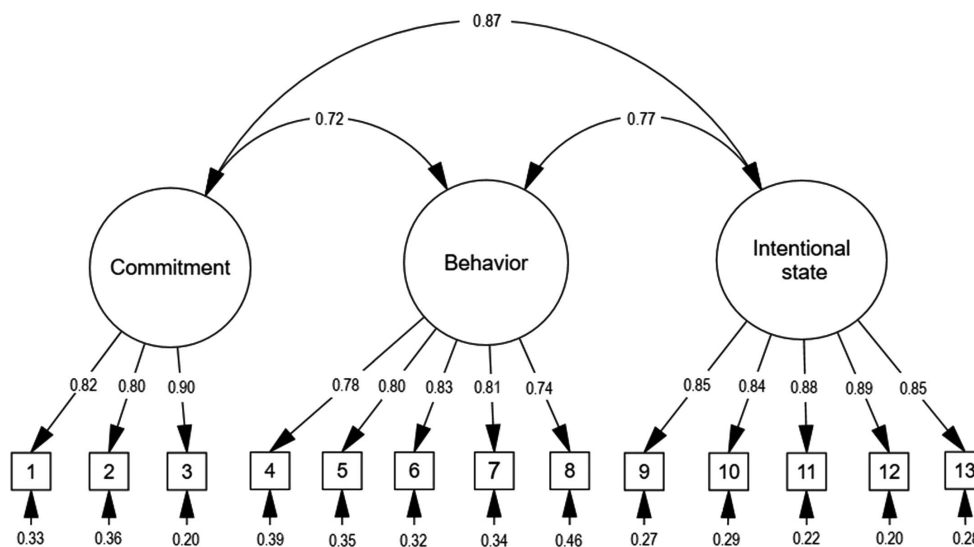


FIGURE 1 Diagram of the internal structure of the EMP-AC.

TABLE 4 CFA of the three-factor model.

Item	F1 ( $\lambda$ )	F2 ( $\lambda$ )	F3 ( $\lambda$ )
1	0.82		
2	0.8		
3	0.9		
4		0.78	
5		0.8	
6		0.83	
7		0.81	
8		0.74	
9			0.85
10			0.84
11			0.88
12			0.89
13			0.85
AVE	71	61	74
F1	1	0.51	0.75
F2	0.72	1	0.59
F3	0.87	0.77	1
$\chi^2$	276.93***		
CFI	0.95		
TLI	0.93		
RMSEA	0.07		
SRMR	0.06		

F1, behavior; F2, intentional state; F3, commitment;  $\lambda$ , factor loading; AVE, average extracted variance; below the diagonal: interfactor correlations; above the diagonal: shared variance between factors ( $AVE > \varphi^2$ ). \*\*\* $p < 0.001$ .

TABLE 5 Means, standard deviations and correlations between the MoINV-U and EMP-AC.

Variable	M	SD	1	2
1. EMP-AC	28.30	7.01	1	
2. MoINV-U	47.87	11.37	0.650**	1

M, mean; SD, standard deviation; \*\*Indicates  $p < 0.01$ ; EMP-AC, motivation to publish scale-scientific articles; MoINV-U, motivation to conduct research scale.

2018). On the other hand, for students, the will and interest to publish is rare (Zhang et al., 2022), largely due to the lack of skills and necessary motivation (Mayta-Tristán et al., 2013; Castro Rodríguez et al., 2017; Sánchez-Duque et al., 2017). As such, the purpose of this study was to design and validate a motivation to publish scientific articles scale for Peruvian university students.

Regarding the evidence of internal structure validity, the three-factor structure: commitment, behavior, and intentional state initially proposed was confirmed. The CFA was performed from the EFA, so it can be interpreted that the EMP-AC is a measure that is based on 3 factors with strong factorial loads and 13 items rated adequately by experts. This means that the motivation to publish scientific articles can be operationalized based on 3 dimensions: commitment, behavior and intentional state. Specifically, Item 3, “I want to contribute to the academic/scientific community through the

publication of a scientific article,” had a greater factor load and therefore better explains the motivation to publish. This result was expected since one of the reasons for publishing is related to the contribution that a researcher wishes to make (Rawat and Meena, 2014). Furthermore, the reliability analysis yielded satisfactory results, allowing us to affirm that the EMP-AC is internally consistent. Additionally, concurrent validity was clearly demonstrated ( $AVE > 0.50$ ). The discriminant validity ( $AVE > \varphi^2$ ) was acceptable, except for the items in the behavior factor that failed to differentiate from the items in the intentional state factor. Despite this, the conclusion is not definite, as there is still discussion about considering discriminant validity as a criterion for evaluating measuring instruments. Although there are several methods for evaluating discriminant validity, statistical evaluations should not be made, as they can lead to erroneous conclusions about the suitability of the scale (Martínez-García and Martínez-Caro, 2009). On the other hand, discriminant validity should be performed in a theoretical manner, which includes content validity, which has been discussed extensively and recommended by Borsboom et al. (2004).

Another important finding has to do with the results of validity based on the relationship with other variables. In this case, the relationship of the EMP-AC with another similar scale (MoINV-U) that evaluates research motivation was analyzed, finding a direct and significant relationship between the scores. This finding is compatible with the result of other studies that orient to recognize that willingness and interest (dimensions of research motivation) are fundamental factors in the practice of writing scientific articles (Lin et al., 2014; Carranza et al., 2022), therefore, it is assumed that the EMP-AC demonstrates convergent validity, given that the constructs that are expected to be related are in fact related.

In contrast to other studies, although the content-based validity and reliability are similar to those of other instruments that measure motivation to investigate, the internal structure of the EMP-AC differs both in the number of dimensions and items in relation to others. Such was the case for Deemer et al. (2010), who reported 3 factors and 20 items, for Lin et al. (2014), who investigated motivation for writing research articles and reported 5 factors and 25 items, and for Carranza-Esteban et al. (2020), who designed and validated a measure to evaluate motivation to conduct research in the Peruvian context, reporting 2 factors distributed in 13 items; other examples include studies from a qualitative perspective (Lee and Kim, 2021; Lu, 2021). In this regard, these differences are due to the nature of the analyzed construct because motivation to conduct research is not the same as motivation to publish scientific articles; that is, a student may have the will and interest to conduct research (Carranza et al., 2022) without a guarantee that there is an intentional state, commitment and behaviors oriented toward scientific production. Otherwise, all students involved in research projects would publish scientific manuscripts, which is not likely in Peru; rather, the percentage of students who participate in scientific publications is very low (Hernández et al., 2019).

In relation to theoretical implications, this model shows congruence in its dimensions, commitment, behavior and intentional state, and is consistent with the SDT, in which Deci and Ryan (1985, 2000) take into account the fundamental desires of competence and autonomy. The items that reflect the autotelic nature

(for example, “*I really want to be the author of a scientific article*”) represent the essence of an intrinsic reward, as does the achievement motive theory of McClelland (1953) in which an individual manifests an impulse to excel and achieve his or her goals. The vast majority of Peruvian universities require their students to publish in international journals to receive a degree, i.e., extrinsic motivation (Vallerand et al., 1992); however, there is an urgent need to better understand the internal motivations that students may have with regard to publishing articles.

This study has some limitations. Given that the sample was Peruvian students, our results may not be generalizable to other student populations, for example, high school students or other Latin American cultures. Additionally, data collection occurred virtually; therefore, it is likely that some participants had unrelated purposes for answering the questionnaire. Likewise, because the study involved the completion of a self-report instrument, biases could have been generated, which is why experimental studies are necessary. Furthermore, psychometric studies should be conducted to obtain evidence of predictive validity and strengthen the results found in this study. It is also necessary to clarify that the results of the analysis of validity based on the relationship with other variables are limited, since only convergent validity data is provided, and a discriminant validity analysis is lacking, in order to strengthen the concurrent validity of the EMP-AC. Finally, in the search for construct indicators, the Web of Science database was not considered, so it is expected that in future research it will be taken into account to verify if the 13 theoretical indicators found are sufficient for the EMP-AC.

In conclusion, the EMP-AC is a tool that presents evidence of validity and reliability for a sample of Peruvian university students. Its contribution lies in the fact that it is a useful measurement tool that allows the measurement of the motivation of Peruvian students to publish scientific articles. Knowing the level of motivation can be useful when planning and evaluating research policies of university institutions. In turn, it allows the identification of future researchers who can better develop their attitudes and skills toward scientific publication.

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## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by Ethics committee of Peruvian Union University (N°2022-CEUPeU-050). The patients/participants provided their written informed consent to participate in this study.

## Author contributions

OM-B, JT-M, and MT-B conceived and designed the experiments, performed the experiments, analyzed and interpreted the data, and wrote the paper. EA-T, WM-G, and JT-C contributed reagents, materials, analysis tools, or data and wrote the paper. All authors contributed to the article and approved the submitted version.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Appendix 1

Spanish-English version of the EMP-AC.

1. Muy en desacuerdo/*Strongly disagree*
2. En desacuerdo/*Disagree*
3. Ni de acuerdo ni en desacuerdo/*Neither agree nor disagree*
4. De acuerdo/*Agree*
5. Muy de acuerdo/*Strongly agree*

Items	1	2	3	4	5
1. Me he propuesto publicar mi trabajo de investigación en una revista científica indexada. / <i>I have proposed to publish my research work in an indexed scientific journal</i>					
2. Creo que el proceso de investigación debe culminar con la publicación del artículo científico. / <i>I believe that the research process should culminate with the publication of a scientific article</i>					
3. Quiero aportar a la comunidad académica/científica a través de la publicación de un artículo científico. / <i>I want to contribute to the academic/scientific community through the publication of a scientific article</i>					
4. Cada vez que puedo asisto a cursos/seminarios/charlas de redacción de artículos científicos. / <i>Whenever I can, I attend courses/seminars/lectures on writing scientific articles</i>					
5. Estoy capacitándome en el uso de bases de datos (Scopus, Web of Science, Scielo, Redalyc u otras). / <i>I am learning how to use databases (Scopus, Web of Science, SciELO, Redalyc or others)</i>					
6. Estoy capacitándome en el uso de gestores de información como Mendeley, EndNote, Citavi, Zotero u otros. / <i>I am learning how to use information management tools such as Mendeley, EndNote, Citavi, Zotero or others</i>					
7. Actualmente soy parte de un proyecto de investigación. / <i>I am currently part of a research project</i>					
8. Pertenezco a un grupo/círculo de investigación. / <i>I belong to a research group/circle</i>					
9. Tengo muchas ganas de ser autor de un artículo científico. / <i>I really want to be the author of a scientific article</i>					
10. Cuando leo artículos científicos imagino que uno de ellos es de mi autoría. / <i>When I read scientific articles, I imagine that one of them is authored by me</i>					
11. Quiero que mi tema de investigación sea publicable. / <i>I want my research topic to be publishable</i>					
12. En cada trabajo académico tengo en mente la publicación de un artículo científico. / <i>For each study I am involved in, I have the publication of a scientific article in mind</i>					
13. Sé que habrá obstáculos en el camino, pero no me rendiré hasta ver publicado mi trabajo de investigación. / <i>I know there will be obstacles along the way, but I will not give up until my research is published</i>					