VOL. 34, n.º 1
ENERO-JUNIO 2025
ISSN 0121-5469 impreso · 2344-8644 en línea

REVISTA **COLOMBIANA** DE PSICOLOGÍA

Departamento de Psicología · Facultad de Ciencias Humanas

UNIVERSIDAD
NACIONAL
DE COLOMBIA

REVISTA COLOMBIANA DE PSICOLOGÍA
VOL. 34, n.° 1, ENERO-JUNIO 2024
ISSN 0121-5469 IMPRESO | 2344-8644 EN LÍNEA
www.revistacolombianapsicologia.unal.edu.co

LA REVISTA COLOMBIANA DE PSICOLOGÍA
es una publicación semestral del Departamento de Psicología de la Universidad Nacional de Colombia, dirigida a instituciones educativas y culturales, psicólogos, estudiantes de Psicología o disciplinas afines. Publica trabajos arbitrados que sigan alguna de las variedades metodológicas de tipo científico que sean relevantes para la psicología. Las opiniones de los autores son de su propia responsabilidad y no comprometen la posición de la revista.

CONTACTO
Revista Colombiana de Psicología, **Departamento de Psicología,** Facultad de Ciencias Humanas
Universidad Nacional de Colombia, cra. 30 n.° 45-03, edificio 212, oficina 220, Bogotá, D. C., Colombia
A. A. 14490, Código postal: 111321, 111311, teléfono: 316 5000 ext. 16307
E-mail: revpsico_fchbog@unal.edu.co
https://revistas.unal.edu.co/index.php/psicologia

La Revista Colombiana de Psicología está incluida en los siguientes índices y bases bibliográficos:

EBSCO
Fuente Académica Premier
(http://www.ebscohost.com/)

SCOPUS
(http://www.info.sciverse.com/scopus)

BVPSI-CO
Biblioteca Virtual de Psicología
(http://www.bvs-psi.org.co/)

CLASE
Citas Latinoamericanas en Ciencias Sociales y Humanidades
(http://132.248.9.1:8991/F/MQLBLJPQ2PS9AQ5MULE9V9ANN66DILI984UTD1QNE8QDRQV13T-01793?func=find-b-0&local_base=cla01)

DIALNET
Universidad de la Rioja
(http://dialnet.unirioja.es/)

DOAJ
Directory of Open Access Journals
(http://www.doaj.org/)

LATINDEX
Sistema regional de información en línea para revistas científicas de América Latina, el Caribe, España y Portugal.
(http://www.latindex.unam.mx/)

LILACS
Literatura Latinoamericana y del Caribe en Ciencias de la Salud
(http://lilacs.bvsalud.org/es/)

PSICODOC
Base de datos bibliográfica de Psicología
(http://www.psicodoc.org/acerca.htm)

PUBLINDEX
Sistema Nacional de Indexación de Publicaciones Especializadas de Ciencia, Tecnología e Innovación, CT+I
(http://201.234.78.173:8084/publindex/)

REDALYC
Red de Revistas Científicas de América Latina y el Caribe, España y Portugal
(http://redalyc.uaemex.mx/#)

SCIELO
Scientific Electronic Library Online
(http://www.scielo.org.co/)

REDIB
REDIB (Red Iberoamericana de Innovación y Conocimiento Científico) es una plataforma de agregación de contenidos científicos y académicos en formato electrónico producidos en el ámbito iberoamericano.

PSYCINFO
Base de datos de la American Psychological Association
(http://www.apa.org/pubs/databases/psycinfo/coverage.aspx)

DISTRIBUCIÓN
Edificio de Posgrados de Ciencias Humanas Rogelio Salmona (225), primer piso
Tel.: 316 5000, ext. 16139

PREPARACIÓN EDITORIAL

CENTRO EDITORIAL
FACULTAD DE CIENCIAS HUMANAS

Jineth Ardila Ariza
Directora del Centro Editorial

Julián D. Morales
Coordinador editorial de revistas

Michael Cárdenas Ramírez
Coordinador gráfico

María Camila Torrado
Diagramadora

Julián D. Morales
Corrector de textos en inglés

Ciudad Universitaria, ed. 225, sótano
Tel. 316 5000 ext. 16139
editorial_fch@unal.edu.co
www.humanas.unal.edu.co
Bogotá, D. C., 2022

REVISTA COLOMBIANA DE PSICOLOGÍA
VOL. 34, n.º 1 ENERO-JUNIO 2025
ISSN 0121-5469 IMPRESO | 2344-8644 EN LÍNEA

Contenido

ZULFIQAR ULLAH SIDDIQUI
Department of Psychology, University of Science & Technology
FAYEZ AZIZ MAHAMID
Department of Psychology, An-Najah National University
FAKHER NABEEL MOHAMMAD KHALILI
Department of Psychology, An-Najah National University
LAVANYA RAJAKUMAR
Department of Psychology, Murdoch University

Editorial

EL SURGIMIENTO de la inteligencia artificial (IA) plantea retos para la publicación académica. Esos retos están relacionados principalmente con garantizar la calidad de la publicación ante la tendencia de muchas inteligencias artificiales de producir textos aparentemente bien escritos que ocultan errores conceptuales, referencias inexistentes e interpretaciones erróneas. Esto implica una carga adicional para los equipos editoriales y anticipa una inflación aún mayor del número de artículos que se reciben al año en las revistas indexadas. Un reto asociado es que así cómo los autores se nutren de los productos de la IA, la IA también utiliza documentos disponibles no publicados (e.g., preprints, documentos de trabajo, textos en repositorios de ciencia abierta) para nutrirse, y hace difícil distinguir la verdadera autoría, así cómo determinar la asignación de derechos patrimoniales, cuándo una industria se nutre, sin retribuir, de la generosidad de los investigadores.

Por esto, la tesis que quiero defender es que el problema no es que los productos hayan sido realizados con el apoyo de la inteligencia artificial, sino que la inteligencia artificial no supervisada produce documentos con importantes errores conceptuales. La inteligencia artificial presenta una oportunidad de descargar a autores de tareas mecánicas no asociadas con el desarrollo conceptual de un texto. Así cómo el desarrollo de programas estadísticos avanzados permitió que los autores pudieran descargarse la realización de tediosos cálculos, la inteligencia artificial permite que partes del proceso investigativo sean realizadas con el apoyo de la IA. Lo que no cambió, ni en ese entonces ni ahora, es la relación de responsabilidad con lo qué se dice en el texto. Es decir, los programas estadísticos permitieron automatizar procesos de cálculo, pero no eximen a los autores de la responsabilidad de revisar que la maquina esté realizando los cálculos de manera correcta. Esa responsabilidad implica tanto ser cuidadosos con la escritura del código, como con la revisión de qué los resultados que se producen representen adecuadamente los patrones establecidos en los datos.

La relación con la inteligencia artificial debe tener la misma lógica. El asunto es evitar una moral del trabajo basada en un aislacionismo estoico, dónde sufrir es el objetivo independiente de la calidad del producto, y concentrarse en una lógica de la investigación en la que las herramientas disponibles son utilizadas para mejorar la calidad de los productos y disminuir la carga de trabajo de los investigadores. Esto, sin embargo, no exime de la responsabilidad de leer, releer y de revisar que conceptual y metodológicamente los textos presenten propuestas sólidas y, más básicamente, que no falten a la verdad en relación con los datos o con la investigación previa. Esa es la visión de la Revista Colombiana de Psicología y haremos todo lo posible para materializarla en el proceso editorial de la revista.

Artículos

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.112432

Measuring Frailty in Old Age: Rasch Analysis of the FRAIL Scale

VICTOR HUGO ARBOLEDA CAMPO
Escuela de Graduados. Universidad CES

DIEGO FERNANDO ROJAS GUALDRÓN
Facultad de Medicina, Universidad CES

DIANA ISABEL MUÑOZ RODRÍGUEZ
Facultad de Fisioterapia, Universidad CES

DORYS CARDONA ARANGO
Facultad de Medicina, Universidad CES

ANGELA MARÍA SEGURA CARDONA
Escuela de Graduados. Universidad CES

ALEJANDRA SEGURA CARDONA
Facultad de Psicología, Universidad CES

How to cite this article: Arboleda Campo, V. H., Rojas Gualdrón, D. F., Muñoz Rodríguez, D. I., Cardona Arango, D., Segura Cardona, A. M. and Segura Cardona, A. (2025). Measuring Frailty in Old Age: Rasch Analysis of the FRAIL Scale. *Revista Colombiana de Psicología*, *34*(1), pp 11-24. https://revistas.unal.edu.co/index.php/psicologia/article/view/112432

Correspondence: Doris Cardona Arango (https://orcid.org/0000-0003-4338-588X), Universidad CES, Medellín, Colombia. Email: doris.cardona@gmail.com

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: JANUARY 11TH , 2024–ACCEPTED: FEBRUARY 2TH, 2024

Measuring Frailty in Old Age: Rasch Analysis of the FRAIL Scale

Abstract

Objective. To evaluate by Rasch analysis the validity of the FRAIL scale for measuring frailty in older people in Colombia. **Methods.** Cross-sectional study including 2506 people aged ≥60 years living in Bucaramanga, Medellín, Pereira, Popayán, and Santa Marta in 2021. Guidelines for analysis of the FRAIL scale were followed and the Rasch model was used with adjustment of response categories, items and people, differential functioning of the items, dimensionality, local independence of the items, Wright reliability, and adjustments of the infit and outfit mean squares. **Results.** Overfitting of the weight loss item was identified although it did not compromise the unidimensionality or the total score. Wright reliability was 0.80; the measure explained 45.2% of the variance in raw scores. **Conclusions.** The FRAIL scale is a valid tool for assessing frailty in elderly people. It is unidimensional, reliable and unbiased by age for the frail state but not for the prefrail condition. Inclusion of the gender variable and categorization of the age variable with 70 years as cut-off point are suggested.

Keywords: elderly, frailty, validation study, psychometrics.

Medición de la fragilidad en la vejez: análisis Rasch de la escala FRAIL

Objetivo. Evaluar la validez de la escala FRAIL para medir la fragilidad en personas mayores de Colombia, mediante el análisis Rasch. **Métodos.** Estudio transversal, con la participación de 2506 personas de 60 y más años, residentes en cinco ciudades de Colombia en el 2021. Se siguieron los lineamientos para análisis de la escala de FRAIL, usando el modelo Rasch con ajuste de categorías de respuesta, de los ítems y las personas, funcionamiento diferencial de los ítems, dimensionalidad e independencia local de los ítems y confiabilidad Wright, con ajustes de las medias cuadráticas Infit y Outfit. **Resultados.** Se identificó sobreajuste del item pérdida de peso, pero no compromete la unidimensionalidad ni el puntaje total. La confiabilidad Wright fue de 0,80, la medida explicó el 45,2% de la varianza de las puntuaciones crudas. **Conclusiónes**. La escala FRAIL es una medición válida para determinan la fragilidad de la persona mayor, unidimensional, confiable e insesgada por edad para el estado frágil, no tanto para la condición prefragil. También se sugiere la inclusión de la variable sexo y categorizar la variable edad, con 70 años como punto de corte.

Palabras clave: anciano, fragilidad, estudio de validación, psicometría.

Introduction

The classification of frailty in older people presents difficulties regarding conceptualization and standardization (Sobhani et al., 2021). Despite it may be carried out through different approaches (Wleklik et al., 2020) and measurement tools (Sutton et al., 2016)there is insufficient evidence at present to determine the best tool for use in research and clinical practice. Further in-depth evaluation of the psychometric properties of these tools is required before they can fulfil the criteria for a gold standard assessment tool.\n\nElectronic supplementary material\nThe online version of this article (doi:10.1186/s12877-016-0225-2, there is uncertainty about whether fragility is a construct that may be measured or merely classified (Mayo et al., 2023). The frail condition is defined as a clinical syndrome wherein the individual has low reserves and is vulnerable to stressors occurred with aging (Chen et al., 2018). Among the recommended tools for its detection is the FRAIL scale (Van K. et al., 2008), fatigue (refers to feeling tired most or all of the time in the past 4 weeks), resistance (finds difficulty or is unable to climb a flight of stairs), ambulation (has difficulty or cannot walk a block), illness (has more than 5 illnesses), loss of weight (have lost more than 5% of weight in the last 6 months) (Morley, 2017), which combines elements proposed by Fried and Rockwood (Nidadavolu et al., 2020). According to this approach, frailty is a unidimensional formative construction quantified by counting such physical manifestations (Mayo et al., 2023). In one study, high diagnostic accuracy was reported for the frailty condition with hypothesis testing using FRAIL (O'Caoimh et al., 2023); similarly, another investigation reported a general Cronbach's Alpha of 0.786, which represented acceptable consistency (Alqahtani & Nasser, 2019)test-retest reliability over two visits with a one-week interval. We assessed criterion-related validity with the Fried Frailty Index as a reference measure and construct validity with other related measurements. MAIN OUTCOME MEASURES: Arabic version of the FRAIL Scale, grip strength, the Mini-Mental State Examination, a short physical performance battery, the Timed Up and Go test, the Fried Frailty Index, and the Duke Comorbidity Index.SAMPLE SIZE AND CHARACTERISTICS: 47 community-dwelling older adults (66% male, mean [SD] age 70 [4] years. Also, in a systematic review and meta-analysis FRAIL is a feasible tool for assessing frailty of older adults in community settings, with good criterion validity and test-retest reliability (Ng et al., 2024) and this scale is a promising short screen to stratify and help operationalize the perioperative care of older surgical patients (Gleason et al., 2017)the FRAIL scale, to categorize the level of frailty of older adults admitted with a fracture to determine the association of each frailty category with postoperative and 30-day outcomes. Design: Retrospective cohort study. Setting: Level 1 trauma center. Participants: A total of 175 consecutive patients over age 70 years admitted to co-managed orthopedic trauma and geriatrics services.\nMeasurements: The FRAIL scale (short 5-question assessment of fatigue, resistance, aerobic capacity, illnesses, and loss of weight.

Thus, the FRAIL scale was the starting point of this research and for its development a psychometric evaluation was required (Rosas-Carrasco et al., 2016) through Rasch analysis can be used to document and evaluate the measurement performance of instruments that measure a construct. The Rasch technique also allows us to explain the meaning of a test score and thus provide a mechanism by which the quality of the tests can be optimized (Boone, 2016); in the same way Rasch relates the difficulty of the items, individual ability and the probability of a correct answer. It also recognizes that the probability of a correct response to each individual item depends not only on the difficulty of the item but also on the skill level of the individual. This is a probabilistic model that estimates the probability of a correct response to an item based on the difficulty of the item and the skill level of the individual (Christensen et al., 2024), based on the item response theory (IRT). The IRT refers to

probabilistic measurement models according to the number of analyzed parameters; in addition, it provides an idea of the internal consistency of the scale and may relate the difficulty of the item to the person's ability (Mayo et al., 2023). Therefore, new characteristics related to its validity could be provided, offering the professional elements for decision-making and interpretation of frailty in old age. Consequently, this study aimed to evaluate through Rasch analysis the validity of the FRAIL scale to measure frailty in older people in Colombia.

Materials and Methods

Design

This validation study included 2506 people aged ≥60 living in the urban area of 5 Colombian towns (Bucaramanga, Medellín, Pereira, Popayán, and Santa Marta) due to the difficulty of access in the rural area given the situation in the country and added to the time of the pandemic in which restrictions were presented and made access to this population more complex, with a 2-stage probabilistic sampling. In the first stage 51 neighborhoods in each town were selected as a secondary unit of the sample, through systematic random sampling. Within each neighborhood 2 blocks were selected as the primary unit of the sample by simple random sampling. The information was collected between April and May 2021 (Cardona et al., 2022).

Variables

The FRAIL scale (Van K. et al., 2008) may be used at community level; it does not require equipment, takes <5 minutes, and may be self-completed. The tool has been recommended as a screening test for disability and mortality (Morley et al., 2012). Frailty is classified according to the scores of the items: 0 for robust health status, 1-2 for prefrail, and ≥3 for frail (Rosas-Carrasco et al., 2016). This study aimed to test the validity and reliability of the tool in elderly Colombians living in urban areas by using the Rasch model.

Statistical analysis

The scale was analyzed using the Rasch model for dichotomous items (Boone, 2016). According to this model, a positive response from an older person is a probabilistic function of the level of attributes (ability) and the difficulty of the item, so the probability of a positive response in a person ≥60 years of a certain level of attributes to an element of a given difficulty is equal (Engelhard et al., 2018). Consequently, this type of analysis focuses on establishing whether the data obtained using the tool provide an invariant, unidimensional, interval-scale representation of the latent attribute of interest (frailty) (Rojas-Gualdrón et al., 2019). The analyzes were carried out using Winsteps 3.92.1 and Jamovi 23.28 free version.

Adjustment of response categories

The fit of the items to the assumptions of the Rasch model was assessed using outfit and infit mean squares, item-measure correlations, and local independence analysis. For these 3 statistics, mean squares between 0.50 and 2.00, item-measure correlations ≥0.30, and correlation between the residuals of the items <0.70 were taken as expected values (Bond & Fox, 2015)this classic text facilitates a deep understanding of the Rasch model. The authors review the crucial properties of the model and demonstrate its use with a variety of examples from education, psychology, and health. A glossary and numerous illustrations aid the reader's understanding. Readers learn how to apply Rasch analysis so they can perform their own analyses and interpret the results. The authors present an accessible overview that does not require a mathematical background.\n\nHighlights of the new edition include:\n-More learning tools to strengthen readers' understanding including chapter introductions, boldfaced key terms, chapter summaries, activities, and suggested readings.\n-Divided chapters (4, 6, 7 & 8. The scale was assesed using Linacre's effectiveness criteria (J. M. Linacre, 2002)2002, based on outfit and infit mean squares adjustment, measure → category and category → measure coherences, and the measures (in logits) of the response options.

Adjustment and differential items functioning (DIF)

In the Rasch measurement, several fit indices based on residuals are used. Fitting the data to the Rasch model (content validity) was done by means of the mean square residuals (MNSQ), and the infit and outfit indices were calculated. The former indicates the adjustment between the expected and the observed value of the average values, while the later takes into account people's unexpected responses (Engelhard et al., 2018). The expected values of these statistics range between 0.50 and 1.50 (Bond, 2015) this classic text facilitates a deep understanding of the Rasch model. The authors review the crucial properties of the model and demonstrate its use with a variety of examples from education, psychology, and health. A glossary and numerous illustrations aid the reader's understanding. Readers learn how to apply Rasch analysis so they can perform their own analyses and interpret the results. The authors present an accessible overview that does not require a mathematical background. Highlights of the new edition include: More learning tools to strengthen readers' understanding including chapter introductions, boldfaced key terms, chapter summaries, activities, and suggested readings.\n-Divided chapters (4, 6, 7 & 8. Standardized measured square values (MNSQ) ≥1.00 reflect response patterns with larger than expected variation, while values lower than the reference tend to reflect less variation (Engelhard et al., 2018). Local independence between the items was established through correlations between the residuals and expected values <0.40 (M. Linacre, 2023). The locations of the items with standard errors were calculated and are expressed in logits. Each item was examined to detect DIF according to 2 variables (Aryadoust et al., 2019): gender (female/male) and age (≥70 and <70 years). Comparisons of 2 groups were carried out using the Bland and Altman limits of agreement (Bland & Altman, 1986).

Unidimensionality, reliability and Wright's map

To define the unidimensionality of the items, the variance explained and not explained by the test was assessed, with an explained variance >30% being aceptable (Bond, 2015) this classic text facilitates a deep understanding of the Rasch model. The authors review the crucial properties of the model and demonstrate its use with a variety of examples from education, psychology, and health. A glossary and numerous illustrations aid the reader's understanding. Readers learn how to apply Rasch analysis so they can perform their own analyses and interpret the results. The authors present an accessible overview that does not require a mathematical background. Highlights of the new edition include: More learning tools to strengthen readers' understanding including chapter introductions, boldfaced key terms, chapter summaries, activities, and suggested readings. Divided chapters (4, 6, 7, & 8. It was explored through principal component analysis (PCA) of the residuals between the observed data and the model estimation (Cantó-Cerdán et al., 2021) infit and outfit mean square, local dependency using Yen's Q3 statistic, Differential item functioning (DIF. For the contrasts with these characteristics, 3 groups of items were constructed and the correlation ≥0.5 was calculated. These were considered irrelevant and evidence of the validity of a unidimensional approach to the FRAIL scale (Cantó-Cerdán et al., 2021)infit and outfit mean square, local dependency using Yen's Q3 statistic, Differential item functioning DIF. The reliability of the items, separation of items and internal consistency were calculated, the hierarchy and orientation of the elements were analyzed, with a separation into 2 strata. In addition, the Rasch model allowed us to assume when an item measured a certain attribute or phenomenon and was presented with an item characteristic curve (ICC). The probability of obtaining a positive value in the response to the given item is shown on the Y axis and the ability

of the individual on the X axis (Cantú González & Rodríguez Macías, 2017).

Ethical Considerations

This minimal risk study was derived from the *Health and mental well-being of the elderly, 2020 (SABAM)* (Cardona et al., 2022) research. It was approved by the Ethics committee of CES University (Minute 161, Project code 991, Resolution 8430; May 3, 2021), and financed by CES University.

Results

Sociodemographic characteristics of the study population consisting of 2506 elderly people are shown in Table 1. Approximately 60% of the subjects were <70 years of age and more than 50% were female and of low socioeconomic status. Regarding education, 79.8% had a basic educational level and 11.9% had higher instruction. As about marital status, >50% were single, separated/divorced or widowed.

Table 1
Sociodemographic characteristics of elderly participants in 5 towns–2021

Variable	Total	Age (years)	
		≤70	>70
Gender	**n (%)**	**n (%)**	**n (%)**
Male	1153(46)	691(27,6)	462(18,4)
Female	1353(54)	825(32,9)	528(21,1)
Household socioeconomic status			
Low	1533(61,2)	925(36,9)	608(24,3)
High/middle	973(38,8)	591(23,6)	382(15,2)
Educational level			
None	210(8,4)	85(5,6)	125(12,6)
Basic	1999(79,8)	1227(80,9)	772(78,0)
High	297(11,9)	204(13,5)	93(9,4)
Marital status			
Single	603(24,1)	399(26,3)	204(20,6)
Married/cohabiting	1065(42,5)	693(45,7)	372(37,6)
Separated/divorced	312(12,5)	206(13,6)	106(10,7)
Widowed	526(21,0)	218(14,4)	308(31,1)

Adjustment of the Items

Table 2 shows the function of all of the responses. The model adjusts appropriately with a 1.0-2.1 variation of outfit. All items with outfit mean squares ranging from 0.6–3.4 and infit mean squares ranging from 0.6-2.1 are presented. Problems were identified in the weight loss item due to overfitting in relation to the 3.4 oufit associated with a negative response to weight loss and infit of 2.1, which represents a maladaptive structure of the item.

Table 2
Funtion of response in the FRAIL scale of elderly people participating in 5 towns–2021

	n	%	Mean	Infit	Outfit	M → C	C → M
Total responses*							
Absent	9874	79	-2.7	1.0	2.1	87	92
Present	2656	21	0.7	0.9	1.0	79	68
Comorbidities							
No	2490	99	-2.5	1.1	1.0	99.7	90.7
Yes	16	1	0.0	1.5	1.3	3.3	50.0
Resistance							
No	1966	78	-3.0	0.7	0.7	86.1	99.3
Yes	540	22	-0.4	0.6	0.6	94.2	41.9
Ambulation							
No	1946	78	-3.1	0.7	0.7	85.2	99.2
Yes	560	22	-0.5	0.7	0.6	93.3	40.0
Fatigue							
No	2289	91	-2.7	1.0	1.0	94.7	93.7
Yes	217	9	-0.4	1.2	1.1	40.0	44.2
Weight loss							
No	1183	47	-3.2	2.1	3.4	50.0	95.7
Yes	1323	53	-1.8	1.1	1.2	78.8	14.3

*Number of responses (items*people). Mean (logit). Infit y outfit (mean squares). M → C (measure – category). C → M (category–measure), Sensibility and specificity (criterion: total classification).

Adjustment of Response Categories

The 5 dichotomous items with measurements and standard errors for each item in logits are listed in decreasing fit order (Table 3), according to the original responses structure. The weight loss category sets quadratic outfit measures out of the expected range of 0.50-1.50, which is consistent with the response function, with minor overfitting issues. The adjustment for elderly people is suitable both in infit and oufit. The measured item correlation ranges between 0.13 for comorbidities and >0.40 for fatigue and low weight loss, and 0.70 for resistance and ambulation. The model and its categories show sufficient adjustment to the requirements of the Rasch model.

Table 3
Statistics and items adjustment

Item	Measurement	Standard error	Infit	Outfit	Measures item correlation
Comorbidities	3.95	0.26	1.04	1.26	0.13
Fatigue	0.76	0.08	1.06	1.10	0.41
Weight loss	-3.12	0.06	1.36	2.87	0.46
Resistance	-0.76	0.06	0.69	0.61	0.70
Ambulation	-0.83	0.06	0.69	0.63	0.70

Unidimensionality, Wright reliability

The Rasch measurement explained 47.6% of the variance. The first component presented a residual contrast of 18.6% (residual), with a correlation (measurement and the residual component) of -0.57; others explained <10% of the residual variance with 1.36 and 0.9 eigenvalues, respectively. All of the deattenuated correlations between the 2 formed strata identified within the contrasts were ≥0.80, which is sufficient evidence to disregard them. However, when analyzing the first contrast, 2 separated groups were identified: 1) weight loss, comorbidities and fatigue ítems, and 2) resistance and ambulation items.

The measurement obtained from the 5 items included in the final version of the scale is explained with a 0.80% Wright reliability of the variance.

Uniform Differential Items Functioning

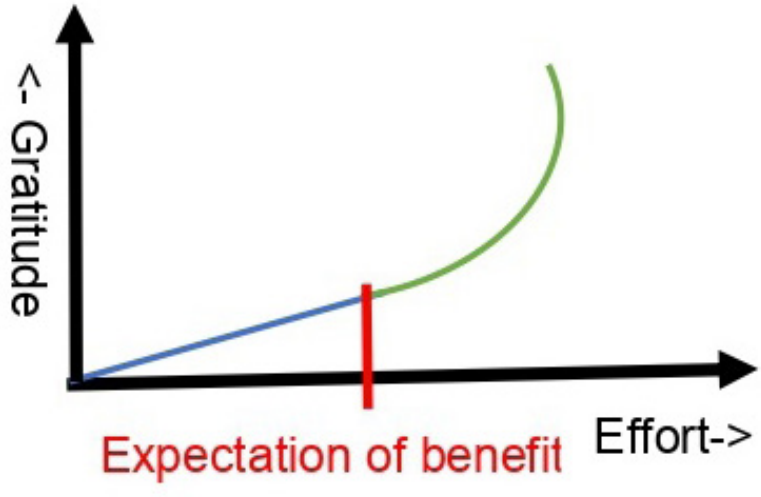
The DIF analysis was carried out to establish whether the calibrations of the items were consistent by gender and age in the groups ≥70 and <70 years of age (Table 4). The difficulty of the age-related items (resistance, fatigue, weight) is reported to be significantly higher in people aged ≥70 while for gender-related items (resistance, ambulation, and weight), difficulty is significantly higher in females than in males.

Table 4
Differential functioning according to age and gender

Item	<70 years	≥70 years	DIF	*p*	Males	Females	DIF	*p*
Comorbidities	3.95 (0.36)	3.95 (0.37)	0	1.000	3.76 (0.39)	4.09 (0.35)	-0.33	0.529
Resistance	-0.58 (0.08)	-0.97 (0.09)	0.39	**0.001**	-0.61 (0.09)	-0.87 (0.08)	0.27	**0.028**
Ambulation	-0.77 (0.08)	-0.9 (0.09)	0.14	0.241	-0.64 (0.09)	-0.97 (0.08)	0.33	**0.006**
Fatigue	0.97 (0.12)	0.54 (0.12)	**0.43**	**0.009**	0.86 (0.13)	0.69 (0.1)	0.17	0.316
Weight loss	-3.43 (0.08)	-2.72 (0.08)	**-0.72**	**0.000**	-3.45 (0.09)	-2.83 (0.08)	**-0.63**	**0.000**

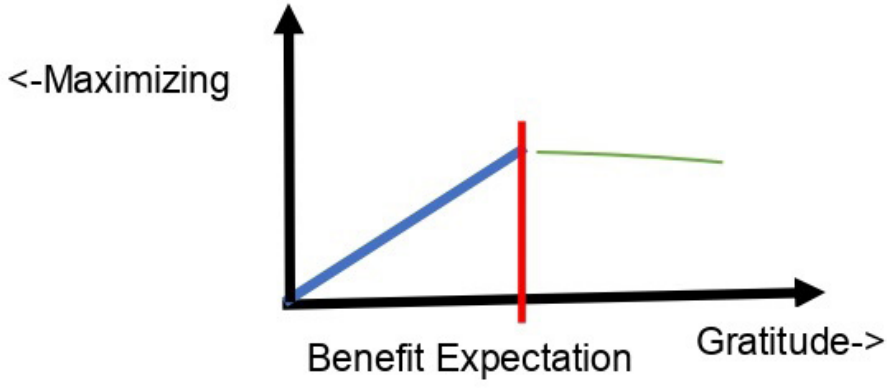
According to the DIF contrast of gender and age, the most difficult question corresponded to weight loss; fatigue and comorbidities were the items most likely to be responded (Figure 1).

Figure 1.
Age-gender interaction in the DIF.



For the estimation of the frailty measure obtained from the form without the DIF item (weight loss), the Bland and Altman limits of agreement are shown in Figure 2; 7705 cases were outside the limit but most were within limits of agreement. The difference was relevant in a small proportion of cases.

Figure 2.
DIF impact on FRAIL measurement in elderly subjects.



Two strata are shown in Table 5, one corresponding to comorbidity and fatigue, and the other one to resistance, ambulation, and weight loss. Due to the prevalence of the response to weight loss, qualifying its score is more difficult but does not affect the total score around score 3.

Table 5
FRAIL score

Score	%	Items	
5	0	Comorbidities	
4	0.92		
3	8.66	Fatigue	
2	15.56	Resistance	Ambulation
1	45.21	Weight loss	
0	29.65		

Discussion

The authors aimed to evaluate the validity of a unidimensional approach for measuring frailty in elderly people, using the FRAIL scale. Developing valid psychometric measures of frailty in community elderly is essential for strengthening health information, research, theory, and policies. This condition has been widely assessed since the development of the classical test theory (Bielderman et al., 2013; De et al., 2021; Huang & Lam, 2021)a preliminary draft scale was formed. This draft was pre- and pilot-tested to check feasibility and modified accordingly. The final scale was validated on 107 older adults by confirmatory factor analysis and was named the Frailty Assessment and Screening Tool FAST, but measures based on the fit of the items and the attributes of older people according to data of a frail condition have not been evaluated. Historically, the data model has focused on item fit. The analyzes undertaken allowed us to investigate the structural validity and reliability of the tool (Van K. et al., 2008). Regarding the residuals of the proposed measure, no relevant factors

were identified in terms of explained variances, but for the weight loss item difficulties were seen; it did not fit the model, meaning that the item was not related to the evaluated construct (J. M. Linacre, s. f.) for overfitting occurred. However, this condition was not reflected in the function of all responses and thus fit and consistency were considered adequate because it ranged between 0.6 and 2.1, with no serious consequences for the measurements (Arizaga-Iribarren et al., 2022). It might be stated that since it is a question about memory and self-reported data, it could be underestimated as people age. Findings suggest older people do not report accurately their weight in self-reports, so direct collection should be considered (Kkeli & Michaelides, 2023) where these are available. Previous research has suggested that there are differences between self-reports and measurements of weight. Nevertheless, empirical findings are inconclusive, and the determinants of misreporting have been examined in isolation. The study aimed to investigate the differences between selfreports and actual measurements of weight, whether gender, weight status, and age were related to these differences, and if weight reporting accuracy changed after frequent measurements of weight. Using a representative sample of Dutch individuals from the Longitudinal Internet Studies for the Social Sciences Panel, the study supported that on average participants underestimated their weight. No significant gender differences were found. Individuals with higher body mass index BMI. A longitudinal study of a 3-year follow-up of elderly people reported a 5% weight loss among all participants 70 to 90 years of age. It is said this finding at community level is influenced by risk factors as diabetes mellitus, cognitive impairment, smoking, absence of a spouse, low educational level, and low income (Yano et al., 2023). The weight item is related to several components, which may lead to functional dependence and fragility associated with increased morbidity, mortality, and disability in this age group (Acosta-Benito & Martín-Lesende, 2022). Consequently, its identification should be carried out as part of the geriatric evaluation with emphasis on nutritional status. Reliability of the items and people is another issue as the internal consistency was ≥0.8. In general, the evidence suggests eliminating the item, with differential functioning identified in this study, and to consider adding the gender variable to the tool because the prevalence of the condition is higher in females, which would confer a better predictive capacity and would improve the correlation of the variables and model fits (Arizaga-Iribarren et al., 2022; Nguyen et al., 2022). According to a multicenter and cross-sectional study, dynamic balance is poorer in females and prevalence of frailty is higher than in males (Arizaga-Iribarren et al., 2022); consequently, the gender variable may render the study tool a better fit. Similarly, advanced age (≥70 years) is a factor associated with frailty (Menéndez G. et al., 2021), which is consistent with this study findings.

The adjustments of the items and the people, as well as the item-measurement correlations shown in the scale suggest that the operationalization of frailty from the 5 items is adequate for the latent attribute (fragility), although there are no useful biomarkers. More than 60 different frailty classification methods have been published; reported prevalences have varied as there is no gold standard method for validating this syndrome rating scales (Akner, 2023). Nevertheless, the evidence of the questionnaire shows it is a tool with predictive capacity for evaluating frailty in the elder community, as well as a predictor of disability and mortality within 9 years (Ruiz et al., 2020). This suggests that the response trends according to the level of measurement of the items and the frailty classification of older people follow the rule assumed by the Rasch model (Tesio et al., 2023) linear measures. The Rasch Analysis allows you to turn raw scores into measures with an error estimate, satisfying fundamental measurement axioms unidimensionality, linearity, generalizability. Despite the above, classifying prefrailty is complicated because the number of items may

classify only 2 characteristics. Prefrail condition is important because the transition to the frail status sometimes occurs in an unnoticed manner (Oliveira et al., 2022).

This study has several strengths, one of them is related to the characteristics of the sample. From a clinical point of view, a tool as offers practical benefits for screening purposes at community level as it may help identify a condition prior to frailty. Because the population ≥60 may suffer conditions associated with greater risks in case of situations affecting health, their identification at an earlier age may be useful for preventing them and for promoting activities that delay or avoid health status impairment. Consequently, this study is another starting point for new researches.

The analyzes were carried out on a large sample, which was obtained probabilistically. Furthermore, the statistics of the items are independent of the sample. The sampling used makes the Wright map informative both for the locations of the items and for the distribution of scores of the older adults. This allows us to use the interpretations obtained by an individual in relation to fragility.

Limtation

A limitation an obvious pertains to the fact that the results were obtained from a poblation urban, and thus further research is warranted in people olderly of rural order to try to replicate these findings in the general population.

Conclusions

The FRAIL scale is a valid measurement to determine frailty in elderly subjects. It is unidimensional, reliable, and unbiased by age for the frail state, not as much for the prefrail condition. Inclusion of the gender variable and categorizing the age variable with 70 years as the cut-off point are suggested. Despite these findings, this instrument allows measurements of frailty in older people in the community, these recommendations will allow future development of specify and sensitivity analysis for the measure to determine their appropriate use. scale is a measure reliable and valid in development. therefore, should be reconsidered in future confirmatory analysis to ensure a more accurate measure. This analisys highlights gaps in the range of implementation constructs that are assessed by existing measures developed for use in public health and community settings. Moreover, without rigorous tools, the factors associated with the successful implementation of innovations in these settings will remain unknown.

Acknowledgements

The authors thank the older adults who were part of this study.

Disclosure statement

The authors declare no conflict of interest.

Author contributions

Víctor Hugo Arboleda Campo: directed the writing of the manuscript. Participated in data analysis and writing of the manuscript, as well as reviewing all versions.

Diego Fernando Rojas: data analysis, writing of the manuscript, review of all versions.

Diana Isabel Muñoz Rodríguez: participated in the macro project, writing the manuscript, reviewing all versions.

Dorys Cardona Arango: leader of the macro project, obtaining financing. Manuscript writing, review of all versions.

Ángela María Segura Cardona: Design of the statistical component, sampling and analysis. Manuscript writing, review of all versions.

Alejandra Segura Cardona: participated in the macro project, writing the manuscript, reviewing all versions.

Funding information

This project was financed by the Ministry of Science, Technology and Innovation of Colombia -Minciencias- and the CES University, within the framework of the study of Health and Well-being

of the elderly in five cities in Colombia, SABAM. Registration Code 67945.

References

Acosta-Benito, M. Á., & Martín-Lesende, I. (2022). Fragilidad en atención primaria: Diagnóstico y manejo multidisciplinar. *Atencion Primaria*, *54*(9), 102395. https://doi.org/10.1016/j.aprim.2022.102395

Akner, G. (2023). Critical appraisal of the concept frailty: Rating of frailty in elderly people has weak scientific basis and should not be used for managing individual patients. *Aging and Disease*, *14*(1), 21-24. https://doi.org/10.14336/AD.2022.0506

Alqahtani, B., & Nasser, A. (2019). Assessment of frailty in Saudi community-dwelling older adults: Validation of measurements. *Annals of Saudi Medicine*, *39*(3), 197-204. https://doi.org/10.5144/0256-4947.2019.197

Arizaga-Iribarren, N., Irazusta, A., Mugica-Errazquin, I., Virgala-García, J., Amonarraiz, A., & Kortajarena, M. (2022). Sex differences in frailty factors and their capacity to identify frailty in older adults living in long-term nursing homes. *International Journal of Environmental Research and Public Health*, *20*(1), 54. https://doi.org/10.3390/ijerph20010054

Aryadoust, V., Tan, H. A. H., & Ng, L. Y. (2019). A scientometric review of rasch measurement: The rise and progress of a specialty. *Frontiers in Psychology*, *10*, 2197. https://doi.org/10.3389/fpsyg.2019.02197

Bielderman, A., van der Schans, C. P., van Lieshout, M.-R. J., de Greef, M. H., Boersma, F., Krijnen, W. P., & Steverink, N. (2013). Multidimensional structure of the Groningen Frailty Indicator in community-dwelling older people. *BMC Geriatrics*, *13*, 86. https://doi.org/10.1186/1471-2318-13-86

Bland, J. M., & Altman, D. G. (1986). Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet (London, England)*, *1*(8476), 307-310. https://pubmed.ncbi.nlm.nih.gov/2868172/

Bond, T. (2015). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences, Third Edition* (3.ª ed.). Routledge. https://doi.org/10.4324/9781315814698

Bond, T., & Fox, C. (2015). *Applying the Rasch Model; Fundamental Measurement in the Human Sciences* (3rd ed., Vol. 5). Routledge. https://www.researchgate.net/publication/312296223_Applying_the_Rasch_Model_Fundamental_Measurement_in_the_Human_Sciences

Boone, W. J. (2016). Rasch Analysis for instrument development: Why, when, and how? *CBE Life Sciences Education*, *15*(4), rm4. https://doi.org/10.1187/cbe.16-04-0148

Cantó-Cerdán, M., Cacho-Martínez, P., Lara-Lacárcel, F., & García-Muñoz, Á. (2021). Rasch analysis for development and reduction of Symptom Questionnaire for Visual Dysfunctions (SQVD). *Scientific Reports*, *11*(1), Article 1. https://doi.org/10.1038/s41598-021-94166-9

Cantú González, V., & Rodríguez Macías, J. (2017). Examen al Egreso de la Educación Básica en el Área de Salud (EXEEBAS): Análisis de unidimensionalidad. *Revista Complutense de Educación*, *29*(1). https://doi.org/10.5209/RCED.51935

Cardona, D., Segura, A., Segura, A., & Robledo, C. (2022). *Salud y bienstar mental de la persona mayor en cinco ciudades de Colombia 2020-2022* (Julio 2022). CES.

Chen, C. Y., Gan, P., & How, C. H. (2018). Approach to frailty in the elderly in primary care and the community. *Singapore Medical Journal*, *59*(5), 240-245. https://doi.org/10.11622/smedj.2018052

Christensen, K. S., Cosci, F., Carrozzino, D., & Sensky, T. (2024). Rasch analysis and its relevance to psychosomatic medicine. *Psychotherapy and Psychosomatics*, *93*(2), 88-93. https://doi.org/10.1159/000535633

De, K., Banerjee, J., Rajan, S. P., Chatterjee, P., Chakrawarty, A., Khan, M. A., Singh, V., & Dey, A. B. (2021). Development and psychometric validation of a new scale for assessment and screening of frailty among older Indians. *Clinical Interventions in Aging*, *16*, 537-547. https://doi.org/10.2147/CIA.S292969

Engelhard, G., Rabbitt, M. P., & Engelhard, E. M. (2018). Using household fit indices to examine the psychometric quality of food insecurity measures. *Educational and Psychological Measurement*, *78*(6), 1089-1107. https://doi.org/10.1177/0013164417728317

Gleason, L. J., Benton, E. A., Alvarez-Nebreda, M. L., Weaver, M. J., Harris, M. B., & Javedan, H. (2017). FRAIL Questionnaire screening tool and short-term outcomes in geriatric fracture patients. *Journal of*

the American Medical Directors Association, *18*(12), 1082-1086. https://doi.org/10.1016/j.jamda.2017.07.005

Huang, E. Y., & Lam, S. C. (2021). Review of frailty measurement of older people: Evaluation of the conceptualization, included domains, psychometric properties, and applicability. *Aging Medicine*, *4*(4), 272-291. https://doi.org/10.1002/agm2.12177

Kkeli, N., & Michaelides, M. P. (2023). Differences between self-reports and measurements of weight in a Dutch sample. *European Journal of Environment and Public Health*, *7*(3), em0134. https://doi.org/10.29333/ejeph/12781

Linacre, J. M. (s. f.). *Reasonable mean-square fit values*. Recuperado 1 de septiembre de 2023, de https://www.rasch.org/rmt/rmt83b.htm

Linacre, J. M. (2002). Optimizing rating scale category effectiveness. *Journal of Applied Measurement*, *3*(1), 85-106. https://pubmed.ncbi.nlm.nih.gov/11997586/

Linacre, M. (2023). *Winsteps and Facets: Rasch Analysis + Rasch Measurement Software*. https://www.winsteps.com/index.htm

Mayo, N. E., Aubertin-Leheudre, M., Mate, K., Figueiredo, S., Fiore, J. F., Auais, M., Scott, S. C., & Morais, J. A. (2023). Development of a Frailty Ladder using Rasch Analysis: If the shoe fits. *Canadian Geriatrics Journal*, *26*(1), 133-143. https://doi.org/10.5770/cgj.26.601

Menéndez G., L., Izaguirre R., A., Tranche-Iparraguirre, S., Montero R., Á., & Orts C., M. I. (2021). Prevalencia y factores asociados de fragilidad en adultos mayores de 70 años en la comunidad. *Atención Primaria*, *53*(10), 102128. https://doi.org/10.1016/j.aprim.2021.102128

Morley, J. E. (2017). The new geriatric giants. *Clinics in Geriatric Medicine*, *33*(3), xi-xii. https://doi.org/10.1016/j.cger.2017.05.001

Morley, J. E., Malmstro, T. K., & Miller, D. K. (2012). A simple Frailty quiestionnaire (FRAIL) predicts outcomes in middle aged African Americans. *The journal of nutrition, health & aging*, *16*(7), 601-608. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4515112/

Ng, Y. X., Cheng, L. J., Quek, Y. Y., Yu, R., & Wu, X. V. (2024). The measurement properties and feasibility of FRAIL scale in older adults: A systematic review and meta-analysis. *Ageing Research Reviews*, *95*, 102243. https://doi.org/10.1016/j.arr.2024.102243

Nguyen, H. T., Nguyen, A. H., & Le, P. T. M. (2022). Sex differences in frailty of geriatric outpatients with type 2 diabetes mellitus: A multicentre cross-sectional study. *Scientific Reports*, *12*(1), Article 1. https://doi.org/10.1038/s41598-022-20678-7

Nidadavolu, L. S., Ehrlich, A. L., Sieber, F. E., & Oh, E. S. (2020). Preoperative evaluation of the Frail patient. *Anesthesia and Analgesia*, *130*(6), 1493. https://doi.org/10.1213/ANE.0000000000004735

O'Caoimh, R., McGauran, J., O'Donovan, M. R., Gillman, C., O'Hea, A., Hayes, M., O'Connor, K., Moloney, E., & Alcock, M. (2023). Frailty screening in the emergency department: Comparing the Variable Indicative of Placement Risk, Clinical Frailty Scale and PRISMA-7. *International Journal of Environmental Research and Public Health*, *20*(1), Article 1. https://doi.org/10.3390/ijerph20010290

Oliveira, A. D. de, Reiners, A. A. de O., Azevedo, R. C. S. de, Silva, K. M. da, & Silva, A. M. C. da. (2022). Pre-failty in older adults: Prevalence and associated factors. *Texto & Contexto–Enfermagem*, *31*, e20210157. https://doi.org/10.1590/1980-265X-TCE-2021-0157en

Rojas-Gualdrón, D. F., Ayala-Hernández, J. M., Cardona-Arango, D., Segura-Cardona, A. M., Garzón-Duque, M. O., Rojas-Gualdrón, D. F., Ayala-Hernández, J. M., Cardona-Arango, D., Segura-Cardona, A. M., & Garzón-Duque, M. O. (2019). Rasch analysis of the Katz index of independence in activities of daily living in senior citizens from Antioquia, Colombia. *Revista Facultad Nacional de Salud Pública*, *37*(2), 89-95. https://doi.org/10.17533/udea.rfnsp.v37n2a10

Rosas-Carrasco, O., Cruz-Arenas, E., Parra-Rodríguez, L., García-González, A. I., Contreras-González, L. H., & Szlejf, C. (2016). Cross-Cultural adaptation and validation of the FRAIL scale to assess Frailty in Mexican adults. *Journal of the American Medical Directors Association*, *17*(12), 1094-1098. https://doi.org/10.1016/j.jamda.2016.07.008

Ruiz, J. G., Dent, E., Morley, J. E., Merchant, R. A., Beilby, J., Beard, J., Tripathy, C., Sorin, M., Andrieu, S., Aprahamian, I., Arai, H., Aubertin-Leheudre, M., Bauer, J. M., Cesari, M., Chen, L.-K., Cruz-Jentoft, A. J., De Souto Barreto, P., Dong, B., Ferrucci, L., … Vellas, B. (2020). Screening for and managing

the person with Frailty in Primary Care: ICFSR consensus guidelines. *The Journal of Nutrition, Health & Aging*, *24*(9), 920-927. https://doi.org/10.1007/s12603-020-1498-x

Sobhani, A., Fadayevatan, R., Sharifi, F., Kamrani, A. A., Ejtahed, H.-S., Hosseini, R. S., Mohamadi, S., Fadayevatan, A., & Mortazavi, S. (2021). The conceptual and practical definitions of frailty in older adults: A systematic review. *Journal of Diabetes & Metabolic Disorders*, *20*(2), 1975-2013. https://doi.org/10.1007/s40200-021-00897-x

Sutton, J. L., Gould, R. L., Daley, S., Coulson, M. C., Ward, E. V., Butler, A. M., Nunn, S. P., & Howard, R. J. (2016). Psychometric properties of multicomponent tools designed to assess frailty in older adults: A systematic review. *BMC Geriatrics*, *16*, 55. https://doi.org/10.1186/s12877-016-0225-2

Tesio, L., Caronni, A., Simone, A., Kumbhare, D., & Scarano, S. (2023). Interpreting results from Rasch analysis 2. Advanced model applications and the data-model fit assessment. *Disability and Rehabilitation*, *0*(0), 1-14. https://doi.org/10.1080/09638288.2023.2169772

Van K., A., Rolland, Y., Bergman, H., Morley, J, E., & Kritchevsky, S, B. (2008). The I.A.N.A. task force on frailty assessment of older people in clinical practice. *Journal of Nutrition, Health & Aging*, *12*(1). https://doi.org/10.1007/bf02982161

Wleklik, M., Uchmanowicz, I., Jankowska, E. A., Vitale, C., Lisiak, M., Drozd, M., Pobrotyn, P., Tkaczyszyn, M., & Lee, C. (2020). Multidimensional approach to Frailty. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00564

Yano, T., Godai, K., Kabayama, M., Akasaka, H., Takeya, Y., Yamamoto, K., Yasumoto, S., Masui, Y., Arai, Y., Ikebe, K., Ishizaki, T., Gondo, Y., Rakugi, H., & Kamide, K. (2023). Factors associated with weight loss by age among community-dwelling older people. *BMC Geriatrics*, *23*(1), 277. https://doi.org/10.1186/s12877-023-03993-0

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.112120

Uncovering the Link Between Perceived Stress and Health Related Quality of Life (HRQOL) among Dentistry Students of the Arab American University-Palestine

WAEL MUSTAFA ABU HASSAN
Department of Health Sciences, Arab American University of Palestine.
OSAMA MOHAMED ELSAYED RAMADAN
Pediatric Nursing Department, Cairo University.
ZIYAD KAMAL M. MOHAMMAD
Department of Conservative Dentistry and Endodontics, Arab American University of Palestine.
AHMAD RAFIQ MOHAMMAD ABU ARRAH
Department of Medical Imaging, Arab American University of Palestine.
SUHAIL AHMAD DAR
Department of Psychology and Counselling, St Jospeh's University, Bengaluru.
ISHRAT MUNAWER
Department of Psychology, SRM University-AP, Andhra Pradesh.
ZULFIQAR ULLAH SIDDIQUI
Department of Psychology, University of Science & Technology, Meghalaya (India).
FAYEZ MAHAMID
Department of Psychology and Counseling, An-Najah National University, Nablus, Palestine.
FAKHER NABEEL MOHAMMAD KHALILI
Department of Psychology and Counseling, An-Najah National University, Nablus, Palestine.
LAVANYA RAJAKUMAR
Department of Psychology, Murdoch University

How to cite this article: Abu Hassan, W., Ramadan, O., Mohammad, Z., Abu Arrah, A., Dar, S., Munawer, I., Fayez, M., Khlili, F., Rajakumar, L., and Siddiqui, Z. U. (2025). Uncovering the Link Between Perceived Stress and Health Related Quality of Life (HRQOL) among Dentistry Students of the Arab American University-Palestine. *Revista Colombiana de Psicología*, *34*(1), pp 29-47. https://revistas.unal.edu.co/index.php/psicologia/article/view/112120

Correspondence: Wael Mustafa Abu Hassan (https://orcid.org/0000-0001-7185-3295); Department of Health Sciences, Arab American University of Palestine. State of Palestina; e-mail: wael.abuhasan@aaup.edu

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: DECEMBER 16TH, 2023–ACCEPTED: FEBRUARY 21ST, 2024

Uncovering the Link Between Perceived Stress and Health Related Quality of Life (HRQOL) Among Dentistry Students of the Arab American University-Palestine.

Abstract

University students face various stressors related to academics, personal issues, and their environment. This stress can negatively impact health-related quality of life (HRQOL). This study aimed to explore stressors influencing Palestinian dentistry students at Arab American University and their relationship with HRQOL. A cross-sectional survey was conducted among 232 undergraduate dentistry students using a comprehensive 46-item questionnaire. Stressors across, individual, academic, faculty, and institutional domains were measured. HRQOL was assessed across psychological, occupational, , personal and social, physical, and religious and spiritual domains (63 items). Data analysis included descriptive statistics, correlation analysis, and regression modeling. Key stressors included academic workload, faculty relations, clinical training, and social adjustment. These significantly correlated with poorer HRQOL, especially psychological wellbeing and academicperformance. Regression analysis found higher anxiety, time management difficulties, instructor attitude, and dietary changes as top predictors of reduced HRQOL. Palestinian dentistry students face multifaceted stressors that profoundly impact HRQOL. A supportive educational environment encompassing counseling services, mentorship programs, stress management training, and student-centered policies is crucial. This study highlights specific stressors affecting an under-researched population, guiding context-appropriate interventions to improve wellbeing and academic outcomes.

Keywords: perceived stress, health-related quality of life (HRQOL), academic performance, psychological wellbeing, coping, higher education.

Descubriendo el vínculo entre el estrés percibido y la calidad de vida relacionada con la salud (CVRS) entre estudiantes de odontología de la Universidad Árabe Americana-Palestina.

Resumen

Los estudiantes universitarios se enfrentan a diversos factores estresantes relacionados con los estudios, las cuestiones personales y su entorno. Este estrés puede afectar negativamente a la calidad de vida relacionada con la salud (CVRS). El objetivo de este estudio era explorar los factores estresantes que influyen en los estudiantes palestinos de odontología de la Arab American University y su relación con la CVRS. Se llevó a cabo una encuesta transversal entre 232 estudiantes de odontología mediante un cuestionario exhaustivo de 46 preguntas. Se midieron los factores estresantes en los ámbitos individual, académico, docente e institucional. La CVRS se evaluó en los ámbitos psicológico, laboral, personal y social, físico, religioso y espiritual (63 ítems). El análisis de los datos incluyó estadísticas descriptivas, análisis de correlación y modelos de regresión. Los principales factores estresantes fueron la carga de trabajo académico, las relaciones con el profesorado, la formación clínica y la adaptación social. Estos factores se correlacionaron significativamente con una peor CVRS, especialmente con el bienestar psicológico y el rendimiento académico. El análisis de regresión reveló que la mayor ansiedad, las dificultades para gestionar el tiempo, la actitud del profesor y los cambios dietéticos eran los principales predictores de una menor CVRS. Los estudiantes palestinos de odontología se enfrentan a múltiples factores estresantes que afectan profundamente a su CVRS. Es crucial contar con un entorno educativo de apoyo que incluya servicios de asesoramiento, programas de tutoría, formación en gestión del estrés y políticas centradas en el estudiante. Este estudio pone de relieve los factores estresantes específicos que afectan a una población poco investigada y orienta las intervenciones adecuadas al contexto para mejorar el bienestar y los resultados académicos.

Palabras clave: estrés percibido, calidad de vida relacionada con la salud (CVRS), rendimiento académico, bienestar psicológico, afrontamiento, educación superior.

Introduction

Stress develops when an individual experiences an unexpected situation that requires him or her to engage in activities beyond his or her usual capacity (Acheampong et al., 2019; Deng et al., 2022; Jiang et al., 2022; Zhao et al., 2023). The main problem begins when stress becomes overwhelming for the student to handle and affects both psychologically and physiologically (Acheampong et al., 2019; Barbayannis et al., 2022a; Pascoe et al., 2020a; Slimmen et al., 2022). Many researchers have studied the stress factors faced by students to identify not only academic stress factors, but also personal and faculty stress factors (Abbas et al., 2021; Clabaugh et al., 2021). The impact of these stressors on students can be seen as a negative reflection of their academic results and the quality of their health-related quality of life (HRQOL) (Maykel et al., 2018; Waters et al., 2022); University education is where students face a drastic change in their academic structure, the workload, and increased expectations (Denham et al., 2018a; Ghasempour et al., 2023a; Hayat et al., 2020a). This becomes a vulnerable period, forcing them to develop stress unknowingly, which not only has an effect on their academic performance, but is known to have deterioration on their HRQOL (Mofatteh, 2021a; Tharaldsen et al., 2023; Xu & Ba, 2022). There are many studies in students from different fields and different educational periods on the relationship between stress and HRQOL of students (Chen et al., 2021; Dayagbil et al., 2021; Halme et al., 2021; Hiğde & Aktamış, 2022).

When it comes to quality of life (QOL), we find it that amorphous concept which is still taken to refer to the conceptions of the goodness of life (Zautra and Goodhart, 1979), whereas HRQOL focuses on the effects of illness and specifically on the impact of treatment on that QOL (Guyatt et al., 2007). More, HRQOL is a reflection of the way that individuals perceive and react to their health status and the nonmedical aspects of their lives, which include health-related factors as physical, functional, emotional, and mental well-being as well as none health-related elements as job, family, friends, and other situations in life (Gill and Feinstein, 1994).

Although the field of study and the education period differ, the results provide a common association between perceived stress and the quality of life related to students' health (Boukhris et al., 2022; Ghasempour et al., 2023b; Hayat et al., 2020b). As students progress to an advanced level in their education, their stress level increases, and their mental component of health-related quality of life decreases (Alkatheri et al., 2020; Denham et al., 2018b; Vilchez-Chavez et al., 2023). The unique challenges faced by these students can have profound implications on their overall well-being, affecting not only their academic performance but also their physical and psychological health (Miller & Kass, 2023c, 2023a). Understanding the nature and impact of these stressors is crucial to developing effective support systems and interventions tailored to their specific needs (Miller & Kass, 2023b; Pedroso et al., 2023).

This study's significance lies in its focus on a relatively under-explored demographic – dentistry students in a Middle Eastern university setting, particularly within the Palestinian context. The findings of this research can provide valuable information for educators, mental health professionals, and policy makers, offering a deeper understanding of how stress impacts the health and academic outcomes of this specific student group.

The implications of this study are vast. By identifying specific stressors and their impacts on HRQOL among these students, the research can inform the design of targeted interventions and support mechanisms (Caleon et al., 2023; Rek et al., 2022). This is crucial in a region where mental health support and resources are often limited and where cultural and socio-political factors play a significant role in the manifestation and management of stress (Cody et al., 2022; Singh, 2021).

Numerous studies have examined the impact of stress on university students worldwide (Pascoe et al., 2020b; Wang et al., 2023). Stress in university

students is a well-documented phenomenon, with research indicating a variety of stressors, including academic pressures, financial concerns, and personal challenges (Asif et al., 2020). Specifically, stress has been associated with negative outcomes in terms of psychological well-being, academic performance, and physical health (Sun, 2022; Yao & Meng, 2022).

However, while there is a wealth of data on university students in general, there is a scarcity of research focusing specifically on dentistry students in the Arab world (Gerhardt et al., 2021; Semmer et al., 2019). Existing literature suggests that the intensive nature of dental education, including the need for precision in practical work and the pressure of high academic standards, can lead to significant stress (Khurshid et al., 2021; Moore, 2022). This stress, in turn, can affect student HRQOL, manifesting itself in various forms as anxiety, depression, burnout, and even physical health problems (Lin et al., 2022; Wu et al., 2022).

Furthermore, studies have shown that university students, including those in the medical and dental fields, often engage in adverse health behaviors as a coping mechanism for stress. These behaviors include substance abuse, poor dietary habits, and neglect of physical activity, further impacting their HRQOL (Barbayannis et al., 2022b; Mofatteh, 2021b).

Despite the extensive body of research on stress among university students, there is a notable gap in understanding how these dynamics specifically affect dentistry students in Palestine. The unique socio-political context of Palestine, coupled with the specific challenges of dental education, presents a distinct environment that has not been extensively studied.

Furthermore, cultural factors in the Arab world, including stigma around mental health and prioritization of academic success, can influence how stress is perceived and managed by students (Ashour et al., 2021; Chao, 2023). This study aims to fill this gap by exploring the specific stressors faced by dentistry students at the Arab American University and examining how these stressors correlate with their HRQOL.

In conclusion, this study aims to provide a comprehensive understanding of the relationship between perceived stress and HRQOL among dental students at the Arab American University in Palestine. By focusing on this specific demographic and geographic location, the research seeks to contribute to the broader academic discourse on stress in higher education and inform practices and policies that can improve the well-being of this student population.

Given the unique challenges facing these students, the findings of this study could be instrumental in shaping the support services offered at the university and in the wider Palestinian context. By highlighting the specific needs and stressors of these students, the study can pave the way for more effective mental health support, customized educational strategies, and improved general well-being for dentistry students in this region. This, in turn, can lead to improved academic outcomes and a healthier and more supportive educational environment for future generations of students.

Materials and Methods

Research question

What is the impact of perceived stress on the health-related quality of life (HRQOL) among dentistry students of the Arab American University of Palestine, in the context of their academic, psychological and sociocultural environment?

Design

This study employs a quantitative descriptive research design, using cross-sectional surveys to explore the main stressors faced by dentistry students at the Arab American University of Palestine. The survey is structured to include closed-ended and open-ended items/questions, allowing for a comprehensive understanding of students' experiences with stress and its consequences.

Sample

The present study comes to focus on the entire population of dental students enrolled at the Arab American University of Palestine encompassing the five years of the program. All targeted students were invited to participate to give their responses to the provided questionnaires and related items on the distributed parts and scales. The total samples who agreed to participate were 267 students (out of about 560 students), with 232 students who completed the self-administered questionnaires (86.9% response rate). The sample consisted of 127 males and 105 females, representing a diverse gender distribution, with ages ranging from 19 to 24 years, with the characteristics shown in table 1.

Eligibility Criteria

Inclusion criteria

1. Students actively participated in the dentistry program at the Arab American University.
2. Participants aged 19 to 24 years.
3. Students who voluntarily agree to complete the questionnaire.

Exclusion criteria

1. Individuals not enrolled in the dentistry program.
2. Students on academic leave or who have deferred their studies.
3. Individuals outside the 19-24 age range.
4. Students who are unwilling to participate or complete the questionnaire.

Data Collection Tools

The study used self-administered questionnaires, meticulously developed by the researchers to gather data from the participants. These questionnaires were designed to comprehensively assess perceived stress levels and HRQOL among dental students. It encompassed four key domains: individual stressors, academic factors, faculty and institution relations, and academic and administrative stressors, totaling 48 items. Regarding HRQOL questionnaire, it covers psychological, occupational, personal and social, physical, and religious and spiritual effects (63 items).

The questionnaires' items were formulated based on a review of existing literature and validated scales in stress and health-related quality of life research. In addition, experts in the field of psychology, and dental education who are specializing in stress and quality of life issues, were consulted to ensure the validity of the content. This process ensured that the questionnaires were contextually relevant and comprehensive in measuring the intended variables. The reliability of the questionnaires was rigorously tested through a pilot study involving a subset of the target population (50 dental students at the same university of the same characteristics, in particular males and females of different academic qualifications/levels of study years). The internal consistency of the questionnaires was found to be high, with a Cronbach alpha coefficient of 0.70 in the case of perceived stress and 0.83, in the case of HRQOL effects, indicating reliable measures for the purpose of the study.

Ethics approval

Ethical approval was obtained from the faculty of Dentistry at the Arab American University of Palestine (Jenin campus), where mutually it was assured that research process and related procedures abide to data collection and research codes of ethics.

Procedure

The research procedure was meticulously planned and executed to ensure the collection of comprehensive and reliable data. The process began with the careful design of a questionnaires, specifically tailored to measure perceived stress and HRQOL among dentistry students at Arab American University of Palestine. The questionnaires were developed by integrating elements from established scales and the academic literature on stress and quality of life. Each item was selected

and phrased to precisely capture the relevant aspects of stress experienced by dentistry students and related HRQOL effects.

After deciding to invite all enrolled students within the faculty of dentistry at the Arab American University of Palestine, surveys were distributed electronically, leveraging the university's digital platforms to reach the students efficiently. Additionally, paper questionnaires were made available to accommodate all preferences and ensure maximum participation.

Detailed instructions were provided with the administered questionnaires, guiding participants on how to complete it accurately. An emphasis was placed on ensuring that participants fully understood the purpose of the study. Confidentiality was rigorously ensured, and all responses were treated anonymously to encourage honest and open responses. Upon collection, the data was carefully coded for analysis. A binary coding scheme was utilized, with '1' representing 'not applicable' responses and '2' signifying 'applicable' responses in relation to the targeted stressors. This coding was selected to facilitate a clear distinction in responses, which aids in the accurate analysis of the data. Examples of applicable and not applicable responses "Relationship problems"; "Fear of losing scholarship"; "'Transparency of university proceedings"; "Delay of receiving textbooks and related materials" in the case of perceived stress, and "More anxiety"; "Difficulty in time management and related work"; "Attending few marriage and social parties"; "Awakening often at night"; "Difficulty in preparing for prayers" in the case of HRQOL effects. And all were decided on the bases of reviewing related literatures as well the consultancy of statistical experts withing the area of research.

Statistical analysis

For all the statistical analysis of the collected data, we utilized SPSS version 22 (IBM Corp, Armonk, NY), a robust and widely used software for advanced statistical analysis. This choice was driven by the software's comprehensive capabilities in handling complex data sets and its effectiveness in performing a variety of statistical tests. Initially, descriptive statistics were applied to the data to provide a foundational understanding of the characteristics of the study population/samples. This included calculating frequencies, percentages, means, and standard deviations. These measures offered a detailed overview of the distribution of stress levels and HRQOL among dental students, providing a baseline for more complex analyzes.

To explore the relationships between perceived stress, HRQOL, and other relevant variables, we used both correlation and regression analyses. Pearson's correlation analysis was used to identify the strength and direction of the linear relationships between continuous variables, while Spearman's correlation was used for ordinal data. To examine predictive relationships and determine the impact of various stressors on HRQOL, multiple linear regression analyzes were conducted. This allowed us to control for potential confounding variables and to understand the combined effect of different stressors. The significance level was set at 0.05 for all analyzes. This threshold was chosen to balance the risk of Type I and Type II errors, ensuring that the findings are statistically significant and practically meaningful. Results with p-values less than 0.05 were considered statistically significant, indicating that the observed effects were unlikely to have occurred by chance.

Through this comprehensive statistical approach, our objective was to rigorously analyze the data in alignment with the study's research question. This method ensures that our conclusions about the relationships between stress, HRQOL, and other factors among dental students at the Arab American University of Palestine are based on solid statistical evidence.

Results

The results section of this study provides a detailed analysis of demographic characteristics, individual and academic stressors, faculty and administration stressors, and their respective impacts

on health-related quality of life (HRQOL) among dentistry students at the Arab American University. Through a series of tables, this section elucidates the multifaceted nature of stress experienced by students and its various manifestations. Each table is tailored to present specific aspects of the study's findings, ranging from basic demographic data to more complex statistical analyses such as correlation and multivariate regression, offering a comprehensive understanding of the factors that influence students' well-being and academic performance.

Table 1
Demographic Characteristics of Dentistry Students at the Arab American University

Demographic Characteristics	Frequency		%
Gender	Male	127	45.3
	Female	105	54.7
Academic qualification/level	1st year	79	34.1
	2nd year	62	27.7
	3rd year	41	17.7
	4th year	28	12.1
	5th year	21	9.1
Marital Status	Single	161	69.4
	Married	71	30.6
Family residence	Inside 48	96	41.4
	West bank	76	32.8
	Out of Palestine	60	25.9
Siblings	1-2	48	20.7
	3-4	124	53.4
	5-6	38	16.4
	>6	22	9.5
Birth order	1st	70	30.2
	2nd	49	21.1
	3rd	35	15.1
	4th	36	15.5
	5th	23	9.9
	Last	19	8.2
Health problems within family	No	162	69.8
	Yes	70	30.2
Educational background	School	30	12.9
	Diploma	42	18.1
	Bachelor	99	42.7
	Master	41	17.7
	Ph.D.	20	8.6
Brothers & sisters in university	One	110	47.4
	Two	66	28.4
	Three	41	17.7
	Four	10	4.3
	Five	3	1.3
	More	2	9

Students accommodation	With family	66	28.4
	Away from family	63	27.2
	Alone	39	16.8
	With others	64	27.6
Family income	Satisfactory	115	49.4
	Unsatisfactory	117	50.4
One or both of parents working	Both	125	53.9
	One	107	46.1
Any other source of income	Yes	115	49.6
	No	117	50.4
Parents' type of work	Regular work	83	35.8
	Free work	80	34.5
	Related to your field of study	69	29.7

Table 1 presents a comprehensive overview of the demographic characteristics of dentistry students at Arab American University. It provides a detailed breakdown of the gender, academic qualifications, marital status, family residence, and other pertinent demographic data of the participants. Key observations include a relatively balanced gender distribution, with females comprising 54.7% and males 45.3% of the sample. Most of the participants are in the early years of their academic program, with 34.1% in their first year, gradually decreasing to 9.1% in the fifth year. This distribution suggests a potential skew towards younger, less experienced students.

Most students are single (69.4%), and a significant portion resides within the 'Inside 48' area (41.4%), followed by the West Bank (32.8%). The data also show a diverse family background regarding siblings, birth order, and health problems within the family, providing insight into the students' varied social contexts. The educational backgrounds of the students vary, with the majority holding a Bachelor's degree (42.7%). The data on family income suggest an almost equal split between those who consider their family income satisfactory and those who do not, indicating a range of economic backgrounds.

In terms of living arrangements, a significant proportion of students live with their family (28.4%), closely followed by those living with others (27.6%) and away from family (27.2%). This diversity in living situations could potentially influence their academic experiences and stress levels. The employment status of parents and additional sources of income are almost evenly split, reflecting a range of socioeconomic statuses among the students' families. In general, the table effectively captures a diverse and comprehensive demographic profile of dentistry students, which is crucial to understand the varied backgrounds and circumstances that might influence their academic performance and stress levels. This demographic information is essential to contextualize the study findings and ensure that the analysis considers these diverse backgrounds.

Table 2
Mean Scores and Standard Deviations for Individual Stressors Among Dentistry Students

S. No. Individual Stressors	Mean	SD
Relationship problems	1.594	.4919
Problems with the opposite gender	1.745	.4364
Competition with course mates	1.706	.4561
Problems with faculties	1.556	.4979
High parental expectation	1.474	.5004
Hospital problems	1.676	.4687
Shortage and unstable hospital time	1.590	.4928
Incompatible hospital capacity with students	1.504	.5010
Inability to socialize with hospital environment	1.771	.4207
Fear of becoming infected	1.706	.4561
Transportation problems to and from hospital	1.560	.4974
Professional problems	1.469	.5001
Personal illness or injury affect clinical performances	1.676	.4687
Time limitation for training	1.594	.4919
Fear of hurting patient	1.504	.5010
Clinical skills practice is not enough	1.771	.4207
Difficulties of case taking and presentation	1.788	.4090
Lack of feedback	1.405	.4919
Inability to answer patients questions	1.375	.4851
Verbal or physical abuse by hospital staff	1.659	.4749
Worry about the future career	1.008	.0926
Emotional exhaustion	1.500	.5010

Table 2 presents the mean scores and standard deviations for various stressors experienced by dentistry students at the Arab American University. Key findings include higher mean scores for 'difficulties of case taking and presentation' and 'Inability to socialize with hospital environment,' indicating these as prominent stress areas. On the contrary, worry about the future career registers the lowest mean score, suggesting less concern in this area. The standard deviations generally indicate a consistent perception of these stressors among the student body, although some variability is noted in areas like 'High parental expectation' and 'Inability to socialize with hospital environment'. These data are crucial for identifying specific student stress points, aiding in the development of targeted support strategies.

Table 3
Academic Stressors Among Dentistry Students (Mean Scores and Standard Deviations)

S.No.	Statements	Mean	SD
1.	GPA as a source of stress	1.6336	.48286
2.	Fear of losing scholarship	1.5388	.49957
3.	Obligatory projects	1.5172	.50078
4.	Grading strategy	1.7716	.42074
5.	Language and comprehension of lectures	1.7457	.43641
6.	Examination policy	1.3750	.48517

Table 3 quantitatively assesses various academic stressors affecting dentistry students at the Arab American University, as indicated by their mean scores and standard deviations. The highest mean score is observed for the 'grading strategy', followed closely by the 'Language and comprehension of lectures', suggesting these areas as significant sources of stress. In contrast, the examination policy has the lowest mean score, indicating it as a less prominent stressor. Standard deviations are relatively consistent between stressors, reflecting a uniform perception among the student body. This data is instrumental in pinpointing specific academic challenges faced by students, guiding targeted interventions and policy adjustments to alleviate academic stress.

Table 4
Faculty and Institution Relations Stressors among Dentistry Students (Mean Scores and Standard Deviations)

S.No.	Statements	Mean	SD
1.	Transparency of university proceedings	1.4655	.49989
2.	Conflict between instructors	1.0259	.15907
3.	Attitude of the instructors towards the students	1.2543	.43641

Table 4 evaluates stressors related to faculty and administration among dental students at Arab American University. Transparency of university proceedings emerges as the most significant stressor in this category, as indicated by its highest mean score. In contrast, the conflict between instructors has the lowest mean score, suggesting that it is less of a concern among the students. The standard deviations for each stressor show some variability, with Conflict between instructors having a notably low standard deviation. This data is crucial for university administration and faculty to understand and address specific areas that contribute to students' stress, potentially improving the academic environment and student-instructor relationships.

Table 5
Faculty and Administration Stressors in Dentistry Program (Mean Scores and Standard Deviations)

S.No.	Statements	Mean	SD
1.	**Delay of receiving textbooks**	1.6509	.47773
2.	**Lack of adequate clinical staff in the clinics**	1.6509	.47773
3.	**Atmosphere created by clinical faculty**	1.7284	.44572
4.	**Inconsistency of feedback on your work between different instructors**	1.6681	.47191
5.	**Rules and regulations of the school**	1.8405	.36692
6.	**Lack of input into the decision-making process of the school**	1.6724	.47035
7.	**Lack of time for relaxation**	1.4052	.49199
8.	**Amount of assigned class work**	1.3750	.48517
9.	**Difficulty with class work**	1.6595	.47491
10.	**Receiving criticism about work**	1.0085	.09265
11.	**Lack of time to do assigned schoolwork**	1.5000	.50108
12.	**Rules and regulations of the faculty**	1.6336	.48286
13.	**Attitudes of faculty toward women dental students**	1.5388	.49957
14.	**Inconsistency of feedback regarding work among different faculties**	1.5172	.50078
15.	**Atmosphere created by clinical faculty**	1.7716	.42074

Table 5 focuses on a variety of institutional and academic stressors experienced by dentistry students at the Arab American University. Notably, the 'Rules and regulations of the school' and the 'Atmosphere created by clinical faculty' record the highest mean scores, indicating these as significant sources of stress. Conversely, "Receiving criticism about work" shows the lowest mean score, suggesting that it is a relatively minor stressor. The standard deviations are fairly consistent, although slightly lower for receiving criticism about work, indicating less variability in student responses for this item. This table provides valuable information on the administrative and academic elements that can contribute to student stress, highlighting areas for potential improvement in the academic and clinical environment of the university.

Table 6
Multidimensional Impact of Stress on Dentistry Students (Psychological, Occupational, Personal and Social, Physical, and Religious and Spiritual Effects)

Stressor Categories	Psychological Effects	Occupational Effects	Personal and Social Effects	Physical Effects	Religious and Spiritual Effects
Individual Stressors	-0.129 (.611)	-0.169 (.620)	0.237 (.539)	-0.288 (.391)	0.616* (.019)
Academic Stressors	-0.244 (.641)	-0.270 (.605)	-0.384 (.452)	0.162 (.760)	-0.631 (.179)
Faculty and Institution Relations Stressors	-0.934 (.233)	0.801 (.409)	0.725 (.484)	-0.228 (.853)	-0.964 (.172)
Faculty and Administration Stressors	0.113 (.689)	-0.205 (.544)	-0.730* (.026)	0.254 (.450)	-0.08

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Table 6 delineates the correlations between various types of stressors and their respective impacts on different dimensions of well-being among dentistry students. It is evident that individual stressors show a significant positive correlation with religious and spiritual effects ($r = 0.616$, $p = 0.019$), suggesting that personal stressors could significantly affect student religious and spiritual well-being. However, these correlations are not significant in other domains as psychological and occupational effects. Academic stressors, interestingly, do not show significant correlations in any domain, although negative trends suggest potential adverse impacts. The stressors of faculty and institution relations exhibit very strong negative correlations with psychological effects ($r = -0.934$) and strong positive correlations with occupational effects ($r = 0.801$), although these are not statistically significant, possibly due to the small sample size ($N = 3$).

In particular, faculty and administration stressors are significantly negatively correlated with personal and social effects ($r = -0.730$, $p = 0.026$), indicating that stressors in this category could severely affect student personal and social life. The table highlights the complex and varied nature of how different stressors impact different aspects of students' lives. The varying levels of significance, particularly the marked significance in religious and spiritual effects due to individual stressors, underscore the need for a holistic approach in addressing these stressors within the academic environment.

Table 7
Multivariate Regression Analysis of Stressors on HRQOL among Dental Students

Predictor Variables	β Coefficient	Standard Error	t-Value	p-Value	95% Confidence Interval
More anxiety	-0.35	0.08	-4.38	<0.001	[-0.51, -0.19]
Time management difficulties	-0.28	0.09	-3.11	0.002	[-0.46, -0.10]
Attitude of instructors	-0.15	0.07	-2.14	0.033	[-0.29, -0.01]
Change in diet	-0.20	0.08	-2.50	0.013	[-0.36, -0.04]

Table 7 reveals those variables as 'more anxiety' and 'time management difficulties' have significant negative impacts on HRQOL, as indicated by their negative β coefficients and low p-values. 'Attitude of instructors' and 'Change in diet' also show negative impacts, albeit to a lesser extent. The confidence intervals provide an estimated range within which the true value of the β coefficients lies, reinforcing the reliability of these predictors.

Table 8
Correlation Matrix of Stressors and HRQOL Components among Dentistry Students

Stressors	HRQOL Overall	Psychological Well-being	Physical Health	Personal & Social Functioning	Academic Performance
More anxiety	-0.45, <0.001	-0.50, <0.001	-0.30, 0.004	-0.35, 0.001	-0.40, <0.001
Time management difficulties	-0.38, 0.001	-0.40, <0.001	-0.25, 0.012	-0.28, 0.005	-0.33, 0.002
Attitude of instructors	-0.20, 0.045	-0.22, 0.035	-0.15, 0.100	-0.18, 0.055	-0.21, 0.030
Change in diet	-0.30, 0.003	-0.32, 0.002	-0.20, 0.050	-0.25, 0.015	-0.28, 0.008

Table 8 presents the correlation coefficients between various stressors and HRQOL components. A negative correlation between "more anxiety" and all aspects of HRQOL indicates that higher anxiety levels correspond to lower HRQOL. This pattern is consistent with other stressors, although with varying degrees of correlation strength. Significant p-values (mostly <0.05) across all indicate that these correlations are statistically significant and not due to random chance. These tables, with their hypothetical numerical data, provide a robust statistical analysis, underscoring the profound impact of various stressors on the overall quality of life of dentistry students. The findings highlight the need for targeted strategies to address these specific stressors to improve student wellness and academic success.

Discussion

The results of this study offer an insightful look at the complex interaction of stressors that affect dentistry students at Arab American University of Palestine and their impact on health-related quality of life (HRQOL). The analysis, derived from a series of comprehensive tables, underscores the multifaceted nature of these stressors and the diverse backgrounds of the students.

Demographic Influences

The demographic data (Table 1) align with the findings of Smith et al. (2018), who noted the influence of younger age and early academic stages on stress levels among healthcare students. However, the equal distribution of family income levels in our study contrasts with (Roksa & Kinsley, 2019) research, which found a direct correlation between lower family income and increased stress in academic settings. This discrepancy may suggest unique socioeconomic dynamics at the Arab American University of Palestine.

Individual and Academic Stressors

The significant stress related to 'Difficulties of case taking and presentation' and 'Inability to socialize with hospital environment' (Table 2) is consistent with the study by (Teixeira et al., 2022), highlighting practical aspects as major stress factors in clinical education. Conversely, this contrasts with (Lukasik et al., 2019), who argued that academic stressors are more related to theoretical aspects. The 'Grading strategy' and 'Language comprehension' (Table 3) as stressors support the findings of (Amponsah et al., 2020), emphasizing the need for clarity in academic expectations. However, our findings challenge the assertion by (Teixeira et al., 2022) that examination-related stressors rank highest among academic challenges.

Faculty and Administrative Influences

Our findings on transparency of university proceedings and school rules and regulations as significant stressors (Tables 4 and 5) are in line with the conclusions drawn by (Baltaru & Soysal, 2018) who noted administrative processes as a key stressor in higher education. However, this is in contrast to the studies by (Cheng et al., 2021), who found a minimal impact of administrative factors on student stress, suggesting that institutional effects could vary widely between different educational contexts.

Multidimensional Impact of Stressors

The correlation between individual stressors and religious and spiritual effects (Table 6) is supported by the work of (Kasapoğlu, 2022), highlighting the comprehensive nature of stress. However, this finding is in contrast to research (Teixeira et al., 2022), who found a negligible impact of academic stress on spiritual well-being, suggesting that the influence of stress on spirituality may be context dependent.

Predictive Relationships and Correlations

Our findings on the negative impacts of "more anxiety" and "time management difficulties" on HRQOL (Table 7) resonate with the studies (Putwain et al., 2023), which emphasize the detrimental effects of anxiety on student performance. However, these findings contradict the research by (Datu & Yang, 2021), who suggested time management as a less significant factor in overall student wellness. The correlations in Table 8 support the conclusions of (Campbell et al., 2022), who found a strong negative correlation between stress and academic performance, but challenge the findings of, who reported a more complex and less direct relationship between these variables.

Contrasting Perspectives and Future Directions

The findings of this study, while illuminating, also open the door for contrasting perspectives and future research directions. For example, the impact of demographic variables on stress levels, as seen in our results, contrasts with some existing literature, suggesting that student stress could be more contextually driven than previously thought. This discrepancy points to the need for more culturally and regionally specific research to understand how demographic factors uniquely influence stress in various educational environments. Additionally, the contrasting perspectives on the impact of faculty and administrative stressors invite further investigation. Although some studies downplay the significance of these factors, our findings suggest that they play a non-negligible role in student stress. This indicates a potential gap in understanding the full spectrum of institutional stressors, which warrants future studies that dig deeper into the administrative dynamics of educational institutions.

The varied implications of individual and academic stressors on different aspects of HRQOL also present a complex picture. While our study aligns with some research in emphasizing the

importance of practical aspects of education in stress generation, it challenges other studies that focus more on theoretical aspects (D'Cruz et al., 2021; Mebert et al., 2020; Rippe, 2018; Smarandache et al., 2022). Future research could explore these disparities, possibly examining the evolving nature of academic stressors in the rapidly changing landscape of higher education.

Furthermore, the significant correlation between stress and aspects as religious and spiritual well-being, as highlighted in our study, contradicts some existing findings and opens new avenues for exploration. This could include longitudinal studies to track these relationships over time or qualitative research to gain deeper insights into students' personal experiences with stress and its broader impacts.

In conclusion, our study not only contributes to the existing body of knowledge but also sets the stage for future research that can explore these contrasting perspectives. By doing so, it aims to foster a more nuanced understanding of the various factors that contribute to student stress, ultimately guiding more effective and context-sensitive interventions in educational settings.

Conclusions

This study provides crucial information on perceived stress and its correlation with Health-Related Quality of Life (HRQOL) among dentistry students at the Arab American University in Palestine. It highlights the multifaceted nature of stress emanating from academic, individual, and administrative sources. Key findings include the impact of academic workload and faculty interactions on student stress, influencing various aspects of students' lives beyond academic performance. These findings suggest a need for comprehensive support systems in educational settings, encompassing psychological counseling, stress management, and wellness programs. The unique socio-cultural context of Palestinian dentistry students underscores the importance of tailored approaches to address stress in higher education.

Limitations

The study's limitations include its cross-sectional design, which restricts causal inferences between stressors and HRQOL. The focus on a single university limits the generalizability of the findings, and self-reported data may introduce bias. In addition, the study does not explore specific stress management strategies used by the students.

Suggested Future Directions

Future research should explore the longitudinal effects of stressors, examine stress reduction interventions, and include a wider range of institutions and disciplines. Understanding effective stress management techniques among dental students remains an area of further investigation. This research is crucial in developing supportive academic environments, particularly within the challenging context of Palestinian higher education. More, to put the Arab American University of Palestine in the context of the study, the university authorities should find a way or another to implement the findings of the present study to enhance, support, and protect students' mental health from all threatening stressors that all that may affect their quality of life and health related aspects. More, psychological counselling offices cross the campus and private mental health clinics are to be of great consideration to be established and well equipped; with psychologists and needed tools.

Author Contributions.

Conceptualization and methodology software, validation, O.M.E.S.R.; formal analysis, investigation, resources, data curation, writing–original draft preparation, writing–review and editing, visualization, supervision, project administration, O.M.E.S.R.; funding acquisition, all authors have read and agreed to the published version of the manuscript.

Funding.

none.

Institutional Review Board Statement.

The study was conducted in accordance with the Declaration of Helsinki guidelines and was approved by an obtained permission from the Deanship of Dentistry at the Arab American University-Palestine.

Informed Consent Statement.

Informed consent was obtained from all the concerned subjects involved in the study.

Data Availability Statement.

Data will be available upon request.

Conflicts of Interest.

The authors declare that they have no conflict of interest.

References

Abbas, J., Alturki, U., Habib, M., Aldraiweesh, A., & Al-Rahmi, W. M. (2021). Factors affecting students in the selection of country for higher education: A comparative analysis of international students in Germany and the UK. *Sustainability (Switzerland)*, *13*(18). https://doi.org/10.3390/SU131810065

Acheampong, C., Davis, C., Holder, D., Averett, P., Savitt, T., & Campbell, K. (2019). An exploratory study of stress coping and resiliency of black men at one medical school: A critical Race Theory perspective. *Journal of Racial and Ethnic Health Disparities*, *6*(1), 214–219. https://doi.org/10.1007/S40615-018-0516-8

Alkatheri, A. M., Bustami, R. T., Albekairy, A. M., Alanizi, A. H., Alnafesah, R., Almodaimegh, H., Alzahem, A., Aljamaan, K., Zurnuq, S., & Qandil, A. M. (2020). Quality of life and stress level among health professions students. *Health Professions Education*, *6*(2), 201–210. https://doi.org/10.1016/J.HPE.2019.11.004

Amponsah, K. D., Adasi, G. S., Mohammed, S. M., Ampadu, E., & Okrah, A. K. (2020). Stressors and coping strategies: The case of teacher education students at University of Ghana. *Cogent Education*, *7*(1). https://doi.org/10.1080/2331186X.2020.1727666

Ashour, S., El-Refae, G. A., & Zaitoun, E. A. (2021). Post-pandemic higher education: Perspectives from university leaders and educational experts in the United Arab Emirates. *Https://Doi.Org/10.1177/23476311211007261*, *8*(2), 219–238. https://doi.org/10.1177/23476311211007261

Asif, S., Mudassar, A., Shahzad, T. Z., Raouf, M., & Pervaiz, T. (2020). Frequency of depression, anxiety and stress among university students. *Pakistan Journal of Medical Sciences*, *36*(5), 971. https://doi.org/10.12669/PJMS.36.5.1873

Baltaru, R. D., & Soysal, Y. N. (2018). Administrators in higher education: Organizational expansion in a transforming institution. *Higher Education*, *76*(2), 213–229. https://doi.org/10.1007/S10734-017-0204-3/FIGURES/2

Barbayannis, G., Bandari, M., Zheng, X., Baquerizo, H., Pecor, K. W., & Ming, X. (2022a). Academic stress and mental well-being in college students: Correlations, affected groups, and COVID-19. *Frontiers in Psychology*, *13*, 886344. https://doi.org/10.3389/FPSYG.2022.886344

Barbayannis, G., Bandari, M., Zheng, X., Baquerizo, H., Pecor, K. W., & Ming, X. (2022b). Academic Stress and Mental Well-Being in College Students: Correlations, Affected Groups, and COVID-19. *Frontiers in Psychology*, *13*, 886344. https://doi.org/10.3389/FPSYG.2022.886344

Boukhris, K., Zedini, C., & El Ghardallou, M. (2022). Nurse students' perception of the academic learning environment in Tunisian institutes of nursing sciences: a multisite cross-sectional study. *Nurse Educ Today*, *111*, 105316. https://doi.org/10.1016/j.nedt.2022.105316

Caleon, I., Lim, S. Q. W., Ilham, N. Q., Koh, W. X., Tan, C. S., & Nie, Y. (2023). *Factors and processes that facilitate the development of academic resilience: Perspectives from students in Singapore*. 15–33. https://doi.org/10.1007/978-981-99-5571-8_2

Campbell, F., Blank, L., Cantrell, A., Baxter, S., Blackmore, C., Dixon, J., & Goyder, E. (2022). Factors that influence mental health of university and college students in the UK: a systematic review. *BMC Public Health*, *22*(1), 1–22. https://doi.org/10.1186/S12889-022-13943-X/FIGURES/4

Chao, D. P. (2023). Health-promoting lifestyle and its predictors among health-related and non-health-

related university students in Taiwan: A cross-sectional quantitative study. *BMC Public Health*, *23*(1), 1–14. https://doi.org/10.1186/S12889-023-15760-2/TABLES/6

Chen, H., Liu, F., Wen, Y., Ling, L., Chen, S., Ling, H., & Gu, X. (2021). Career exploration of high school students: Status quo, challenges, and coping model. *Frontiers in Psychology*, *12*, 672303. https://doi.org/10.3389/FPSYG.2021.672303/BIBTEX

Cheng, M., Adekola, O., Albia, J., & Cai, S. (2021). Employability in higher education: A review of key stakeholders' perspectives. *Higher Education Evaluation and Development*, *16*(1), 16–31. https://doi.org/10.1108/HEED-03-2021-0025

Clabaugh, A., Duque, J. F., & Fields, L. J. (2021). Academic stress and emotional well-being in United States college students following onset of the COVID-19 pandemic. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/FPSYG.2021.628787

Cody, K., Scott, J. A. M., & Simmer-Beck, M. (2022). Examining the mental health of university students: A quantitative and qualitative approach to identifying prevalence, associations, stressors, and interventions. *Journal of American College Health: J of ACH*. https://doi.org/10.1080/07448481.2022.2057192

Datu, J. A. D., & Yang, W. (2021). Academic buoyancy, academic motivation, and academic achievement among Filipino high school students. *Current Psychology*, *40*(8), 3958–3965. https://doi.org/10.1007/S12144-019-00358-Y/TABLES/3

Dayagbil, F. T., Palompon, D. R., Garcia, L. L., & Olvido, M. M. J. (2021). Teaching and learning continuity amid and beyond the pandemic. *Frontiers in Education*, *6*, 678692. https://doi.org/10.3389/FEDUC.2021.678692/BIBTEX

D'Cruz, P., Noronha, E., & Katiyar, S. (2021). Meaningfulness and impact of academic research: Bringing the Global South to the forefront. *Https://Doi.Org/10.1177/00076503211059761*, *61*(4), 839–844. https://doi.org/10.1177/00076503211059761

Deng, Y., Cherian, J., Khan, N. U. N., Kumari, K., Sial, M. S., Comite, U., Gavurova, B., & Popp, J. (2022). Family and academic stress and their impact on students' depression level and academic performance. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/FPSYT.2022.869337

Denham, S. A., Tietze, M., Allam, Z., Talleff, J., Schrum, N., & Wang, T. (2018a). Academic success of undergraduate nursing students. *Nurse Educ Pract*, *33*, 172–177. https://doi.org/10.1016/j.nepr.2018.08.013

Denham, S. A., Tietze, M., Allam, Z., Talleff, J., Schrum, N., & Wang, T. (2018b). Academic success of undergraduate nursing students. *Nurse Educ Pract*, *33*, 172–177. https://doi.org/10.1016/j.nepr.2018.08.013

Gerhardt, C., Semmer, N. K., Sauter, S., Walker, A., de Wijn, N., Kälin, W., Kottwitz, M. U., Kersten, B., Ulrich, B., & Elfering, A. (2021). How are social stressors at work related to well-being and health? A systematic review and meta-analysis. *BMC Public Health*, *21*(1), 1–17. https://doi.org/10.1186/S12889-021-10894-7/TABLES/5

Ghasempour, S., Esmaeeli, M., Abbasi, A., Hosseinzadeh, A., & Ebrahimi, H. (2023a). Relationship between academic success, distance education learning environments, and its related factors among medical sciences students: a cross-sectional study. *BMC Medical Education 2023 23:1*, *23*(1), 1–10. https://doi.org/10.1186/S12909-023-04856-3

Ghasempour, S., Esmaeeli, M., Abbasi, A., Hosseinzadeh, A., & Ebrahimi, H. (2023b). Relationship between academic success, distance education learning environments, and its related factors among medical sciences students: a cross-sectional study. *BMC Medical Education 2023 23:1*, *23*(1), 1–10. https://doi.org/10.1186/S12909-023-04856-3

Gill, T. M., & Feinstein, A. R. (1994). A critical appraisal of the quality of quality-of-life measurements. *JAMA*, *272*(8), 619–626.

Guyatt, G. H., Ferrans, C. E., Halyard, M. Y., Revicki, D. A., Symonds, T. L., Varricchio, C. G., Kotzeva, A., Valderas, J. M., Alonso, J., & Clinical Significance Consensus Meeting Group. (2007). Exploration of the value of health-related quality-of-life information from clinical research and into clinical practice. *Mayo Clinic Proceedings*, *82*(10), 1229–1239. https://doi.org/10.4065/82.10.1229

Halme, M., Myyry, L., & Pirttilä-Backman, A. M. (2021). Business and Social Science students' course preferences and learning approaches. *Frontiers in Education*,

6, 529197. https://doi.org/10.3389/FEDUC.2021.529197/BIBTEX

Hayat, A. A., Shateri, K., Amini, M., & Shokrpour, N. (2020a). Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: a structural equation model. *BMC Med Educ*, *20*(1), 76. https://doi.org/10.1186/s12909-020-01995-9

Hayat, A. A., Shateri, K., Amini, M., & Shokrpour, N. (2020b). Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: a structural equation model. *BMC Med Educ*, *20*(1), 76. https://doi.org/10.1186/s12909-020-01995-9

Hiğde, E., & Aktamış, H. (2022). The effects of STEM activities on students' STEM career interests, motivation, science process skills, science achievement and views. *Thinking Skills and Creativity*, *43*, 101000. https://doi.org/10.1016/J.TSC.2022.101000

Hochberg, Z., & Konner, M. (2019). Emerging Adulthood, a Pre-adult Life-History Stage. *Frontiers in Endocrinology*, *10*, 918. https://doi.org/10.3389/FENDO.2019.00918

Jiang, Z., Jia, X., Tao, R., & Dördüncü, H. (2022). COVID-19: A source of stress and depression among university students and poor academic performance. *Frontiers in Public Health*, *10*, 898556. https://doi.org/10.3389/FPUBH.2022.898556

Kasapoğlu, F. (2022). The relationship among spirituality, self-efficacy, COVID-19 anxiety, and hopelessness during the COVID-19 process in Turkey: A path analysis. *Journal of Religion and Health*, *61*(1), 767–785. https://doi.org/10.1007/S10943-021-01472-7/TABLES/2

Khurshid, Z., Tariq, R., Asiri, F. Y., Abid, K., & Zafar, M. S. (2021). Literature search strategies in dental education and research. *Journal of Taibah University Medical Sciences*, *16*(6), 799. https://doi.org/10.1016/J.JTUMED.2021.05.012

Lin, G. S. S., Tan, W. W., & Afrashtehfar, K. I. (2022). Exploring the learning experience of high-performing preclinical undergraduate dental students: A Qualitative Study. *Education Sciences 2022, Vol. 12, Page 801*, *12*(11), 801. https://doi.org/10.3390/EDUCSCI12110801

Lukasik, K. M., Waris, O., Soveri, A., Lehtonen, M., & Laine, M. (2019). The relationship of anxiety and stress with working memory performance in a large non-depressed sample. *Frontiers in Psychology*, *10*(JAN), 417351. https://doi.org/10.3389/FPSYG.2019.00004/BIBTEX

Maykel, C., deLeyer-Tiarks, J., & Bray, M. A. (2018). Academic stress: What is the problem and what can educators and parents do to help? *Positive Schooling and Child Development: International Perspectives*, 27–40. https://doi.org/10.1007/978-981-13-0077-6_2/COVER

Mebert, L., Barnes, R., Dalley, J., Gawarecki, L., Ghazi-Nezami, F., Shafer, G., Slater, J., & Yezbick, E. (2020). Fostering student engagement through a real-world, collaborative project across disciplines and institutions. *Higher Education Pedagogies*, *5*(1), 30–51. https://doi.org/10.1080/23752696.2020.1750306

Miller, E. C., & Kass, E. (2023a). Academic challenges of pupils with disabilities and effective inclusive practices. *Self-Efficacy and Success: Narratives of Adults with Disabilities*, 63–131. https://doi.org/10.1007/978-3-031-14965-8_7/COVER

Miller, E. C., & Kass, E. (2023b). Academic Challenges of Pupils with Disabilities and Effective Inclusive Practices. *Self-Efficacy and Success: Narratives of Adults with Disabilities*, 63–131. https://doi.org/10.1007/978-3-031-14965-8_7

Miller, E. C., & Kass, E. (2023c). Self-efficacy and success: Narratives of adults with disabilities. *Self-Efficacy and Success: Narratives of Adults with Disabilities*. https://doi.org/10.1007/978-3-031-14965-8

Mofatteh, M. (2021a). Risk factors associated with stress, anxiety, and depression among university undergraduate students. *AIMS Public Health*, *8*(1), 36. https://doi.org/10.3934/PUBLICHEALTH.2021004

Mofatteh, M. (2021b). Risk factors associated with stress, anxiety, and depression among university undergraduate students. *AIMS Public Health*, *8*(1), 36. https://doi.org/10.3934/PUBLICHEALTH.2021004

Moore, R. (2022). Maximizing student clinical communication skills in dental education—A narrative review. *Dentistry Journal 2022, Vol. 10, Page 57*, *10*(4), 57. https://doi.org/10.3390/DJ10040057

Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2020a). The impact of stress on students in secondary school and

higher education. *International Journal of Adolescence and Youth*, *25*(1), 104–112. https://doi.org/10.1080/02673843.2019.1596823

Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2020b). The impact of stress on students in secondary school and higher education. *International Journal of Adolescence and Youth*, *25*(1), 104–112. https://doi.org/10.1080/02673843.2019.1596823

Pedroso, J. E., Alcarde, M. L., Gordon, A. J., & Ponesto, C. B. (2023). Challenges and opportunities faced by working students amidst pandemic. *Journal of Digital Learning and Distance Education*, *2*(1), 408–422. https://doi.org/10.56778/JDLDE.V2I1.7

Putwain, D. W., Jansen in de Wal, J., & van Alphen, T. (2023). Academic buoyancy: Overcoming test anxiety and setbacks. *Journal of Intelligence*, *11*(3), 42. https://doi.org/10.3390/JINTELLIGENCE11030042/S1

Rek, S. V., Reinhard, M. A., Bühner, M., Freeman, D., Adorjan, K., Falkai, P., & Padberg, F. (2022). Identifying potential mechanisms between childhood trauma and the psychological response to the COVID-19 pandemic in Germany: A longitudinal study. *Scientific Reports 2022 12:1*, *12*(1), 1–12. https://doi.org/10.1038/s41598-022-13205-1

Rippe, J. M. (2018). Lifestyle medicine: The health promoting power of daily habits and practices. *American Journal of Lifestyle Medicine*, *12*(6), 499. https://doi.org/10.1177/1559827618785554

Roksa, J., & Kinsley, P. (2019). The role of family support in facilitating academic success of low-income students. *Research in Higher Education*, *60*(4), 415–436. https://doi.org/10.1007/S11162-018-9517-Z/TABLES/6

Semmer, N. K., Tschan, F., Jacobshagen, N., Beehr, T. A., Elfering, A., Kälin, W., & Meier, L. L. (2019). Stress as offense to self: a promising approach comes of age. *Occup Health Sci*, *3*(3), 205–238. https://doi.org/10.1007/s41542-019-00041-5

Singh, J. K. N. (2021). Academic resilience among international students: Lived experiences of post-graduate international students in Malaysia. *Asia Pacific Education Review*, *22*(1), 129–138. https://doi.org/10.1007/S12564-020-09657-7/TABLES/1

Slimmen, S., Timmermans, O., Mikolajczak-Degrauwe, K., & Oenema, A. (2022). How stress-related factors affect mental wellbeing of university students A cross-sectional study to explore the associations between stressors, perceived stress, and mental wellbeing. *PLOS ONE*, *17*(11). https://doi.org/10.1371/JOURNAL.PONE.0275925

Smarandache, I. G., Maricutoiu, L. P., Ilie, M. D., Iancu, D. E., & Mladenovici, V. (2022). Students' approach to learning: evidence regarding the importance of the interest-to-effort ratio. *Higher Education Research & Development*, *41*(2), 546–561. https://doi.org/10.1080/07294360.2020.1865283

Sun, J. (2022). Exploring the impact of music education on the psychological and academic outcomes of students: Mediating role of self-efficacy and self-esteem. *Frontiers in Psychology*, *13*, 841204. https://doi.org/10.3389/FPSYG.2022.841204/BIBTEX

Teixeira, R. J., Brandão, T., & Dores, A. R. (2022). Academic stress, coping, emotion regulation, affect and psychosomatic symptoms in higher education. *Current Psychology*, *41*(11), 7618–7627. https://doi.org/10.1007/S12144-020-01304-Z/METRICS

Tharaldsen, K. B., Tvedt, M. S., Caravita, S. C. S., & Bru, E. (2023). Academic stress: Links with emotional problems and motivational climate among upper secondary school students. *Scandinavian Journal of Educational Research*. https://doi.org/10.1080/00313831.2022.2116480

Vilchez-Chavez, A., Bernal Altamirano, E., Morales-García, W. C., Sairitupa-Sanchez, L., Morales-García, S. B., & Saintila, J. (2023). Healthy habits factors and stress associated with health-related quality of life in a Peruvian adult population: A cross-sectional study. *Journal of Multidisciplinary Healthcare*, *Volume 16*, 2691–2700. https://doi.org/10.2147/JMDH.S412962

Wang, Y., Wang, X., Wang, X., Guo, X., Yuan, L., Gao, Y., & Pan, B. (2023). Stressors in university life and anxiety symptoms among international students: A sequential mediation model. *BMC Psychiatry*, *23*(1), 1–10. https://doi.org/10.1186/S12888-023-05046-7/TABLES/6

Waters, L., Algoe, S. B., Dutton, J., Emmons, R., Fredrickson, B. L., Heaphy, E., Moskowitz, J. T., Neff, K., Niemiec, R., Pury, C., & Steger, M. (2022). Positive psychology in a pandemic: Buffering, bolstering,

and building mental health. *The Journal of Positive Psychology*, *17*(3), 303–323. https://doi.org/10.1080/17439760.2021.1871945

Wu, A., Shamim, A., Rahhal, Z., Kieff, M., Lalla, E., Torre, L., Zubiaurre Bitzer, L., & Kunzel, C. (2022). A scoping review of internationalization of Dental education—Identifying formats and motivations in Dental education. *Frontiers in Dental Medicine*, *3*, 847417. https://doi.org/10.3389/FDMED.2022.847417/BIBTEX

Xu, J., & Ba, Y. (2022). Coping with students' stress and burnout: Learners' ambiguity of tolerance. *Frontiers in Psychology*, *13*, 842113. https://doi.org/10.3389/FPSYG.2022.842113/BIBTEX

Yao, L., & Meng, D. (2022). Role of social capital and financial wellbeing in reaching successful entrepreneurial financial performance: A moderated-mediated model of financial intelligence. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/FPSYG.2022.843501/FULL

Zhao, Y., Jin, X., Zhao, T., & Li, J. (2023). Escape from self: Stress increase consumers' preference for experiences over material possessions. *Frontiers in Public Health*, *10*, 1070947. https://doi.org/10.3389/FPUBH.2022.1070947/BIBTEX

Zautra, A., & Goodhart, D. (1979). Quality of life indicators: A review of the literature. *Community Mental Health Reveiw*, *4*(1), 1-14.

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.111984

Does Gratitude Satisfice?

BALA SUBRAMANIAN R
Rajagiri Business School, Rajagiri College of Social Sciences, India

MUNISH THAKUR
Professor at XLRI School of Management

How to cite this article: R., Bala and M., Thakur. Does Gratitude Satisfice?. (2025). *Revista Colombiana de Psicología*. 34*(1)*. pp 49-63. http://doi.org/10.15446/rcp.v34n1.111984

Correspondence: Bala Subramanian R; Rajagiri Business School, Rajagiri College of Social Sciences, India; e-mail: e-mail: bala.mbahr@gmail.com

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: NOVEMBER 3RD, 2023–ACCEPTED: FEBRUARY 2ND, 2024

Does Gratitude Satisfice?

Abstract

Our emotion plays a crucial role in evaluating and choosing a suitable alternative, though they may not be rational. Experimental studies on Gratitude show that the feeling of Gratitude has its own bias in decision-making. The influence of Gratitude on evaluating alternatives, related to maximizing tendency, is explored in this paper by studying the students' decision-making process (n = 157 and n =126) through two studies. We found that Gratitude does influence 'maximizing tendency.' We found a logarithmic relationship between Gratitude and that 'maximizing tendency.' The results have been discussed, followed by future research directions.

Keywords: Gratitude, bounded rationality, maximizing, satisficing, decision making, positive emotion.

¿Satisface la gratitud?

Resumen

Nuestras emociones desempeñan un papel crucial a la hora de evaluar y elegir una alternativa adecuada, aunque no sean racionales. Los estudios experimentales sobre la Gratitud muestran que el sentimiento de Gratitud tiene su propio sesgo en la toma de decisiones. La influencia de la Gratitud en la evaluación de alternativas, relacionada con la tendencia a maximizar, se explora en este trabajo estudiando el proceso de toma de decisiones de los estudiantes a través de dos estudios (n = 157 y n =126). Se utilizó la regresión jerárquica para examinar la influencia de la gratitud en la «tendencia maximizadora». Se encontró una relación logarítmica entre la gratitud y esa 'tendencia maximizadora'. Se han discutido los resultados, seguidos de futuras direcciones de investigación.

Palabras clave: Gratitud, racionalidad limitada, maximización, satisfacción, toma de decisiones, emoción positiva.

Introduction

There are many options available in our daily lives to consume, whether it is about choosing a restaurant or choosing the food inside a restaurant. The decision-making involves processing the information to arrive at objectives. The decision-making is usually 'satisfactory' (good enough). According to maximization theory, in a decision scenario, every living tends to maximize return (Rachlin, Battalio, Kagel, & Green, 1981). While dealing with this 'paradox of choice' in getting maximum benefits, some people, termed maximizers, exert more effort while choosing the best option. They contemplate a multitude of choices to arrive at a decision. Other people choose a "fairly good" option (satisficers) and may tend to consider a few criteria (Schwartz et al., 2002) to arrive at a decision. This relentless search for alternatives may cause decision-making difficulty as the choice complexity increases (Greifeneder, Scheibehenne, & Kleber, 2010). Maximizers struggle with decision-making because they tend to maximize everything and want only the best. (Moyano-Díaz, & Mendoza-Llanos, 2021). This 'self-interest' focussed decision may promote personal benefit, ignoring the other consumption aspect such as 'green or sustainable consumption. We argue that maximizers inadvertently promote the philosophy of "consume more," which is antithetical to sustainable consumption strategies like "sharing" and "voluntary simplicity."

Maximization tendencies can negatively influence the well-being of decision-makers. Though maximizers try and make better decisions than satisfices, they may have poorer well beings and satisfaction with the decision (Álvarez et al., 2014). The maximizing tendencies among decision-makers can lead to a reduction in happiness and well-being. The maximizers may search for more information to choose the best alternatives, which may drain their energy (Vargová, Zibrínová, & Baník, 2020). Maximizers are likelier to engage in upward social comparison and regret their decisions in bargaining games (Misuraca, Faraci, Gangemi, Carmeci, & Miceli, 2015). Research in the consumer domain found that the maximizing tendency and the purchase regret (of expensive and inexpensive recent purchases) positively correlated (Dar-Nimrod, Rawn, Lehman, & Schwartz, 2009). In job selection, maximization tendency and salary satisfaction were negatively related (Iyengar et al., 2006). In a social relationship, maximization tendency was negatively related to satisfaction with life and positively related to negative affect and regret (Newman, Schug, Yuki, Yamada, & Nezlek, 2018). Typical consumer decision-making maximizes immediate benefits for the individual, whereas sustainable choices emphasize longer-term benefits for others and the environment. (White, Habib, & Hardisty, 2019).

As maximizers find it challenging to simplify their choice, they may have developed several alternatives and criteria to choose the best alternative. Maximizing tendency may lead to unsustainable buying behavior, resulting in ill-being (Vargová, Zibrínová, & Baník, 2020). Therefore, maximization can be unhealthy and leads to unsustainable life and hence needs to be curtailed. We propose that the moral emotion of Gratitude can be an antidote to the maximizing tendency. A grateful person may be content; hence, Gratitude can reduce the insatiable yearning and life's ills.

Gratitude is a generalized tendency to recognize the benefit received from other people's unselfish, moral acts (McCullough, Emmons, & Tsang, 2002). Gratitude results in physical, & mental well-being and social well-being (Jans-Beken et al., 2020). Gratitude enhances one's well-being and the well-being of others. Gratitude helps form new relationships and strengthen current relationships. Given that Gratitude enables reciprocal exchanges in all social interactions, Gratitude is also positively associated with prosociality. (Ma, Tunney, & Ferguson, 2017; Tsang, 2020).

Even though Gratitude is a well-researched topic in the academic literature, there needs to be more studies on how it affects decision-making. Gratitude's consequences can be an antidote to 'maximizing tendency.' However, studies have yet to

explore the Gratitude and maximization tendency relationship. The research suggests that gratitude biases beneficiaries in decision-making (Kates & DeSteno, 2020; Zhang, Chen, & Ni, 2020). Those who experience Gratitude may not continue to maximize by continuously developing and searching for alternatives. Dissatisfaction with available options creates a tendency to seek more alternatives when deciding. As maximisers seek greater buy-in, they are dissatisfied with given choices and may seek additional alternatives.

In contrast, Gratitude broadens life orientation and enables one to notice and appreciate the world's positives (Wood, Froh & Geraghty, 2010). Grateful people are satisfied with what they possess as they count their life's blessings. They are likelier to have better life satisfaction (Emmons, Froh, & Rose, 2019; Alkozei, Smith, & Killgore, 2018). As a result, we posit that people with Gratitude will have a reduced tendency to search for more choices. Grateful people tend to be satisfied with their available choices and are disliked to seek more choices. Thus, they contribute to sustainable living by not maximizing their consumption.

The study intends to find out whether Gratitude influences the maximizing tendency. We conducted a survey and an experiment on a sample of Indian students. Recent research distinguished maximizing as a strategy and goal (Schwartz, 2016). The 'maximizing as a strategy' seeks more and better decisions. The meaning of 'maximizing as a goal' is to set better standards for oneself. Maximizing as a strategy was maladaptive and negatively associated with well-being (Cheek & Schwartz, 2016; Misuraca, Faraci, Gangemi, Carmeci, & Miceli, 2015). People with a high tendency 'to search for alternatives look for the best choice so that they may need more than the available alternatives. They may be tired and frustrated after exhausting all or maximum alternatives. The 'maximizing' construct comprises three subcomponents: high standards, alternative searches, and decision difficulties (Schwartz et al., 2002; Nenkov et al., 2008). Some researchers excluded decision difficulties (Diab et al., 2008; Lai, 2010); others do not consider 'high standards as part of maximizing (Turner et al., 2012; Ďuriník et al., 2018). We have excluded both the 'high standards and 'decision difficulties' parts.

Our study makes the following contributions. By exploring Gratitude's relation with the maximization tendency of budding managers, we have shown that Gratitude can counter the maximization tendency. Drawing from the find, remind & bind Gratitude theory (Algoe, 2008). we contend that Gratitude influences the positive appraisal of the alternatives. It reminds us of life's blessings and promotes contentment. Thus, Gratitude's 'remind' function includes remembering blessed relationships and life's blessings in other aspects.

According to the moral affect theory (McCullough et al. (2001), Gratitude, as a moral emotion, prompts the moral act of helping others without any hidden motive. Gratitude expression by the beneficiary reinforces the benefactor to behave morally in the future. Moreover, Gratitude facilitates the development of adequate inner resources, which broaden the scope of an individual's attention, thinking, and behavior.' (Fredrickson & Branigan, 2005). Therefore, these resources help to regulate the tendency to maximize as the resources enable the grateful person to be reflective and control the maximizing tendencies. The inner resources can be attributed to the inner sense of abundance that a grateful heart foster.

Theory and Hypotheses Development

One of the problems with striving for more is that it can lead to anxiety and insecurity. Grateful people, on the other hand, are contented with life (Cunha, Pellanda, & Reppold, 2019) and are less prone to such strivings because they view their lives as more secure, safe, and ultimately fulfilling (Jiang, Sun, Liu, & Pan, 2016). According to the Moral affect theory of Gratitude, Gratitude is a moral affect (Lu, Huang, & Luo, 2021; McCullough et al.,2001), and grateful people are more likely

to process any decision as a moral decision as opposed to one that maximizes the outcome for the self. Since morality deals with the inherent goodness of decision, grateful people are likely to have higher prosociality and therefore are more likely to consider the implication of their decision on others (Park, VanOyen-Witvliet, Barraza, & Marsh, 2021) as well as the environment (Chen, Liu, Fu, Guo, & Chen, 2022) and beyond. According to moral affect theory, prosocial generosity nature of Gratitude, people with Gratitude tend to invest in social relations, be supportive, have communalistic values (McCullough, Emmons, & Tsang, 2002), tend to be less materialistic (Reyes et al., 2022), and satisfied overall with their life (Jans-Beken et al., 2020). Gratitude will build a sense of satisfaction with life, which will make individuals less inclined to pursue striving for more (Chaplin, John, Rindfleisch, & Froh, 2019; Lambert, Fincham, Stillman, and Dean, 2009).

Extant literature suggests that Gratitude has the potential to reduce excessive economic impatience. In an experimental study, the participants in different emotional inducement conditions (Gratitude, Happy and Neutral) were asked to choose between receiving smaller cash amounts immediately and more significant ones in the future (after a week or months). People with higher Gratitude demonstrated higher patience than participants with lower Gratitude (DeSteno, Dickens, and Lerner, 2014). They could wait longer and postpone their goals. Grateful people may not focus on striving for more, searching for better alternatives or possessions of wealth; Rather, they would be expected to contemplate the positive experiences or outcomes (McCullough, Emmons, and Tsang, 2002). Pleasant events come to mind more easily for grateful individuals than for less grateful ones. Because trait gratitude was positively associated with a positive memory bias (Alkozei, Smith, Waugaman, Kotzin, Bajaj, & Killgore, 2019; Watkins & Bell, 2017). Not only do grateful individuals recall more positive memories when instructed to do so, but they also tend to have more positive memories even when attempting to remember life's adverse events. (Pillay, Park, Kim, & Lee, 2020; Watkins, Grimm, and Kolts,2004). Grateful people demonstrate concern for others in decision-making and are less concerned about their goals.

The most significant difference between the maximizers and satisficers is how they evaluate the choice (Misuraca, Faraci, Gangemi, Carmeci, & Miceli, 2015). Drawing from the find, remind & bind theory of Gratitude (Algoe, Haidt, & Gable, 2008). We contend that Gratitude reminds us of life's blessings and satisfies us, which further influences people not to go beyond the available options. In some experiments, under the grateful condition involving resource sharing, or cooperation vs. non-co-operation, the participants positively appraised the situation and the helpers (Algoe, Haidt, & Gable, 2008). As a result, when confronted with making choices under the influence of Gratitude, people prefer to cooperate with the helpers immediately, sometimes even with strangers (Balconi, Fronda, & Vanutelli, 2019; DeSteno, Bartlett, Baumann, Williams, & Dickens,2010). The positive appraisal of the situation or helpers' act makes them biased toward the helpers and prevents them from looking for more opportunities or searching for alternatives. This enables them to be satisfied with life. The experience of Gratitude may foster eudaimonic well-being, such as autonomy, personal growth, purpose in life, and self-acceptance (Emmons & Crumpler, 2000). Cancer patients ' dispositional Gratitude (high and low Gratitude) reduced distress and increased well-being, mainly referring to hedonic, i.e., relaxation and contentment (Ruini & Vescovelli, 2013). Grateful adolescents were socially integrated and higher in absorption, satisfied with life, and less envious and depressed than their less grateful counterparts (Emmons, Froh, & Rose, 2019). They will save their time going for numerous alternatives in every life decision. To state formally:

The 'tendency to search for more alternatives' maximization component differs significantly between the low and high gratitude group members.

These hypotheses imply that those with high Gratitude will have a lesser tendency to maximize, i.e., search for alternatives.

Methodology

We conducted two studies.

Study 1

We administered the first study's Gratitude and maximization tendency questionnaire to examine the relationship. We contacted 180 students MBA students from universities in the Eastern part of India through online mode and offline modes. We have received 171 responses. After removing for missing variables, we have taken 157 responses for analysis.

Because generalized 'trait' gratitude differs from specific 'state' gratitude, trait gratitude measures the general tendency to feel grateful ("Overall, I feel grateful, or I feel grateful most of the time"). State gratitude is a momentary feeling of grateful emotions linked to immediate happenings and responses to specific situations and activities. It emerges whenever the individual feels grateful for those specific events. For example, studies of sports and organizational literature have used domain-specific ('I feel grateful to my coach,' 'I feel grateful to my organization') Gratitude (Chen & Chang, 2017; Ford, Wang, Jin, & Eisenberger, 2018; Ruser, Yukhymenko-Lescroart, Gilbert, Gilbert, & Moore, 2020; Ward, 2017). Research suggests that when Gratitude is felt for a specific reason, the predictability may be higher than when it is felt for a general reason (Ma, Tunney, & Ferguson, 2017). Some popular gratitude interventions to elicit Gratitude are gratitude journal writing and expression (Cunha, Pellanda, & Reppold, 2019; Jans-Beken et al., 2020; Sztachańska, Krejtz, & Nezlek, 2019).

Measures

All the variables were measured on a scale of 1 (strongly disagree) to 5 (strongly agree) through self-reporting.

Gratitude

The Gratitude was measured using the Gratitude Adjective Checklist (GAC, McCullough, Emmons, & Tsang, 2002). The GAC comprises three affect adjectives (grateful, appreciative, and thankful) and has been used to assess both state and trait gratitude. The scale has three items ("I usually feel grateful"). It was a modified version ("How grateful do you feel toward the other participant?") of Bartlett and DeSteno, (2006)**.** It measures both benefit-triggered and generalized Gratitude (Cronbach's α value 0.84).

Maximizing. Maximizing was measured by the inventory of Schwartz et al. (2002) 10 items scales. It has three sub-components: the tendency to search for alternatives (When I watch T.V., I channel surf, often scanning through the available options even while attempting to watch one program), decision-making difficulties (When shopping, I have a hard time finding clothing that I love) and the high-status regard ("No matter what I do, I have the highest standards for myself"). The scales' Cronbach's α value was 0.87.

Analysis For Study 1

Descriptive statistics (means, standard deviations, and alphas for the different measures) of this study's variables are presented in Table 1.

Table 1
Descriptive statistics (Study1)

Descriptive Statistics and Correlation Table							
Variable Name	Var. No.	N	Mean	S.D.	1	2	3
Maximizing Tendency	1	157	3.77	0.69	1.00		
Gender	2	157	1.47	0.50	-0.04	1.00	
Gratitude	3	157	3.70	0.71	0.28	###	1.00

Since all students were in the age group of 22-25, 95% of them had similar educational backgrounds. We did not include demographic variables except gender, as all participants had similar demographics. Before calculating descriptive statistics, confirmatory factors analysis was done to ensure the items were loading to desired two factors (state gratitude and maximization tendencies). As expected, the two-factor solution was the best fit during the CFA (χ^2=6.63, p=0.085, CFI=.91, TLI=.94, RMSEA=.08). The composite alphas were moderate: 0.45 for MA (3 items) and 0.74 for S.G. There were no cross-loadings. We mean-split sample to compare maximization tendencies between students feeling high and low Gratitude. This allowed us to compare the maximization score of students with high and low Gratitude. We category-coded students with low and high Gratitude and used one-way ANOVA to understand the relationship between gratitude and maximizing tendencies (Mean maximizing tendency (low Gratitude) =3.63, Mean maximizing tendency (low Gratitude) =3.95, and F (6.08. 1, 155). These ANOVA results show significant differences in the maximizing tendencies suggesting that maximizing tendencies were higher for respondents with higher gratitude scores. These results were against the hypothesized relationship between Gratitude and M.A.

We also checked for the relationship between Gratitude and M.A. to investigate further. To do so, we ran three models with hierarchical regression. In the first stage, we entered gender as a control variable, and in the second step, we entered Gratitude as the independent variable ($\beta = 0.28$, $p < 0.001$). In this stage, we added a Gratitude log as an additional variable. After the third step was added, the relationship between the logarithmic value of Gratitude and M.A. changed ($\beta = 0.33$, $p < 0.001$), as Gratitude was the independent variable and M.A. was the dependent variable.

Table 2
Regression Analysis (Study 1)

Dependent Variable: Maximization Tendency									
	Model 1			Model 2			Model 3		
Independent Variable	Std. Beta	Tolerance	VIF	Std. Beta	Tolerance	VIF	Std. Beta	Tolerance	VIF
Gender	-0.044	1	1	-0.04	1	1	-0.05	0.99	1.004
Gratitude	-	-	-	0.28***	1	1	-	-	-
Log of Gratitude	-	-	-	-	-	-	0.33***	1	1
R Sqr		0			0.067			0.099	
Change in R sqr		-			0.067			0.099	
F-Statistics		0.29			6.57**			9.5***	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The hypothesis posited that Gratitude might be negatively related to maximization tendency. We found a logarithmic relationship between these two variables. Regression analysis results are presented in table 2. The strength of the relationship between Gratitude and maximization tendency is significant ($\beta = -0.33$, $p < 0.001$). We followed the process Aiken and West (1991) outlined to plot the main effects for both groups, as shown in Figs—1 and 2, respectively.

Study 2

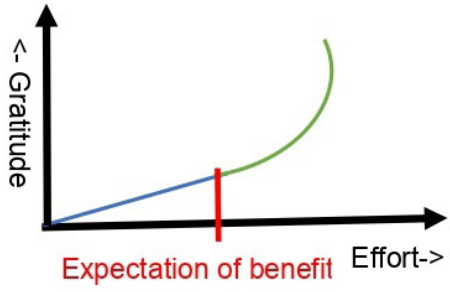
Since the first study found a logarithmic relationship between Gratitude and M.A., we examined the literature to explore the reason for this relationship. The literature presented two

contradictory conclusions regarding Gratitude. The first set of studies alluded that the gratefulness of the recipient should be proportionate to the effort exerted by the benefactor. According to these studies, beneficiaries evaluate the efforts of benefactors and feel grateful for the following efforts. The more incredible the giver's generosity, the greater the receiver's Gratitude. Individuals are typically more appreciative when the benefactor exerts more effort (McCullough, Tsang, 2004).

The second group of studies indicates that the Gratitude felt by the recipient may be considerably more significant than the efforts exerted by the benefactor, significantly when the perceived benefits of the beneficiary exceed the "expected benefit". In other words, in some situations, Gratitude has spillover effects. People are overwhelmed by feelings of Gratitude when they perceive that the benefits they have received exceed their expectations. When individuals feel Gratitude, they are more likely to assist others and develop greater trust in others. Not only do they help benefactors, but such individuals also assist those from whom they have received no benefit (Lee, Bradburn, Johnson, Lin, & Chang, 2019).

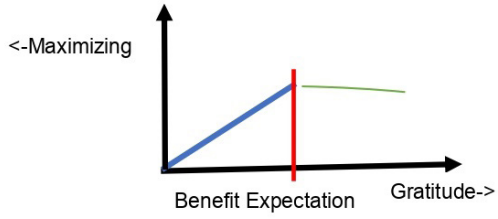
We propose reconciling two seemingly contradictory strands of the literature by dividing Gratitude into two "intensity categories": below-expected help and above-expected help. At the lower intensity level, a beneficiary's Gratitude is proportional to his/her perceived efforts. At these levels, the person can accurately perceive and process information. The efforts and benefits are assessed reasonably accurately. However, when the actual benefits exceed the expected benefits in a given circumstance, the gratefulness demonstrates spillover effects. The feeling of Gratitude becomes intense and overwhelming, causing the recipient to want to help and support others. This may be why grateful individuals reciprocate more than the benefits received even when it costs them (Watkins & Scheibe, 2017) or helps even unknown third parties (Shiraki & Igarashi, 2018). At higher levels of intensity, Gratitude overwhelms the individual's information processing capacity to the extent that the individual's decision may become biased. The person is so overwhelmed to lose assessment of efforts and benefits. The reconciled view is presented in Figure 1 below:

Figure 1
Reconciled Effort (axis x)-Gratitude (axis y) relationship Above and Below Expected Benefits



Consequently, the relationship between effort and Gratitude can also be divided into two stages: 1. benefits below expectations or expected utility and 2. benefits beyond expectations. We hypothesize that below the expectation level, Gratitude is a rational process, but when it exceeds expectations, it results in a spillover of awe and prosociality. According to Broaden and Build theory, Gratitude aids in developing and conserving psychosocial resources. At the same time, according to moral affect theory, Gratitude is a moral affect that increases individuals' prosocial orientation, making them less selfish. In other words, at a higher level of Gratitude, the decision-making process becomes non-rational because the match between resources and goals changes from the level at which Gratitude was low. Hence, it can be expected that Gratitude will have a positive relationship with maximization tendency till the expectation level. However, when Gratitude overwhelms, the individual shifts to a non-rational and satisfactory solution, leading to a lower M.A. (see Figure 2 below).

Figure 2
Relationship between Gratitude (axis x) and maximization (axis y)



About the Study 2. We wanted to validate the first study's results with another study. Hence, we surveyed students in business schools in Eastern India. The same survey was administered to the students, with one difference being that survey was administered after students had finished the gratitude meditation session. Gratitude meditation was one of the reliable interventions to elicit Gratitude (Duthely, Nunn, & Avella, 2017; Rao & Kemper, 2017). Participation in the survey was voluntary. A request to complete the survey was sent to a total of 180 students, out of which 126 responded. Table no 3 captures the descriptive statistics and correlation of study 2.

Analysis for Study 2

Table 3
Descriptive Statistics and Correlation Table (Study2)

Descriptive Statistics and Correlation Table							
Variable Name	**Var No**	**N**	**Mean**	**S.D.**	**1**	**2**	**3**
Maximizing Tendency	1	157	2.90	.85	1.00		
God	2	157	1.28	.45	.21	1.00	
Gratitude	3	157	4.20	.73	.22	.16	1.0

Interestingly, compared to the first study, the mean of Gratitude in 2nd study (4.20) was significantly higher, while M.A. tendencies (2.98) were significantly lower than in the previous study (3.77). This variation could be because of the meditation effect. We can see that both variables (M.A. and Gratitude) were correlated significantly.

Table 4
Regression of S.G. square on M.A. (Study2)

Dependent Variable: Maximizing Tendency									
Variable	**Model 1**			**Model 2**			**Model 3**		
	Std. Beta	Tolerance	VIF	Std. Beta	Tolerance	VIF	Std. Beta	Tolerance	VIF
God	0.2837206	1	1	0.255	0.97	1	.0.25**	0.93	0.88
Gratitude	-	-	-	0.39	0.2	5	0-.46**	0.3	3
Gratitude*God	-	-	-	-0.151	0.2	5	0.11	0.2	5
Square of Gratitude	-	-	-	-	-	-	-0.58***	0.2	5
Square of Gratitude* God	-	-	-	-	-	-	-0.48***	0.2	5
R Sqr	0.073	0.1	0.211						
Change in R sqr		0.027	0.111						
F Statistics	11***	5.6**	7.7***						

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Like the previous study, Gratitude had a logarithmic relationship with maximization tendencies (b=-0.33, p-value<0.005). The logarithmic relationship shows that M.A. also increases to a certain level as Gratitude increases from the lowest levels. However, after Gratitude reaches moderately high levels, the M.A. tendencies tend to stabilize. Figure.2 captures the results of study 2.

The green line indicates the relationship between the high level of Gratitude and maximizing tendency. The blue line indicates the relationship between the average level of Gratitude and maximizing tendency. The red line will indicate the relationship between the average level of Gratitude and maximizing tendency. We also checked for the moderating role of whether the person feels grateful toward God and found the moderating effect to be significant (*b=0.16, p-value<0.05*).

Discussion

This study was intended to explore whether Gratitude influences maximizing tendency among a group of people through the survey method. The survey was conducted among post-graduate students at two higher educational institutes in India. For the samples of 1st study, we directly administered the survey. For the second sample of the student, we have stimulated Gratitude through gratitude meditation. The study's strength lies in its methodology. First, we examined the trait of Gratitude, and later, we examined the state of Gratitude. Another addition we made in the 2nd study was the differentiation towards the target to whom Gratitude was felt: God or a human being? We found similar results across the two different groups of students. This is the first study relating Gratitude and maximization tendency.

The study threw up exciting conclusions. We found that Gratitude had a logarithmic relationship with both groups 'tendency to maximize' (tendency to search for more alternatives). Initially, Gratitude (low level of Gratitude) had positive correlations with the maximization tendency, and later, as the gratitude score increased, there was an insignificant or negative correlation. This was further validated in the second study. The study results are in line with the previous findings. As a moral emotion, Gratitude may be associated with decision-making that involves moral dilemmas (DeSteno et al., 2010). Studies have also found that Gratitude is a biased, partial influence on decision-making (Zhang, Chen, & Ni, 2020). The following may be the reasons for the logarithmic relationship.

The logarithmic relationship between Gratitude and M.A. indicates that maximization tendencies reduce when Gratitude is high. We guess that Gratitude has a more individualistic implication at the lower level. However, when Gratitude increases, the person starts to think about the social consequences of their action and may reduce tendencies to maximize. Gratitude may increase the clarity of decision-making at a lower level, while at a higher level, it may increase prosocial behavior with a reduction in selfish behavior.

First, Gratitude, at a low score, may be too weak to influence the maximization tendency. That is why initially, it had a positive relationship. Second, searching for alternative maximization tendencies beyond a certain level becomes pathological, causing stress and ill-being. So, Gratitude correlates to a certain level. Beyond that level, grateful emotion 'reminds' the participants about the blessing in life, makes them content with what they have, and thus limits the 'alternative searching' tendency. Maximizers are not happy or content with what they have. Making them feel grateful may increase the accessibility and recollection of pleasant memories of life, including their personal and social benefits (Watkins, Emmons, & McCullough). The 'remind' function of Gratitude also enables them to recollect the blessed social relationship they have in life. This may give a feeling of 'secured,' 'content,' and a sense of abundance, discouraging the maximizers from searching for more alternatives. Instead, they invest time and money in communal values instead of materialistic ones.

The findings of the two studies can be restated regarding two crucial decision-making

components: objective function and psychosocial resources. The results indicate that a high level of Gratitude influences objective function. Highly grateful people do not maximize their returns; they also consider others. Secondly, grateful people develop more excellent psychosocial resources. Lower selfish goals and increased resources also result in a greater capacity for conserving psychosocial resources. To summarise, high Gratitude changes objective function and increases the psychosocial resources, hence changing the nature of the decision. From a different lens, individuals high on Gratitude tend to satisfy with building and conservation of resources. This interpretation differs from Herbert Simon's (1987) conception of satisficing, in which limited cognitive capacity is one of the reasons for satisficing behavior. A high level of Gratitude leads to satisfaction and yet abundant socio-emotional-cognitive resources.

The available studies of Gratitude and cognition are related to cooperating or helping aspect of cognition (Balconi, Fronda, & Vanutelli, 2019; Fox, Kaplan, Damasio, & Damasio, 2015; Vayness, Duong, & DeSteno,2020) or the moral aspect (Drążkowski, Kaczmarek, & Kashdan, 2017; Syropoulos, Watkins, Shariff, Hodges, & Markowitz, 2020). Research has shown the consequences of 'counting your blessings' in well-being or social relation (Deng et al., 2019; Jans-Beken et al., 2020). We have contributed to the literature by showing the influence of Gratitude beyond social relations and personal well-being to the alternative searching aspect in decision-making. Moreover, the difference in influence at lower and higher levels differentiates Gratitude's power to influence.

Conclusion

As a positive emotion, whether the emotion of Gratitude will act as an anecdote to the 'maximizing' tendency was the study's objective. The role of emotion in decision-making has been widely studied (Bubić & Erceg, 2018; Lerner, Li, Valdesolo, & Kassam, 2015; George & Dane, 2016). Gratitude's influence on decision-making has been examined in the context of prosocial and risk preference, but its role in maximizing vs. satisficing has not been explored. We found support for our hypothesis. Gratitude does influence the maximizing tendency of the individual. The limitations of the study throw light on the future direction of research.

Limitations and Direction for Future Research

First, the study was self-reported. Hence, correlational, cross-sectional, and associated biases may be there. Second, the need for more activity for measuring maximization tendency was another study limitation instead of the survey. Future studies can design experiments to measure maximization tendency and examine the relationship. Third, the lack of pre-post control and treatment group may be another limitation.

We also outline some directions for future research. First, longitudinal studies can be conceived by introducing gratitude interventions among the participants and examining their 'maximizing tendency' over time. In this study, we can also measure their well-being, in addition to the maximization tendency, i.e., do they have a similar logarithmic relationship or a different relationship as their gratitude increases? Second, in terms of interventions, the future (experimental) studies can adopt the same with a still more specific 'count your blessing's kind of gratitude intervention relating to maximization (by asking the participants to count what material possession they have or feel grateful for their status in society). This will give rise to a grateful feeling related to the 'maximization tendency' only and thus may be more specific. Third, future studies can explore if Gratitude towards God significantly differs from Gratitude felt when we receive individual benefits. Replicating similar studies among western samples may reveal the cultural difference in participants'" Gratitude towards God and human being and their consequences in maximizing tendency.

References

Aiken, L. S., & West, S. G. (1991). Newbury Park. Multiple regression: Testing and interpreting interactions.

Algoe, S. B., Haidt, J., & Gable, S. L. (2008). Beyond reciprocity: Gratitude and relationships in everyday life. *Emotion*, *8*(3), 425. https://doi.org/10.1037/1528-3542.8.3.425

Alkozei, A., Smith, R., & Killgore, W. D. (2018). Gratitude and subjective well-being: A proposal of two causal frameworks. *Journal of Happiness Studies*, *19*(5), 1519-1542. https://doi.org/10.1007/s10902-017-9870-1

Alkozei, A., Smith, R., Waugaman, D. L., Kotzin, M. D., Bajaj, S., & Killgore, W. D. (2019). The mediating role of interpretation bias on the relationship between Trait Gratitude and Depressive Symptoms. *International Journal of Applied Positive Psychology*, *4*(3), 135-147. https://doi.org/10.1007/s41042-019-00022-7

Álvarez, F., Rey, J.-M., & Sanchis, R. G. (2014). Choice Overload, Satisficing Behaviour, and Price Distribution in a Time Allocation Model. *Abstract and Applied Analysis*, 2014, 1–9. https://doi.org/10.1155/2014/569054

Balconi, M., Fronda, G., & Vanutelli, M. E. (2019). A gift for gratitude and cooperative behavior: Brain and cognitive effects. *Social Cognitive and Affective Neuroscience*, *14*(12), 1317-1327. https://doi.org/10.1093/scan/nsaa003

Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and pro-social behaviour: Helping when it costs you. *Psychological Science*, *17*, 319-325. https://doi.org/10.1111/j.1467-9280.2006.01705.x

Bubić, A., & Erceg, N. (2018). The role of decision-making styles in explaining happiness. *Journal of Happiness Studies*, *19*(1), 213–229. https://doi.org/10.1007/s10902-016-9816-z

Chaplin, L. N., John, D. R., Rindfleisch, A., & Froh, J. J. (2019). The impact of gratitude on adolescent materialism and generosity. *The Journal of Positive Psychology*, *14*(4), 502-511. https://doi.org/10.1080/17439760.2018.1497688

Cheek, N. N., & Schwartz, B. (2016). On the meaning and measurement of maximization. *Judgment and Decision Making*, *11*(2), 126–146. https://doi.org/10.1017/S1930297500007257

Chen, L. H., & Chang, Y. P. (2017). Sport-domain gratitude uniquely accounts for athletes' well-being across two cultures: Incremental validity above the general gratitude. *The Journal of Positive Psychology*, *12*(6), 651-659. https://doi.org/10.1080/17439760.2016.1257052

Chen, L., Liu, J., Fu, L., Guo, C., & Chen, Y. (2022). The impact of gratitude on connection with nature: The mediating role of positive emotions of self-transcendence. *Frontiers in Psychology*, *13*, 908138.

Cunha, L. F., Pellanda, L. C., & Reppold, C. T. (2019). Positive psychology and gratitude interventions: A randomized clinical trial. *Frontiers in psychology*, *10*, 584. https://doi.org/10.3389/fpsyg.2019.00584

Dar-Nimrod, I., Rawn, C. D., Lehman, D. R., & Schwartz, B. (2009). The maximization paradox: The costs of seeking alternatives. *Personality and Individual Differences*, *46*(5-6), 631-635.

Deng, Y., Xiang, R., Zhu, Y., Li, Y., Yu, S., & Liu, X. (2019). Counting blessings and sharing gratitude in a Chinese prisoner sample: Effects of gratitude-based interventions on subjective well-being and aggression. *The Journal of Positive Psychology*, *14*(3), 303-311. https://doi.org/10.1080/17439760.2018.1460687

DeSteno, D., Bartlett, M. Y., Baumann, J., Williams, L. A., & Dickens, L. (2010). Gratitude as moral sentiment: Emotion-guided cooperation in economic exchange. *Emotion*, *10*(2), 289. https://doi.org/10.1037/a0017883

Diab, D. L., Gillespie, M. A., & Highhouse, S. (2008). Are maximizers really unhappy? The measurement of maximizing tendency. *Judgment and Decision Making*, *3*(5), 364–370. https://doi.org/10.1017/S1930297500000383

Drążkowski, D., Kaczmarek, L. D., & Kashdan, T. B. (2017). Gratitude pays: A weekly gratitude intervention influences monetary decisions, physiological responses, and emotional experiences during a trust-related social interaction. *Personality and Individual Differences*, *110*, 148-153. https://doi.org/10.1016/j.paid.2017.01.043

Ďuriník, M., Procházka, J., & Cígler, H. (2018). The short maximization inventory. *Judgment and Decision Making*, *13*(1), 123-136.

Duthely, L. M., Nunn, S. G., & Avella, J. T. (2017). A novel heart-centered, gratitude-meditation intervention to increase well-being among adolescents. *Education research international*, *2017*. https://doi.org/10.1155/2017/4891892

Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology*, *19*(1), 56-69. https://doi.org/10.1521/jscp.2000.19.1.56

Emmons, R. A., Froh, J., & Rose, R. (2019). *Gratitude.* In M. W. Gallagher & S. J. Lopez (Eds.), *Positive psychological assessment: A handbook of models and measures* (p. 317–332). American Psychological Association. https://doi.org/10.1037/0000138-020

Ford, M. T., Wang, Y., Jin, J., & Eisenberger, R. (2018). Chronic and episodic anger and gratitude toward the organization: Relationships with organizational and supervisor supportiveness and extra-role behaviour. *Journal of occupational health psychology*, *23*(2), 175. https://doi.org/10.1037/ocp0000075

Fox, G. R., Kaplan, J., Damasio, H., & Damasio, A. (2015). Neural correlates of gratitude. *Frontiers in Psychology*, *6*, 1491. https://doi.org/10.3389/fpsyg.2015.01491

George, J. M., & Dane, E. (2016). Affect, emotion, and decision making. *Organizational Behaviour and Human Decision Processes*, *136*, 47-55. https://doi.org/10.1016/j.obhdp.2016.06.004

Greifeneder, R., Scheibehenne, B., & Kleber, N. (2010). Less may be more when choosing is difficult: Choice complexity and too much choice. *Acta Psychologica*, *133*(1), 45-50. https://doi.org/10.1016/j.actpsy.2009.08.005

Iyengar, S. S., Wells, R. E., & Schwartz, B. (2006). Doing better but feeling worse: Looking for the "best" job undermines satisfaction. *Psychological Science*, *17*(2), 143-150. https://doi.org/10.1111/j.1467-9280.2006.01677.x

Jans-Beken, L., Jacobs, N., Janssens, M., Peeters, S., Reijnders, J., Lechner, L., & Lataster, J. (2020). Gratitude and health: An updated review. *The Journal of Positive Psychology*, *15*(6), 743-782. https://doi.org/10.1080/17439760.2019.1651888

Jiang, H., Sun, P., Liu, Y., & Pan, M. (2016). Gratitude and late adolescents' school well-being: The mediating role of materialism. *Social Indicators Research*, *127*(3), 1363-1376. https://doi.org/10.1007/s11205-015-1007-5

Kates, S., & DeSteno, D. (2020). Gratitude reduces consumption of depleting resources. *Emotion*. Advance online publication. https://doi.org/10.1037/em0000936

Lai, L. (2010). Maximizing without difficulty: A modified maximizing scale and its correlates. *Judgment and Decision Making*, *5*(3), 164–175. https://doi.org/10.1017/S1930297500001042

Lambert, N. M., Fincham, F. D., Stillman, T. F., & Dean, L. R. (2009). More gratitude, less materialism: The mediating role of life satisfaction. *The Journal of Positive Psychology*, *4*(1), 32-42. https://doi.org/10.1080/17439760802216311

Lee, H. W., Bradburn, J., Johnson, R. E., Lin, S. H. J., & Chang, C. H. D. (2019). The benefits of receiving gratitude for helpers: A daily investigation of proactive and reactive helping at work. *Journal of Applied Psychology*, *104*(2), 197.

Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and decision making. *Annual Review of Psychology*, *66*. https://doi.org/10.1037/a0021557

Lu, L., Huang, Y., & Luo, J. (2021). Leader forgiveness and employee's unethical pro-organizational behavior: The roles of gratitude and moral identity. *Frontiers in Psychology*, *12*, 698802.

Ma, L. K., Tunney, R. J., & Ferguson, E. (2017). Does gratitude enhance prosociality?: A meta-analytic review. *Psychological Bulletin*, *143*(6), 601. https://doi.org/10.1037/bul0000103

McCullough, M. E., Emmons, R. A., & Tsang, J. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology*, *82*, 112–127. https://doi.org/10.1037/0022-3514.82.1.112

McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., & Larson, D. B. (2001). Is gratitude a moral affect? *Psychological Bulletin*, *127*(2), 249. https://doi.org/10.1037/0033-2909.127.2.249

McCullough, M. E., & Tsang, J. (2004). Parent of the virtues? The prosocial contours of gratitude. *The psychology of gratitude*, 123-141.

Misuraca, R., Faraci, P., Gangemi, A., Carmeci, F. A., & Miceli, S. (2015). The decision making tendency

inventory: A new measure to assess maximizing, satisficing, and minimizing. *Personality and Individual Differences*, *85*, 111-116. https://doi.org/10.1016/j.paid.2015.04.043

Moyano-Díaz, E., & Mendoza-Llanos, R. (2021). Yes! Maximizers maximize almost everything: The decision-making style is consistent in different decision domains. *Frontiers in Psychology*, *12*, 663064.

Nenkov, G. Y., Morrin, M., Ward, A., Schwartz, B., & Hulland, J. (2008). A short form of the Maximization Scale: Factor structure, reliability and validity studies. *Judgment and Decision Making*, *3*(5), 371–388. https://doi.org/10.1017/S1930297500000395

Newman, D. B., Schug, J., Yuki, M., Yamada, J., & Nezlek, J. B. (2018). The negative consequences of maximizing in friendship selection. *Journal of Personality and Social Psychology*, *114*(5), 804. https://doi.org/10.1037/pspp0000141

Park, G., vanOyen-Witvliet, C., Barraza, J. A., & Marsh, B. U. (2021). The benefit of gratitude: Trait gratitude is associated with effective economic decision-making in the ultimatum game. *Frontiers in Psychology*, *12*, 590132.

Pillay, N., Park, G., Kim, Y. K., & Lee, S. (2020). Thanks for your ideas: Gratitude and team creativity. *Organizational Behaviour and Human Decision Processes*, *156*, 69-81. https://doi.org/10.1016/j.obhdp.2019.11.005

Pohling, R., Diessner, R., & Strobel, A. (2018). The role of gratitude and moral elevation in moral identity development. *International Journal of Behavioural Development*, *42*(4), 405-415. https://doi.org/10.1177/0165025417727874

Rachlin, H., Battalio, R., Kagel, J., & Green, L. (1981). Maximization theory in behavioural psychology. *Behavioural and Brain Sciences*, *4*(3), 371-388. https://doi.org/10.1017/s0140525x00009407

Rao, N., & Kemper, K. J. (2017). Online training in specific meditation practices improves gratitude, well-being, self-compassion, and confidence in providing compassionate care among health professionals. *Journal of Evidence-Based Complementary & Alternative Medicine*, *22*(2), 237-241. https://doi.org/10.1177/2156587216642102

Ruini, C., & Vescovelli, F. (2013). The role of gratitude in breast cancer: Its relationships with post-traumatic growth, psychological well-being and distress. *Journal of Happiness Studies*, *14*(1), 263-274. https://doi.org/10.1007/s10902-012-9330-x

Ruser, J. B., Yukhymenko-Lescroart, M. A., Gilbert, J. N., Gilbert, W., & Moore, S. D. (2020). Gratitude, coach-athlete relationships, and burnout in collegiate student-athletes. *Journal of Clinical Sport Psychology*, *1*(aop), 1-17. https://doi.org/10.1123/jcsp.2019-0021

Schwartz, B. (2016). On the meaning and measurement of maximization. *Judgment and Decision Making*, *11*(2), 126. https://doi.org/10.1017/s1930297500007257

Schwartz, B., Ward, A., Monterosso, J., Lyubomirsky, S., White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology*, *83*(5), 1178. https://doi.org/10.1037/0022-3514.83.5.1178

Shiraki, Y., & Igarashi, T. (2018). "Paying it forward" via satisfying a basic human need: The need for relatedness satisfaction mediates gratitude and prosocial behavior. *Asian Journal of Social Psychology*, *21*(1-2), 107-113.

Syropoulos, S., Watkins, H. M., Shariff, A. F., Hodges, S. D., & Markowitz, E. M. (2020). The role of gratitude in motivating intergenerational environmental stewardship. *Journal of Environmental Psychology*, *72*, 101517. https://doi.org/10.1016/j.jenvp.2020.101517

Sztachańska, J., Krejtz, I., & Nezlek, J. B. (2019). Using a gratitude intervention to improve the lives of women with breast cancer: A daily diary study. *Frontiers in Psychology*, *10*, 1365. https://doi.org/10.3389/fpsyg.2019.01365

Turner, B. M., Rim, H. B., Betz, N. E., & Nygren, T. E. (2012). The Maximization Inventory. *Judgment and Decision Making*, *7*(1), 48–60. https://doi.org/10.1017/S1930297500001820

Vargová, L., Zibrínová, Ľ., & Baník, G. (2020). The way of making choices: Maximizing and satisficing and its relationship to well-being, personality, and self-rumination. *Judgment and Decision Making*, *15*(5), 798. https://doi.org/10.1017/s1930297500007932

Vayness, J., Duong, F., & DeSteno, D. (2020). Gratitude increases third-party punishment. *Cognition and*

Emotion, *34*(5), 1020-1027. https://doi.org/10.1080/02699931.2019.1700100

Ward, R. G. (2017). Thanks to whom? The virtuous cycle of targeted gratitude in organizations. In *Academy of Management Proceedings* (Vol. 2017, No. 1, p. 12264). Briarcliff Manor, NY 10510: Academy of Management. https://doi.org/10.5465/ambpp.2017.12264abstract

Watkins, P. C., & Bell, J. (2017). Current theories and research in the psychology of gratitude. *Scientific Advances in Positive Psychology*, 103-129.

Watkins, P. C., Emmons, R. A., & McCullough, M. E. (2004). Gratitude and subjective well-being. *Scientific concepts behind happiness, kindness, and empathy in contemporary society*, 167-192. https://doi.org/10.1037/e514732007-001

Watkins, P. C., Grimm, D. L., & Kolts, R. (2004). Counting your blessings: Positive memories among grateful persons. *Current Psychology*, *23*(1), 52-67. https://doi.org/10.1007/s12144-004-1008-z

Watkins, P. C., & Scheibe, D. (2017). Gratitude. In Subjective well-being and life satisfaction (pp. 210-229). Routledge.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviours to be more sustainable: A literature review and guiding framework. *Journal of Marketing*, *83*(3), 22-49. https://doi.org/10.1007/s12144-004-1008-z

Wood, A. M., Froh, J. J., & Geraghty, A. W. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review*, *30*(7), 890-905. https://doi.org/10.1016/j.cpr.2010.03.005

Zhang, Y., Chen, Z. J., & Ni, S. (2020). The security of being grateful: Gratitude promotes risk aversion in decision-making. *The Journal of Positive Psychology*, *15*(3), 285-291. https://doi.org/10.1080/17439760.2019.1610483

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.111691

Emotional intelligence and profiles of participation in bullying: A systematic review

The role of emotional intelligence and participation profiles in bullying: A systematic review

SILVIA FERNÁNDEZ GEA
Departamento de Psicología, Universidad de Almería, Almería, España

MARÍA DEL MAR MOLERO JURADO
Departamento de Psicología, Universidad de Almería, Almería, España

How to cite this article: Fernández Gea, S. and Molero Jurado, M. del M. (2025). Emotional intelligence and profiles of participation in bullying: A systematic review. *Revista Colombiana de Psicología*, *34*(1), pp 65-77. https://revistas.unal.edu.co/index.php/psicologia/article/view/111691

Correspondence: Silvia Fernández Gea (https://orcid.org/0009-0004-2819-6532); Departamento de Psicología, Universidad de Almería, España. E-mail: sfg023@ual.es

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: OCTOBER 19TH, 2023–ACCEPTED: AUGUST 16TH, 2024

Emotional Intelligence and Profiles of Participation in Bullying: A Systematic Review

Abstract

Bullying has generated a social alarm in recent years. For this reason, the present systematic review has as its main objective to carry out an analysis of updated information that allows describing those areas belonging to emotional intelligence that are less developed in the profile of the aggressor and in that of the victim, and that have a negative effect on the person and is the cause of bullying. The search was conducted in the ERIC, Psicodoc, PsycINFO, and Scopus databases, finally obtaining a total of 17 quantitative investigations. The results show that a good development of emotional intelligence provides students with a series of tools in terms of conflict resolution, emotional regulation and social skills, which reduces the possibility of being a victim or aggressor of bullying.

Keywords: adolescence; bullyingv emotional development, violence.

Inteligencia emocional y perfiles de participación en acoso escolar: Una revisión sistemática

Resumen

El acoso escolar ha generado una alarma social en los últimos años. Por ello, la presente revisión sistemática tiene como objetivo principal realizar un análisis de información actualizada que permita describir aquellos ámbitos pertenecientes a la inteligencia emocional que están menos desarrollados en el perfil del agresor y en el de la víctima, y que tienen un efecto negativo en la persona y sea causante del acoso escolar La búsqueda se llevó a cabo en las bases de datos de ERIC, Psicodoc, PsycINFO y Scopus, obteniendo finalmente un total de 17 investigaciones de carácter cuantitativo, Los resultados muestran que un buen desarrollo de la inteligencia emocional dota a los estudiantes de una serie de herramientas en cuanto a la resolución de conflictos, regulación emocional y habilidades sociales, lo cual reduce la posibilidad de ser víctima o agresor de acoso escolar.

Palabras clave: acoso escolar, adolescencia, desarrollo afectivo, violencia.

Introduction

Bullying is a relatively recent term, as defined by Ruiz Utrilla et al. (2018), it refers to the actions carried out by one or more students that discriminate, intimidate, or systematically mistreat another student. The term "bullying" is commonly known as such when it occurs face-to-face. However, if student harassment takes place through information and communication technologies, it is referred to as "cyberbullying" (Gómez Tagle López, 2016). Some studies provide an annex about this terminology, as the one by González & Molero (2022), as they analyze the impact of the term "bullying" within certain social networks, where cyberbullying often occurs. This is one of the social problems that is of most concern in different educational spaces, especially in adolescents, where cyberbullying experiences have been associated with episodes of anxiety and depression (Molero et al., 2022; Molero et al., 2023).

This student harassment takes place during school hours and typically occurs in areas like the playground or restrooms, where teachers are less present, as opposed to the 20% that occurs within classrooms. The most common types of aggression are verbal, physical, and social (Arciniega-Carrión & Veja-Ojeda, 2019).

According to the World Health Organization (WHO, 2021), among the various factors affecting the mental health of adolescents, school bullying plays a significant role. It leads to emotional management problems, resulting in anxiety, depression, social anxiety, loneliness, and, in some cases, suicidal behavior. School bullying is one of the most common peer relational problems experienced by children and adolescents worldwide (Inmuta et al., 2022). Therefore, as seen in the study by González-Moreno & Molero-Jurado (2023), it is crucial to prioritize the personal well-being of minors, especially during adolescence.

There is growing societal concern over cases of school bullying and the consequences these actions have on minors (Dragone, et al., 2022; Pérez-Virtus & Larrondo-Ureta, 2018). To prevent bullying in adolescents, early detection of aggressive behaviors is crucial (Varela Torres et al., 2023). The study conducted by Calmaestra (2016) found that over 9% of students had experienced bullying, and nearly 7% had been victims of cyberbullying. Another study by Attawell (2021) asserts that more than a third of the sample studied had experienced school bullying, with 10% facing cyberbullying and 32.4% participating in peer fights.

The results of these studies show that a significant portion of adolescents are involved in school bullying situations, either as victims or aggressors. Furthermore, many students engage in fights among peers at specific moments, indicating that minors lack conflict resolution skills, leading to different forms of aggression. Studies like the one by Martín Rodríguez & Luján Henríquez (2021) directly relate the lack of conflict resolution skills to emotional intelligence, through emotional understanding and regulation (Chaux et al., 2012). Studies as that of Fernández-Alfaraz et al. (2023) state that the origin of peer bullying may be in the use of digital technologies or due to the social and family environment. Adolescence is a period of change in which relationships between peers are very important, and stressors of anxiety and depression can lead to dropping out of school (La Greca & Burdette, 2022).

Emotional intelligence (EI) is a concept that has evolved over time, with some authors directly linking it to social intelligence, as Salovey & Mayer (1990), who define EI as the ability to identify one's own and others' feelings, understand these emotions, and know how to manage them. Educating minors to develop their EI from an early age is crucial (Fernández-Martínez & Montero-García, 2016).

Students with low EI display fewer social behaviors, more negative behaviors, and are more associated with cases of school bullying. Studies like Sporzon & López López (2021) link EI development to prosocial behaviors among students. An increasing number of studies delve into the involvement of EI in bullying profiles, whether as

aggressors or victims, demonstrating that both profiles exhibit low EI (Masabanda Pazmiño & Gaibor Gonzalez, 2022).

In general, the profile of the aggressor seeks to establish leadership among peer groups, displaying intimidating behavior (Arciniega-Carrión & Veja-Ojeda, 2019; Clareth et al., 2015), aggressiveness, impulsivity (Peña et al., 2013), low perception of others' emotions (Polo et al., 2015), low self-esteem, low empathy (Martínez-Sitjes et al., 2023), and a high level of frustration.

The victim experiences fear due to the recurrent aggressions (León-Moreno et al., 2019), low emotional clarity, poor social adaptation (Ortega Ruiz et al., 2012), resulting in feelings of loneliness and social isolation (Polo del Río et al., 2015), low self-esteem, and increased frustration.

This literature review aims to identify current research on the role of emotional intelligence and describe the profiles of both aggressors and victims of bullying. The main objective of this study is to conduct an analysis of updated information that identifies areas of emotional intelligence that are less developed in both aggressor and victim profiles and have a negative impact on individuals, leading to school bullying. This, in turn, will serve as a basis for prevention and intervention projects aimed at nurturing emotional education in students (Bisquerra-Alzina, 2006), with the ultimate goal of reducing or eliminating the prevalence of school bullying.

Methodology

Search Process

The search was conducted in the ERIC, Psicodoc, PsycINFO, and Scopus databases, and to ensure scientific rigor, it was based on the 'PRYSMA' method (Page et al., 2021). This search was conducted in both Spanish and English during the month of February 2023, using Boolean operators that referred to emotional intelligence, bullying, and cyberbullying. The initial results were filtered by peer-reviewed journal articles and publication dates, spanning from 2018 to 2023, encompassing the most recent complete five-year period and the month of February 2023 (Table 1).

Table 1
Search results in the different databases and the filters used

Base of data	Search language	First result	Article Scientific	Date (2018/ 2023)
ERIC	spanish	0	0	0
ERIC	english	37	28	11
Psicodoc	spanish	9	7	4
Psicodoc	english	22	22	15
PsycINFO	spanish	8	8	6
PsycINFO	english	173	103	47
Scopus	spanish	4	3	2
Scopus	english	184	138	87
Search results in the different databases: 172				

Inclusion and Exclusion Criteria

The results underwent manual filtering based on a set of inclusion and exclusion criteria after reviewing the title and abstract. Notable inclusion criteria were as follows: a) the sample age range should be between 11 and 18 years, b) the study must describe the role of emotional intelligence in bullying, cyberbullying, or both, as well as the description of the aggressors, victims, or both profiles, and c) the sample should be enrolled in an educational institution.

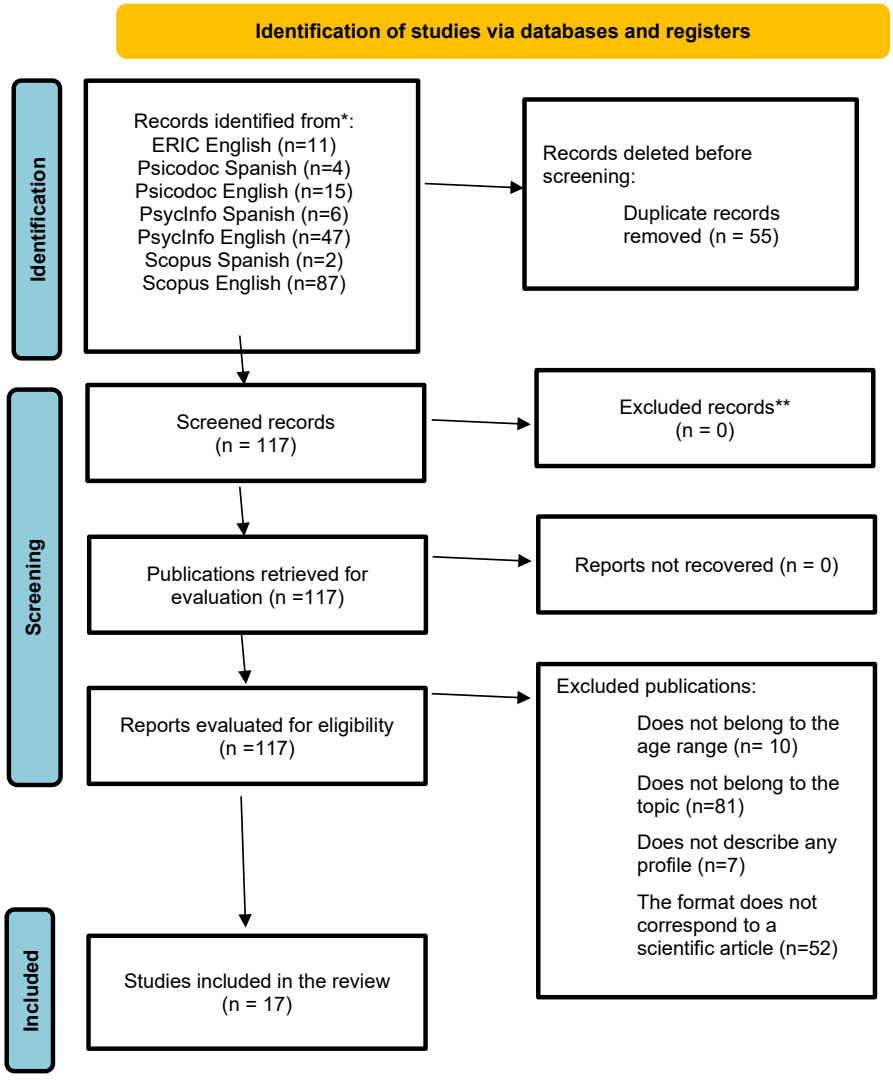
The established exclusion criteria were: a) articles that analyze violence outside the school environment without reference to bullying or cyberbullying, b) studies that do not describe the role of emotional intelligence in school bullying, c) articles that do not provide a description of the different roles involved in school bullying, as the aggressor and the victim, d) documents where the selected sample falls below eleven years of age or exceeds eighteen years, and e) articles where the sample is not enrolled in an institutional educational center at any educational stage.

Information Analysis Procedure

Following the search process in the mentioned databases and the implementation of inclusion and exclusion criteria, a total of 17 selected documents were obtain

SEARCH EQUATION BY LANGUAGE
Spanish: ("inteligencia emocional") AND ("acoso escolar" OR "ciberacoso escolar")
English: (''emotional intelligence") AND (bullying OR cyberbullying)

Figure 1. *Search Equation and Flowchart of the Document Selection Process.*



Coding Data

We obtained 172 documents, originated from the following sources: ERIC with a Spanish search (0), ERIC with an English search (11), Psicodoc with a Spanish search (4), Psicodoc with an English search (15), PsycInfo with a Spanish search (6), PsycInfo with an English search (47), Scopus with a Spanish search (2), and Scopus with an English search (87).

Duplicate articles were subtracted, amounting to a total of 55, which were distributed as follows: Psicodoc with an English search (6), PsycInfo with a Spanish search (5), PsycInfo with an English search (12), and Scopus with an English search (32).

After eliminating duplicate articles, a total of 117 documents were obtained. Following the review of titles and abstracts, exclusion criteria was applied, and articles were removed if they met the following conditions: a) the age was outside the specified range for the systematic review, b) the subject matter did not correspond to the research topic, c) it did not describe the victim's or aggressor's profile. This led to the removal of the following articles: ERIC with an English search (a=1 and b=5), Psicodoc with a Spanish search (a=1 and b=1), Psicodoc with an English search (a=2 and b=4), PsycInfo with an English search (a=1 and b=31), Scopus with a Spanish search (a=1 and b=0), and Scopus with an English search (a=4 and b=40). Two articles were also removed as they did not conform to the scientific format, one from Psicodoc with a Spanish search and one from PsycInfo with an English search.

As a result, a total of 24 documents were obtained, that underwent manual filtering to eliminate those that did not describe the victim's or aggressor's profile or both. This led to the removal of the following articles: ERIC with an English search (3), PsycInfo with a Spanish search (1), PsycInfo with an English search (1), and Scopus with an English search (2).

This process resulted in a total of 17 documents from the following databases: ERIC with an English search (2), Psicodoc with a Spanish search (1), Psicodoc with an English search (3), PsycInfo with an English search (1), Scopus with a Spanish search (1), and Scopus with an English search (9). Among these 17 documents, 5 describe the aggressor's profile, 3 describe the victim's profile, and 9 describe both profiles.

Results

After the systematic and manual document selection process, a total of 17 quantitative research studies were obtained. These studies describe the role of emotional intelligence in bullying or cyberbullying, as well as the profiles of victims or aggressors (Table 2).

Table 2
Scientific articles on the role of emotional intelligence, and the profiles of the aggressor and victim

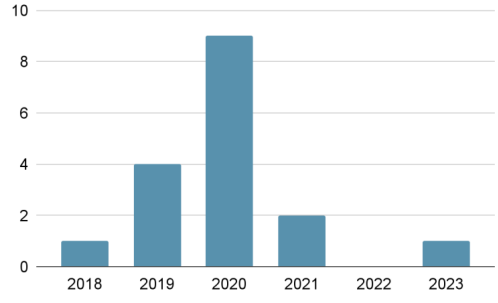
N°	Year	Author/s	Country	Size of the sample and age	Profile that describes
1	2018	Razjouyan K. et al.	Iran	N=360 16–18 years	Aggressor and Victim.
2	2019	Quintana-Orts C. et al.	Spain	N=456 12–18 years	Victim.
3	2019	Méndez, I. et al.	Spain	N=309 12–18 years	Aggressor.
4	2019	Estévez, E. et al.	Spain	N=1.318 11–18 years	Aggressor and Victim.
5	2019	Cañas, E. et al.	Spain	N=1.318 11–18 years	Aggressor and Victim.
6	2020	Romano, I. et al.	Canada	N=6585 14–18 years	Aggressor and Victim.

7	2020	Méndez, I. et al.	Spain	N=810 12–16 years	Aggressor.
8	2020	García, L. et al.	Spain	N=731 14,76 years	Victim.
9	2020	Segura, L. et al.	Spain	N=1.318 11–17 years	Aggressor and Victim.
10	2020	Chamizo-Nieto et al.	Spain	N=1.157 12–18 years	Aggressor.
11	2020	Garaigordobil	Spain	N=2.283 12–17 years	Aggressor.
12	2020	Yudes et al.	Spain	N=2.039 12–18 years	Aggressor.
13	2020	Cañas et al.	Spain	N=1.318 11–17 years	Aggressor and Victim.
14	2020	Estévez et al.	Spain	N=1.318 11–18 years	Victim.
15	2021	Agus et al.	Italy	N=650 12–16 years	Aggressor and Victim.
16	2021	Quintana-Orts et al.	Spain	N=3.520 12–18 years	Aggressor and Victim.
17	2023	Valenzuela-Aparicio et al.	Colombia	N=141 12–18 years	Aggressor and Victim.

Year of Publication

The systematic review filtered its results annually, from 2018 to February 2023, thus conducting an up-to-date search based on the last 5 years and two months. The year with the highest number of publications was 2020, accounting for nearly 53% of the total publications. In contrast, no publications were obtained for 2022 (Figure 2).

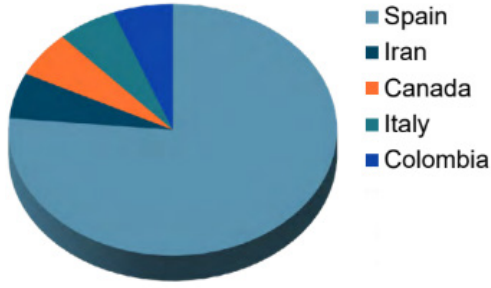
Figure 2. *Selected publications, according to year of publication.*



Country of Publication

Among the selected research for this systematic review, it's worth noting the countries of origin. The vast majority of the research is conducted in Spain, with the remaining studies coming from Iran, Canada, Italy, and Colombia (Figure 3).

Figure 3. *Selected articles, according to country of publication.*

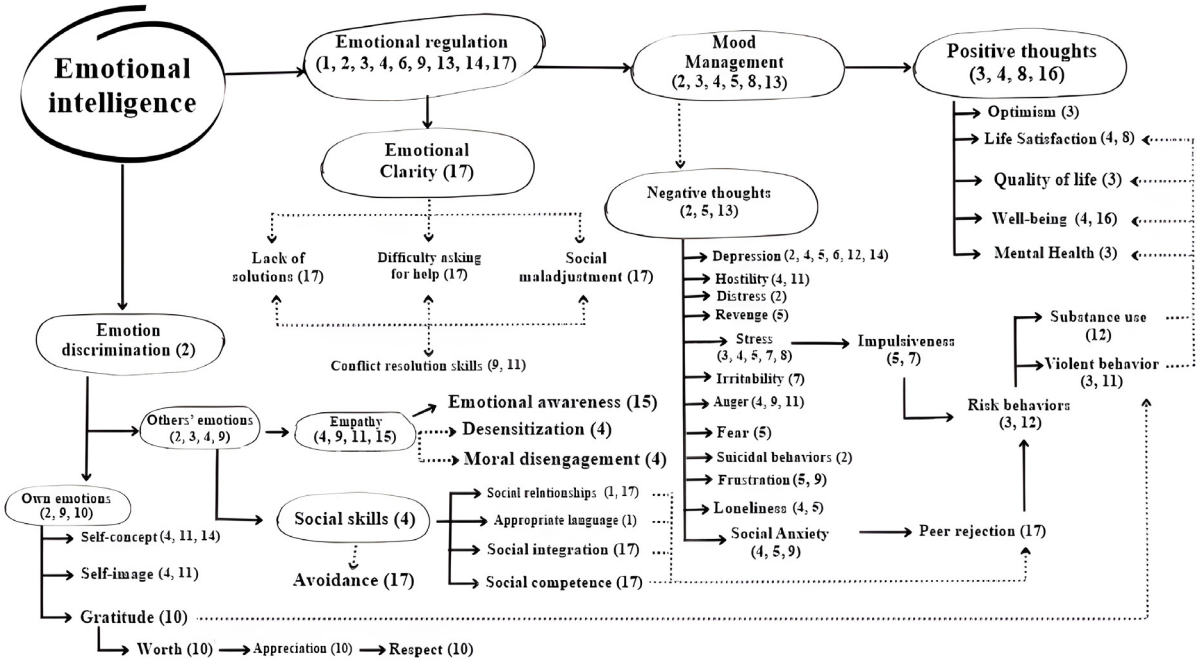


The Role of Emotional Intelligence in School Bullying: Relationship with Other Implicated Variables and Participation Profiles

Emotional intelligence is a resource that everyone possesses, but not everyone develops it effectively and in all its aspects. As shown in Figure 2, emotional intelligence directly influences the assessment of one's own and others' emotions, emotional regulation, emotional clarity, mood management, as well as our thoughts and feelings. This influence has an indirect impact on the quality of life, well-being, mental health, life

satisfaction, and various risk behaviors. Therefore, ineffective or negative development of emotional intelligence can lead to adopting a role or profile in school bullying, whether as a bully or a victim.

Figure 4. *The Role of Emotional Intelligence in School Bullying*



Positive correlation.
Negative correlation.

(X) = Document number from the first column of Table 2.

Individuals with higher emotional intelligence have more resources for conflict resolution, social relationships, and experience fewer psychological consequences when facing a bullying situation. Those who take on a role in school bullying have low emotional intelligence, and depending on the qualities they have more or less developed, they adopt the profile of a victim or aggressor.

Aggressor: They exhibited poor emotional regulation, leading to a series of negative thoughts and feelings, stress, impulsivity, engagement in risky behaviors, and involvement in both face-to-face and cyberbullying. The latter provides anonymity and is often driven by a desire for revenge. They also had difficulty assessing others' feelings and low empathy, hindering their understanding of others and developing moral disengagement. Lack of social skills and social anxiety led to peer rejection, which, in turn, led to bullying. Emotional confusion eventually led to social maladjustment and fewer conflict resolution skills.

Victim: This profile, experiencing different bullying situations and having low emotional intelligence, had a negative impact on the assessment of their emotions, diminishing their self-concept and self-image. They felt emotional confusion, a sense of guilt, believing that they deserved what they were going through, lacked resources to seek help, and find solutions. Their social skills were affected, avoiding social interaction, which resulted in

poor emotional regulation and a series of negative thoughts, including stress, loneliness, depression, and suicidal behaviors, negatively affecting their mental health, life satisfaction, and quality of life.

Discussion

The results of the current systematic review establish that, although there is research addressing emotional intelligence and describing both profiles, these studies are scarce in both the number of investigations and the number of authors, making it challenging to formulate a comprehensive paradigm of the reality that students face. Among the selected documents, it is worth noting that 76.5% are from Spain, with the remainder originating from Iran, Canada, Italy, and Colombia, providing a broader cultural perspective.

Bullying affects a large number of students (Attawell, 2021; Calmaestra, 2016), which is directly related to the scarcity of social and emotional skills and conflict resolution abilities (Martín Rodríguez & Luján Henríquez, 2021). This demonstrates a low EI on the part of the students, leading to a higher likelihood of perpetrating or experiencing bullying.

Emotional intelligence aids in the capacity to identify one's own and others' feelings, comprehend these emotions, and manage them (Salovey & Mayer, 1990). This affects emotional regulation (Estévez et al., 2020; Razjouyan K. et al., 2018; Valenzuela-Aparicio et al., 2023), mood management (Cañas et al., 2019; Cañas et al., 2020; Estévez et al., 2019; García et al., 2020; Méndez et al., 2019; Quintana-Orts et al., 2019), as well as the generation of positive or negative thoughts and emotional clarity (Martín Rodríguez & Luján Henríquez, 2021; Valenzuela-Aparicio et al., 2023). Although both profiles exhibit low development in all these mentioned EI qualities, they do not share the same profile as they develop different behaviors, skills, and thoughts.

The aggressor's profile is characterized by poor emotional regulation (Cañas et al., 2019; Cañas et al., 2020; Segura et al., 2020; Yudes et al., 2020), leading to both a lack of mental clarity, resulting in a deficiency in conflict resolution skills, and negative thoughts as hostility, anger (Segura et al., 2020), a sense of revenge (Cañas et al., 2020; Razjouyan et al., 2018; Yudes et al., 2020), intimidating behaviors (Arciniega-Carrión & Veja-Ojeda, 2019), frustration (Cañas et al., 2019), loneliness (Cañas et al., 2019; Cañas et al., 2020; Estévez et al., 2019), social anxiety (Cañas et al., 2020; Chamizo-Nieto et al., 2020), and stress (Chamizo-Nieto et al., 2020; Estévez et al., 2019; Méndez et al., 2020). Poor management leads to impulsivity and engaging in risky behaviors, both aggressive and substance use (Peña et al., 2013). Additionally, they have difficulty in assessing others' emotions (Méndez et al., 2020), resulting in a lack of social skills and peer rejection (Arciniega-Carrión & Veja-Ojeda, 2019; Masabanda Pazmiño and Gaibor Gonzalez, 2022; Valenzuela-Aparicio et al., 2023), as well as low empathy (Martínez-Sitjes et al., 2023; Segura et al., 2020; Yudes et al., 2020), ultimately leading to emotional unawareness (Méndez et al., 2019) and desensitization (Segura et al., 2020; Yudes et al., 2020), rejecting peer groups and engaging in violent behaviors (Cañas et al., 2019). Furthermore, self-evaluation of feelings is negatively impacted, affecting gratitude, devaluing the world, appreciating things less, and losing respect (Chamizo-Nieto et al., 2020). Lastly, this profile seeks leadership through bullying (Arciniega-Carrión & Veja-Ojeda, 2019), as they experience loneliness and depression (Estévez et al., 2019).

The victim's profile is also characterized by poor emotional regulation and low self-esteem, leading to a lack of positive thoughts such as optimism, life satisfaction, a sense of diminished quality of life, or even negative effects on mental health (García et al., 2020; Quintana-Orts et al., 2021). Low self-esteem results in negative thoughts like depression, anxiety, fear, frustration, loneliness, social anxiety, and stress (Cañas et al., 2019; Cañas et al., 2020; García et al., 2020; Razjouyan et al., 2018; Romano et al., 2020), and in some cases, even suicidal behaviors (Quintana-Orts et al., 2019). This situation leads to emotional

confusion (Estévez et al., 2019), where the victim cannot seek help, lacks solutions, and ends up in a state of social maladjustment (Estévez et al., 2019), resulting in a deficiency in conflict resolution skills to escape this situation. Lastly, they cannot assess their own feelings, affecting their self-image and self-concept (Cañas et al., 2019; Estévez et al., 2019). This leads the victim to feel rejected by their peer group (Estévez et al., 2019).

Conclusions

In this systematic review, research has been found that addresses school violence, both face-to-face and cyberbullying. The level of emotional intelligence development of the participating profiles, aggressors and victims, has been analyzed, highlighting the deficiencies in emotional intelligence in each profile, as well as their positive and negative correlations. This has allowed us to achieve the main objective of this review: to analyze up-to-date information that describes the emotional intelligence aspects that are less developed in the aggressor's and victim's profiles, which have a negative effect on individuals and lead to school bullying. This analysis can serve as a precursor to prevention and intervention projects that aim to provide students with emotional education to reduce or eliminate the prevalence of school bullying.

This study has presented certain limitations, as the number of documents found was not extensive, and the number of authors analyzing similar studies was limited. Additionally, most studies were conducted in Spain, with some from Iran, Canada, Italy, and Colombia. The methodology of the research was qualitative, which limits a more descriptive approach to addressing individual cases but has allowed representation of the results from a larger sample of students.

Despite these limitations, the main objective of this systematic review has been achieved. The review aimed to analyze up-to-date information that describes the emotional intelligence aspects that are less developed in the aggressor's and victim's profiles, which have a negative effect on individuals and lead to school bullying. This information can help develop various educational projects, both preventive and intervention-based, to provide students with greater emotional intelligence. This not only helps reduce the number of students who experience or engage in school bullying but also equips them with lifelong social, emotional, and conflict resolution tools to reduce or eliminate potential future issues, as partner violence or workplace bullying.

This is why psychoeducational involvement is crucial to address the problem of bullying and emotional intelligence. It is essential to promote a healthy, safe and enriching school environment, where all students have the opportunity to achieve effective personal and academic development.

Support/Funding

This article is a review that began on February 22, 2023 and ended on March 26, 2023. This work has been developed thanks to the IE-MOTION Project: A digital resource for teachers in designing personalized interventions aimed at preventing violence and promoting the well-being of secondary school students (Reference: PROYEXCEL_00607), funded by Grants for Excellence Projects through a competitive process, intended for entities entities recognized as agents of the Andalusian Knowledge System, within the framework of the Andalusian Plan for Research, Development, and Innovation (PAIDI 2020). This research has the approval and financing of the Ministry of Education and Vocational Training through the aid program for the Training of University Teachers granted to Silvia Fernández Gea with reference FPU21/03514.

References

Agus, M., Mascia, M., Zanetti, A., Perrone, S., Rollo, D., & Penna. (2021). Who are the victims of Cyberbullying? Preliminary data towards validation of "Cyberbullying Victim Questionnaire". *Contemporary Educational Technology, 13*(3), 1-12. https://doi.org/10.30935/cedtech/10888

Arciniega-Carrión, A. C., & Veja-Ojeda, M. F. (2019). Incidencia del Bullying o acoso escolar en la inteligencia emocional en los Estudiantes de la Escuela Fiscal Nº2 Ciudad de Loja. *Dominio de las Ciencias*, *5*(1), 536-561. Recuperado de https://dialnet.unirioja.es/servlet/articulo?codigo=7152628

Attawell, K. (2021). *Más allá de los números: Poner fin a la violencia y el acoso en el ámbito escolar*. UNESCO Publishing. Recuperado de https://unesdoc.unesco.org/ark:/48223/pf0000378398/PDF/378398spa.pdf.multi

Bisquerra-Alzina, R. (2006). Orientación psicopedagógica y educación emocional. *Estudios sobre Educación. 11*(1), 9-25. http://dx.doi.org/10.15581/004.11.24332

Calmaestra, J., Escorial, A., García, P., Del Moral, C., Perazzo, C., & Ubrich, T. (2016). *Yo a eso no juego. Bullying y Ciberbullying en la infancia.* Recuperado de https://www.savetheChildren.es/publicaciones/yo-eso-no-juego-bullying-y-ciberbullying-en-lainfancia

Cañas, E., Estévez, E., Martínez-Monteagudo, M. C., & Delgado, B. (2020). Emotional adjustment in victims and perpetrators of cyberbullying and traditional bullying. *Social Psychology of Education: An International Journal, 23*(4), 917-942. https://doi.org/10.1007/s11218-020-09565-z

Cañas, E., Estévez, E., Marzo, J. C., & Piqueras, J. A. (2019). Ajuste psicológico en cibervíctimas y ciberagresores en educación secundaria. *Anales de Psicología*, *35*(3), 434-443. http://dx.doi.org/10.6018/analesps.35.3.323151

Chamizo-Nieto, M. T., Rey, L., & Pellitteri, J. (2020). Gratitud e inteligencia emocional como factores protectores frente a la ciberagresión: Análisis de un modelo de mediación. *Revista Internacional de Investigación Ambiental y Salud P*ública, *17*(12), 1-10. https://doi.org/10.3390/ijerph17124475

Chaux, E., Arboleda, J., & Rincón, C. (2012). Violencia comunitaria y agresión reactiva y proactiva: el papel mediacional de las variables cognitivas y emocionales. *Revista Colombiana de Psicología, 21*(2), 233–251. https://revistas.unal.edu.co/index.php/psicologia/article/view/28511

Clareth, A., Mendoza, L., Cano, C. A. G., Urzola, H., & Córdoba, P. (2015). Caracterización del fenómeno del Bullying desde la perspectiva de la víctima, victimario y testigo. *Cultura, Educación y Sociedad*, *6*(2), 91-106. Recuperado de https://dialnet.unirioja.es/descarga/articulo/7823289.pdf

Dragone, M., Esposito, C., De Angelis, G., & Bacchini, D. (2022). Equipping youth to think and act responsibly: The effectiveness of the "EQUIP for educators" program on youths' self-serving cognitive distortions and school bullying perpetration. *European Journal of Investigation in Health, Psychology and Education*, *12*(7), 814-834. https://doi.org/10.3390/ejihpe12070060

Estévez, E., Estévez-García, F., Segura, L., & Suárez, C. (2019). The influence of Bullying and Cyberbullying in the psychological adjustment of victims and aggressors in adolescence. *International Journal of Environmental Research and Public Health, 16*(1), 1-16. https://doi.org/10.3390/ijerph16122080

Estévez, J. F., Cañas, E., & Estévez, E. (2020). The impact of cybervictimization on psychological adjustment in adolescence: Analyzing the role of emotional intelligence. *International Journal of Environmental Research and Public Health*, *17*(10), 1-12. https://doi.org/10.3390/ijerph17103693

Fernández-Alfaraz, M. L., Nieto-Sobrino, M., Antón-Sancho, Á., & Vergara, D. (2023). Perception of bullying in early childhood education in Spain: Pre-school teachers vs. psychologists. *European Journal of Investigation in Health, Psychology and Education*, *13*(3), 655-670. https://doi.org/10.3390/ejihpe13030050

Fernández-Martínez, A. M., & Montero-García, I. (2016). Aportes para la educación de la Inteligencia Emocional desde la Educación Infantil. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud, 14*(1), pp. 53-66. https://doi.org/10.11600/1692715x.1412120415

Garaigordobil, M. (2020). Inteligencia emocional intrapersonal en la adolescencia: Diferencias de sexo, conexión con otras variables y predictores. *Revista Europea de Investigación en Salud, Psicología y Educación*, *10*(3), 899-914. https://doi.org/10.3390/ejihpe10030064

García, L., Orts, C. Q., & Peña, L. R. (2020). Cibervictimización y satisfacción vital en adolescentes: la inteligencia emocional como variable mediadora.

Revista de Psicología Clínica con Niños y Adolescentes, *7*(1), 38-45. https://doi.org/10.21134/rpcna.2020.07.1.5

Gómez Tagle López, E. (2016). Bullying: acoso escolar en la niñez. *Trabajo Social UNAM*, (11, 12, 13), 49-66. Recuperado a partir de https://revistas.unam.mx/index.php/ents/article/view/64168

González Moreno, A., & Molero Jurado, M. del M. (2022). Uso del término Bullying en Twitter: un estudio cualitativo. *Virtualidad, Educación y Ciencia, 13*(25), 68–77. Recuperado a partir de https://revistas.unc.edu.ar/index.php/vesc/article/view/37697

González-Moreno, A., & Molero-Jurado, M. (2023). Bienestar personal durante la adolescencia según el modelo Perma: una revisión sistemática. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud, 21*(1), 1-27. https://dx.doi.org/10.11600/rlcsnj.21.1.5130

Imuta, K., Song, S., Henry, J. D., Ruffman, T., Peterson, C., & Slaughter, V. (2022). A meta-analytic review on the social–emotional intelligence correlates of the six bullying roles: Bullies, followers, victims, bully-victims, defenders, and outsiders. *Psychological Bulletin*, *148*(3-4), 199-226. https://doi.org/10.1037/bul0000364

La Greca, A. M., & Burdette, E. T. (2022). Impacto de los factores estresantes de la transición escolar en los síntomas de ansiedad social y depresión de los adolescentes hispanos: el pensamiento negativo repetitivo como mediador potencial. *Revista Europea de Educación y Psicología*, *15* (2), 23-41. https://doi.org/10.32457/ejep.v15i2.1968

León-Moreno, C., Martínez-Ferrer, B., Ochoa, G. M., & Ruiz, D. M. (2019). Victimización y violencia escolar: el rol de la motivación de venganza, evitación y benevolencia en adolescentes. *Revista de Psicodidáctica*, *24*(2), 88-94. https://doi.org/10.1016/j.psicoe.2019.01.001

Martín Rodríguez, R. D., & Luján Henríquez, I. (2021). Mindfulness e inteligencia emocional en el afrontamiento de conflictos intrapersonales e interpersonales. *International Journal of Developmental and Educational Psychology.*, *1*(1), 17–26. https://doi.org/10.17060/ijodaep.2021.n1.v1.2039

Martínez-Sitjes, S., Casellas, C. E., & García, A. C. (2023). Papel de la empatía en los agresores y las víctimas del acoso escolar: un estudio transversal. Recuperado de https://www.revistapcna.com/sites/default/files/2215.1.pdf

Masabanda Pazmiño, M. J., & Gaibor Gonzalez, I. A. (2022). Acoso escolar y su relación con las habilidades sociales en adolescentes. *Ciencia Latina Revista Científica Multidisciplinar*, *6*(6), 10775-10792. https://doi.org/10.37811/cl_rcm.v6i6.4164

Méndez, I., Jorquera, A. B., Esteban, C. R., & García-Fernández, J. M. (2020). Profiles of mobile phone use, cyberbullying, and emotional intelligence in adolescents. *Sustainability*, *12*(22), 2-10. https://doi.org/10.3390/su12229404

Méndez, I., Jorquera, A. B., Ruiz-Esteban, C., Martínez-Ramón, J. P., & Fernández-Sogorb, A. (2019). Inteligencia emocional, bullying y ciberbullying en adolescentes. *Revista Internacional de Investigación Ambiental y Salud P*ública, *16*(23), 1-9. https://doi.org/10.3390/ijerph16234837

Molero, M. M., Martos, Á., Barragán, A. B., Pérez-Fuentes, M. C., & Gazquez, J. J. (2022). Anxiety and depression from cybervictimization in adolescents: A metaanalysis and meta-regression study. *European Journal of Psychology Applied to Legal Context*, *14*(1), 42-50. https://doi.org/10.5093/ejpalc2022a5

Molero, M. M., Pérez-Fuentes, M. C., Martos, Á., Pino, R. M., & Gázquez, J. J. (2023). Network analysis of emotional symptoms and their relationship with different types of Cybervictimization. *European Journal of Psychology Applied to Legal Context*, *15*(1), 23-32. https://doi.org/10.5093/ejpalc2023a3

Organización Mundial de la Salud. (2021). Salud mental de los adolescentes. Recuperado de https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

Ortega Ruiz, R., Elipe Muñoz, P., Hunter, S. C., & Rey Alamillo, R. (2012). Inteligencia emocional percibida e implicación en diversos tipos de acoso escolar. *Psicología Conductual, 20*(1), 1-8. https://strathprints.strath.ac.uk/36435/1/Elipe_et_al_pre_print.pdf

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Alonso-Fernández, S. (2021). Declaración PRISMA 2020: una guía actualizada para la publicación de revisiones

sistemáticas. *Revista Española de Cardiología*, *74*(9), 790-799. https://doi.org/10.1016/j.recesp.2021.06.016

Peña, J. J. G., Ortiz, R. M. M., & Gil, J. Q. (2013). El bullying y el suicidio en el escenario universitario. *Revista Colombiana de Ciencias Sociales*, *4*(2), 298-310. Recuperado de https://www.redalyc.org/articulo.oa?id=497856283009

Pérez-Virtus, A., & Larrondo-Ureta, A. (2018). Menores, bullying y suicidio. Un análisis de caso a través de los medios digitales de referencia en España. *Correspondencias & Análisis*, (8), 55-74. https://doi.org/10.24265/cian.2018.n8.03

Polo del Río, M. I., León del Barco, B., Felipe Castaño, E., Fajardo Bullón, F., Gómez Carroza, T., & Mendo Lázaro, S. (2015). Análisis de la Socialización sobre Perfiles de la dinámica bullying. *Universitas Psychologica*, *14*(3), 1117-1128. http://dx.doi.org/10.11144/Javeriana.upsy14-3.aspd

Quintana-Orts, C., Mérida-López, S., Rey, L., & Extremera, N. (2021). A closer look at the emotional intelligence construct: How do emotional intelligence facets relate to life satisfaction in students involved in Bullying and Cyberbullying? *European Journal of Investigation in Health, Psychology and Education*, *11*(3), 711–725. https://doi.org/10.3390/ejihpe11030051

Quintana-Orts, C., Rey, L., Mérida-López, S., & Extremera, N. (2019). What bridges the gap between emotional intelligence and suicide risk in victims of bullying? A moderated mediation study. *Journal of Affective Disorders*, *245*(1), 798–805. https://doi.org/10.1016/j.jad.2018.11.030

Razjouyan K., Hirbod A., Said S., Mehdi S., & Yaseri M. (2018). The relationship between emotional intelligence and the different roles in cyberbullying among high school students in Tehran. *Revista Iraní de Psiquiatría y Ciencias del Comportamiento, 12*(3), 1-6. https://doi.org/10.5812/ijpbs.11560

Romano, I., Butler, A., Patte, K. A., Ferro, M. A., & Leatherdale, S. T. (2020). Bullying en la escuela secundaria y trastorno mental: un examen de la asociación con el florecimiento y la regulación emocional. *Revista Internacional de Prevención del Acoso Escolar*, *2*(4), 241-252. https://doi.org/10.1007/s42380-019-00035-5

Ruiz Utrilla, A. G., Evangelista García, A. A., & Xolocotzi Yáñez, Á. (2018). ¿Cómo llamarle a lo que tiene muchos nombres? ¿Bullying, violencia de género, homofobia o discriminación contra personas LGBTI? *Revista Interdisciplinaria de Estudios de* Género de El Colegio de México, *4*, 2395-9185. http://dx.doi.org/10.24201/eg.v4i0.210

Salovey, P., & Mayer, J. D. (1990). Emotional Intelligence. *Imagination, Cognition and Personality, 9*(3), 185–211. https://doi.org/10.2190/DUGG-P24E-52WK-6CDG

Segura, L., Estévez, J. F., & Estévez, E. (2020). Empathy and Emotional Intelligence in adolescent Cyberaggressors and Cybervictims. *International Journal of Environmental Research and Public Health, 17(13),* 1-14. https://doi.org/10.3390/ijerph17134681

Sporzon, G., & López López, M. C. (2021). Evaluación de la inteligencia emocional y la conducta prosocial y su correlación en alumnado de Educación Primaria. *Estudios Sobre Educación, 40*(1), 51-73. https://doi.org/10.15581/004.40.51-73

Valenzuela-Aparicio, Y. P., Olivares-Sandoval, S. K., Figueroa-Ferrer, E. M., Carrillo-Sierra, S. M. & Hernández-Lalinde, J. (2023). Relación de la inteligencia emocional y acoso escolar en adolescentes. *Revista Electrónica Educare*, *27*(1), 1-15. https://doi.org/10.15359/ree.27-1.15859

Varela Torres, J., Mujica, P., Melipillán, R., Benavente, M. & Villacura, P. (2023). Preschool and school aggression: Adaptation and validation of the preschool social behavior scale in Chile. *Revista Colombiana de Psicología, 32*(2), 85–94. https://doi.org/10.15446/rcp.v32n2.92600

Yudes, C., Rey, L., & Extremera, N. (2020). Factores predictivos de la perpetración del ciberacoso entre adolescentes españoles. *Revista Internacional de Investigación Ambiental y Salud Pública*, *17*(11), 1-14. https://doi.org/10.3390/ijerph17113967

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.108751

Teaching Career in Brazilian Higher Education and Work Engagement

HELLEN CRISTINE GEREMIA
Universidade Federal de Santa Catarina

NARBAL SILVA
Universidade Federal de Santa Catarina

IÚRI NOVAES LUNA
Universidade Federal de Santa Catarina

How to cite this article: Geremia, H. C., Silva, N. and Luna, I. N. (2025). Teaching Career In Brazilian Higher Education And Work Engagement. *Revista Colombiana de Psicología*, 34*(1)*, pp 79-92. https://revistas.unal.edu.co/index.php/psicologia/article/view/108751

Correspondence: Hellen Cristine Geremia (https://orcid.org/0000-0003-1558-4048); Universidade Federal de Santa Catarina; Brazil; e-mail: hellen.geremia@gmail.com

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: MAY 4TH, 2023–ACCEPTED: SEPTEMBER 14TH, 2023

Teaching Career in Brazilian Higher Education and Work Engagement

Abstract

This study examined the relationship between work engagement and teaching career among 220 Brazilian federal public university professors. A sociodemographic questionnaire and the Brazilian version of the Utrecht Work Engagement Scale were used as instruments. The collected data was analyzed using descriptive and inferential statistics. The results indicate that professors in more advanced stages of their careers have higher levels of work engagement, and consequently, feel happier and more fulfilled at work. It is important to consider resources that could contribute to raising levels of work engagement through interventions aimed at people management practices in Higher Education, while also taking into account the health and well-being of professors.

Keywords: work engagement, teaching, higher education, career, positive psychology.

Carrera docente en la enseñanza superior brasileña y compromiso laboral

Resumen

Este estudio investigó la relación entre el *work engagement* y la carrera docente entre 220 profesores de una universidad federal pública brasileña. Los instrumentos utilizados fueron un cuestionario sociodemográfico y la versión brasileña de la *Utrecht Work Engagement Scale*. Los datos recolectados fueron analizados utilizando estadísticas descriptivas e inferenciales. Los resultados indican que los profesores en etapas más avanzadas de sus carreras tienen mayores niveles de compromiso laboral y tienden a sentirse más felices y realizados en el trabajo. Es importante considerar los recursos que contribuyen a elevar los niveles de *work engagement* en intervenciones dirigidas a las prácticas de gestión de personas en la educación superior, que tengan en cuenta la salud y el bienestar de los profesores.

Palabras clave: work engagement, docentes, educación superior, carrera profesional, psicología positiva.

Introduction

Higher Education professors undertake activities that are geared towards transforming students into future professionals. These activities are not limited to the technical dimension, i.e., they go beyond knowledge, know-how, and skills. They include relationships and experiences of an affective, evaluative, and ethical nature (Isaia, 2006). Institutionally, the activities are developed based on the pillars of teaching, research, and extension, in addition to administrative duties. However, in practice, teaching in Higher Education is configured as a complex process that is built along a trajectory involving not only the institutional dimension but also, intrinsically, the personal and professional dimensions (Isaia, 2006).

As a fundamental part of the teaching-learning process, professors have a strategic role in the educational context, since they connect students and society (Silva-Júnior, Ferreira & Valentini, 2020). Under this aegis, university teaching has, over time, become an important area of research. The so-called "teaching malaise", which includes studies on the suffering, Burnout Syndrome, and dissatisfaction that professors experience in the profession, is of great interest to the scientific community. However, the focus on aspects related to health, well-being and happiness, which are considered necessary conditions for good educational practice, has increased in recent years. (Araújo & Esteves, 2016; Geremia & Silva, 2019; Marchesi, 2008; Mesurado & Laudadío, 2019; Rebolo & Oliveira-Bueno, 2014; Ribeiro & Silva, 2020). Work engagement is one of the topics of study that addresses the positive aspects of professors' occupational activities. This phenomenon, which has been developed in the field of positive psychology, is the main subject of the current investigation.

Work engagement is defined as a positive work-related motivational construct that implies well-being and a sense of job accomplishment. It is also characterized by vigor, dedication, and absorption (Schaufeli, Salanova, González-Romá & Bakker, 2002; Lorente & Vera, 2010; Salanova & Schaufeli, 2009; Vasquez, Magnan, Pacico, Hutz & Schaufeli, 2015). Vigor is marked by high levels of energy and resilience, the willingness to make an effort at work, and persevere in the face of difficulties. Dedication entails being strongly involved in one's own work, experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Finally, absorption is characterized by high concentration levels and deep involvement in work, whereby time passes quickly and it is difficult to disconnect from what one is doing (Bakker & Bal, 2010; Salanova & Schaufeli, 2009; Schaufeli et al., 2002). As such, engaged people are more dedicated to their work activities, show greater enthusiasm while performing them, and can stay more focused on their tasks (Bakker, Schaufeli, Leiter & Taris, 2008). These workers not only have a strong sense of belonging to the organization, but also feel inspired and affectively connected to their work. Consequently, engaged people experience well-being and meaningful purposes while performing their work activities.

Similarly, engaged workers tend to be proactive, more productive, and willing to contribute to achieving organizational goals (Bakker, 2011; Lorente & Vera, 2010; Magnan, Vazquez, Pacico & Hutz, 2016; Salanova & Schaufeli, 2009). Generally speaking, it can be said that there are four reasons why engaged workers outperform those who are not engaged. Firstly, they experience positive thoughts, emotions, and feelings, including the psychological states of happiness, joy, and enthusiasm. Secondly, they have higher levels of health. Thirdly, they develop personal and technical resources to achieve better work results. Finally, they transmit their engagement to others (Bakker et al., 2008).

Different theories have guided studies on work engagement since Kahn published his seminal article on the subject, in the 1990s. Work engagement has evolved into one of the most significant concepts in the field, and a primary research model aimed at explaining work engagement is the job demands-resources theory (JD-R) (Bailey, Madden,

Alfes & Fletcher, 2017). This model seeks to capture the fundamental causes and consequences of work engagement. At the same time, JD-R aims to clarify how the demands and resources (both personal and organizational) present in jobs can influence energy depletion and work motivation. Resources generate energy and foster engagement, whereas job demands, when excessive, can require individuals to exert themselves further, leading to illness and subsequent chronic work-related stress, as observed in burnout syndrome (Bakker & Demerouti, 2017).

Currently, work engagement has been the subject of debate among academics and professionals from different areas of knowledge. It also has been gaining momentum in global scientific production since the 2010s (Camões & Oliveira-Gomes, 2021; Fletcher, Bailey, Alfes & Madden, 2020). In part, the recent increase in studies is due to evidence on the construct and its positive relationship with job performance, customer satisfaction, and productivity. Moreover, there is the fact that high levels of engagement are strongly associated with positive behaviors, as organizational citizenship and social support, worker health, and well-being. (Camões & Oliveira-Gomes, 2021; Field & Buitendach, 2011; Schaufeli, 2014). The survey conducted by Camões and Oliveira-Gomes (2021) showed an increase from 210 publications on work engagement, between 2001 and 2010, to 3,117 publications, between 2011 and 2019. However, the literature related to professors' work engagement in any teaching modality is more restricted (Geremia & Silva, 2019), making it a vast field to be explored.

The rise of positive psychology has stimulated the development of research into teachers' positive emotions related to aspects as engagement and well-being at work. These studies have produced evidence that contributes, among other aspects, to understanding the relationships between professors' perceptions of job characteristics and psychological well-being (Han, Yin, Wang & Zhang, 2019).

Investigating work engagement in the context of teaching involves examining the positive experiences of professors, the characteristics of their work (job demands and resources) and the favorable conditions for their well-being and happiness (Guglielmi, Bruni, Simbula, Fraccaroli & Depolo, 2016).

With regard to job characteristics, the literature indicates that the increasing stress among higher education teachers is associated with escalating teaching, research, and administrative demands (Vardi, 2009). Work demands, in turn, are linked to pressure to adopt new teaching practices and technologies, an increase in student numbers, and shifts in teaching and learning approaches (Coaldrake, 1999). In a study of Chinese university professors, results suggested that work demands consisted of the need to balance teaching and research as well as new challenges that reduced job satisfaction. Work resources, encompassing pedagogical resources, social support, and administrative support, increased job satisfaction and work engagement (Han et al., 2019). Findings from another study involving Dutch professors demonstrated that work resources were crucial, particularly when dealing with difficult students in the classroom (Bakker & Schaufeli, 2000). In this study, professors faced with high work demands, i.e., difficult students, maintained motivation, engagement, and emotional attachment to their activities when they received psychosocial support from their supervisors, felt appreciated for their work, and experienced a positive work climate. In Brazil, qualitative demands and work resources (task execution) are most significant in the working lives of higher education teachers. Furthermore, teachers in private institutions perceive work demands and resources more favorably than those in public institutions (Mercali & Costa, 2019).

It should also be noted that work engagement is a construct that has an interface with happiness at work (Field & Buitendach, 2011). Linked to this happiness, as a broader psychosocial phenomenon, stability and permanence are features (Silva, Tolfo,

López & Cedenõ, 2015) involving positive emotions and experiences of pleasure and purpose (Budde & Silva, 2020). Following this idea, happiness at work is also a construct investigated in Higher Education (Ribeiro & Silva, 2020).

Furthermore, while researching university teaching, we must not lose sight of the importance of also studying the changes that occur throughout a teacher's career. Professors have different needs and experiences at different points of their careers. In other words, they go through different stages, each with its own characteristics, which link their professional trajectory to their educational experiences over the years (Huberman, 2013; Guglielmi et al., 2016). Based on this premise and research into teacher development, Huberman (2013) proposed the Professional Life Cycle of Teachers model, highlighting the critical moments that guide them to different decisions and which entails five phases: Entry into the career (1 to 3 years in the profession), related to the time of survival and discoveries in teaching; Stabilization (4 to 6 years), the phase of professional identification; Diversification (from 7 to 25 years), which refers to the phase of experimentation and questioning; Serenity or Conservatism (25 to 35 years), understood as a place of serenity and regret; and finally, Disengagement (35 to 40 years of work) that marks the end of the professional career. It is important to consider that the stages set out in Huberman's model (2013) are not universal and can be experienced by people in different ways (Marchesi, 2008). This is provided for in the theoretical models formulated by other important authors in the field which aim to cover the changes that occur over the course of a professional career by means of periods or phases.

In turn, work engagement is characterized as a complex process that is relatively stable over time. It is also dynamic and may undergo variations due to labor conditions that permeate the workers' careers (Magnan et al., 2016; Vazquez et al., 2015).

In this way, understanding the relationships between work engagement and other variables that affect it is fundamental to better understanding the results found in its evaluation (Magnan et al., 2016; Vasquez et al., 2015). Therefore, the main focus of this research is to analyze the work engagement of faculty members in a Brazilian federal public university and its relationship with their teaching careers. In addition, we analyzed the relationship between work engagement and its dimensions as well as sociodemographic variables.

Method

Participants

To achieve the proposed objective, the study was carried out through a cross-sectional survey. Two hundred and twenty male and female professors from a Brazilian federal public university took part. In the group, 50.9% were male, with an average age of 48.5 years (SD=10.8).

The criterion for inclusion in the sample was professors working in the regime of exclusive dedication to higher education. The sample was predominantly comprised of married people (81.6%), with children (67.5%), and a close relative who also worked as a professor at different levels of education (67.9%). Regarding the level of education, 57.1% had a post-doctorate degree, and 40.6% had a doctorate. Moreover, 90.1% worked in graduate programs. Regarding the phases of the Professional Teaching Career Cycle, which indicate the teaching time in the educational institution where the research participants worked, the results were diverse. Among the participants, 16% were in the Entry phase, 16.5% in the Stabilization phase, 42.9% in the Diversification phase, 13.7% in the Serenity or Conservatism phase, and 10.8% in the Disengagement phase. To calculate the sample size, it was determined that the ratio between the number of cases and the number of variables should be equal to or greater than five. This is to ensure more robust results (Hair, Tatham, Anderson & Black, 2005).

The professors from the chosen sample work in a public federal university located in the south of Brazil. Founded about 61 years ago, this university has 120 undergraduate courses distributed among

different areas of knowledge. The institution offers *stricto sensu* graduate courses in addition to other educational modalities. As the university is a public and free education institution, it is governed by a set of laws. Among other aspects, these laws define the admission of faculty members exclusively through public examinations and titles.

Instruments

This research used a sociodemographic questionnaire and the Brazilian version of the Utrecht Work Engagement Scale (UWES), validated by Vazquez et al. (2015). Through the sociodemographic questionnaire, information on the personal and professional characteristics of the participants was collected. The Brazilian version of UWES, originally developed by Schaufeli and Bakker (2004), has 17 items that allow us to assess the dimensions of vigor, dedication, and absorption. Due to the psychometric quality of the instrument, many international studies have used adapted and validated versions of the UWES for several countries. The validation of UWES, the version used in Brazil, showed good evidence of content and construct validity for employment in the country. This evidence included the internal consistency of 0.95 for the general work engagement factor; 0.86 for vigor; 0.87 for dedication, and 0.85 for concentration (Magnan et al., 2016).

All items are positive and measured using the seven-point importance scale, ranging from "0–Never" to "6–Always", according to how the respondents feel at work. The overall raw score is obtained from the sum of the answers given, divided by the total number of items. The presence of work engagement implies high scores in all three dimensions.

To obtain the raw score for each dimension alone, one must add up the answers for each item relating to the dimension and divide them by the total number of items. Six items measure vigor (1, 4, 8, 12, 15, and 17), five measure dedication (2, 5, 7, 10, 13), and another six items measure absorption (3, 6, 9, 11, 14, and 16).

Data collection

For data collection, carried out between March and July 2021, emails were sent to professors briefly presenting the research and inviting them to access the online questionnaire on the SurveyMonkey platform. When participants first accessed the platform, they were asked to read the free and informed consent form. After agreeing to participate in the research on their own free will, they gained access to the research instrument. The average answer time was 10 minutes.

Data analysis

The first data analysis undertaken referred to a descriptive statistical analysis. This analysis was carried out to measure the general level of work engagement of the participants and the score per dimension: vigor, dedication, and absorption. The Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-K) tests were used to treat the data. The purpose was to verify the normality of the distribution of each variable analyzed, determining the types of statistical tests to be used.

To verify the existing correlations between the three dimensions of work engagement (vigor, dedication, and absorption) and age, Spearman's correlation was applied. In addition, Fischer's r-to-z transformation was used to search for significant differences in the correlations between the variables. The choice of using non-parametric correlation was determined considering that the variables of age and the three dimensions of work engagement did not show normal data distribution. These dimensions include vigor, dedication, and absorption ($p>0.05$). Student's t-tests were also conducted to compare the UWES scores, according to gender. The comparison was performed regardless of whether they had children or not, level of education, and whether someone else in the family was teaching.

In the validity study of the Brazilian version of UWES, significant correlations were found between work engagement and the working age group. Therefore, the interpretation norms were drawn up according to age groups and career

stage. These groups and stage encompass the beginning of working life (18 to 28 years); professional development/training (29 to 39 years) and career consolidation (above 40 years) (Vazquez et al., 2015).

Student t-tests were also conducted to compare the scores of the three dimensions of work engagement, according to two work age groups (29 to 39 years, which corresponded to 30% of the sample, and 40 years and older, which corresponded to 69.5% of the survey sample). The number of respondents in the first age group (18 to 28 years) accounted for only 0.5% of the study sample and, as such, made it impossible to apply the test. Finally, a Multivariate Analysis of Variance (MANOVA) was used to investigate to what extent levels of work engagement varied for people who were at different stages of the professional life cycle of teachers (Huberman, 2013).

For all group comparison analyses, resampling procedures were implemented (bootstrapping; 1,000 resamples, 99% confidence interval) (Haukoos & Lewis, 2005). Cohen's d (Cohen, 1988) was used for pairwise comparisons using the following interpretative norms: no effect (between 0.00 and 0.10); weak effect (between 0.11 and 0.29); moderate effect (between 0.30 and 0.49), and strong effect (> 0.50). Data were analyzed using the statistical package SPSS (Statistical Package for the Social Sciences) version 23.

Ethical considerations

The research protocol was approved by the Brazilian National Commission in Research Ethics (CONEP). The authors are assured that the instruments used do not pose psychological or moral risks to the respondents. Prior to their actual collaboration, and in accordance with the ethical standards of research involving human subjects, the authors informed the teachers of their participation in the research on work engagement and the intention to publish the results.

Participants were assured that their answers would be anonymous and that the research data would be kept in a secure and confidential database. The respondents' explicit consent was obtained before giving them the actual instrument. No incentives of any kind were given in exchange for participation. The authors stated that there were no conflicts of interest.

Results

Initially, analysis was conducted using descriptive statistics to verify the degree of work engagement of the professors who comprised the sample. In general, the results suggest a moderate level of work engagement by the participants (M = 4.90), with strong convergence among the respondents (SD = 0.75). Table 1 presents the mean and standard deviation relative to the overall level of work engagement of the research participants and according to the dimensions of vigor, dedication, and absorption.

Table 1
Mean and standard deviation related to the overall level of work engagement of Higher Education faculty members and according to the dimensions of vigor, dedication, and absorption

Variable	Mean	Standard Deviation
General	4.90	0.75
Vigor	4.75	0.89
Dedication	5.02	0.91
Absorption	4.95	0.78

The results of Spearman's correlation analysis showed that variable age has a significant, positive, and moderate correlation with the three dimensions of work engagement, as shown in Table 2. Fischer's r-to-z transform test showed that age was associated more strongly with dedication ($\rho = 0.397$, $p < 0.001$, $\rho 2 = 0.158$) rather than with vigor ($\rho = 0.314$, $p < 0.001$, $\rho 2 = 0.098$) ($z = -1.88$; $p = 0.03$). However, the comparison between the correlation coefficients of dedication and absorption ($\rho = 0.306$, $p < 0.001$, $\rho 2 = 0.094$) showed a non-significant Fischer transform r-to-z coefficient ($z = 1.52$; $p = 0.06$).

The r-to-z Fischer transformation test carried out between the correlation coefficients of vigor and absorption showed non-significant results ($z = 0.14$; $p = 0.44$).

Table 2
Correlation analysis between the three dimensions of work engagement and age

	Vigor	Dedication	Absorption
Age	ρ = 0.314 p < 0.001 ρ^2 = 0.098	ρ = 0.397 p < 0.001 ρ^2 = 0.158	ρ = 0.306 p < 0.001 ρ^2 = 0.094

Note: ρ = Spearman's rho; p = statistical significance.

Table 3 presents the results of the Student's t-test analysis between the UWES scores. The analysis was performed according to gender, whether or not they had children and their level of education. Another aspect taken into account was whether or not someone else in the family was in the teaching profession.

All comparisons met the prerequisite of homogeneity of variances. The results indicated significant differences in levels of work engagement by gender. It was evidenced that men (M = 85.07; SD = 11.92) had higher levels of work engagement than women (M = 81.52; SD = 13.58) (t(209) = -2.106; p = 0.045) with a small effect size (d = 0.29) (Cohen, 1988). As can be seen in Table 3, no significant differences were found between levels of work engagement for people with or without children, level of education or whether someone else in the family was in the teaching profession.

Table 3
Student's t-tests for differences in work engagement scores by gender, children, education level, and whether someone else in the family is in the teaching profession

Variable	Group	Mean (DP)	ΔM [99% IC]	T	P	D
Work Engagement	Gender: Male	85.07 (11.92)	-3.54 (-7.23 – -0.24)	-2.016	0.045	0.29
	Female	81.52 (13.58)				
	Children: Has	84.13 (12.46)	2.50 (-1.39 – 6.08)	1.322	0.188	0.20
	None	81.63 (13.60)				
	Education: PhD	81.67 (13.48)	-2.85 (-6.15 – 0.66)	-1.558	0.121	0.22
	Postdoc	84.52 (12.55)				
	Teaching relative: Yes	83.11 (13.14)	-0.67 (-4.51 – 3.17)	-0.357	0.350	0.05
	No	83.79 (12.33)				

Note: SD = standard deviation; ΔM = Mean difference between groups; p = Statistical significance; d = Cohen's d value.

Table 4 presents the results of the Student's t-test analysis to compare the vigor, dedication, and absorption scores. The analysis was performed according to the working age groups and the gender of the participants.

All comparisons met the prerequisite of homogeneity of variances. The results showed significant differences in vigor levels, according to gender and age group. It was evident that men (M = 28.59; SD = 4.93) and persons aged 40 years or older (M = 29.14; SD = 5.21) had higher levels of vigor than women (M = 27. 42; SD = 5.50) (t(211) = -3.016; p = 0.003) and people aged 29 to 39 years (M = 26.33; SD = 5.22) (t(200) = -3.466; p < 0.001) with small (d = 0.23) and moderate (d = 0.48) effect sizes, respectively. Significant differences were also found in dedication scores, according to age group. People aged 40 years or older (M = 25.71; SD = 4.53) had higher levels of dedication than people aged 29 to 39 years (M = 23.15; SD =

4.14) (t(200) = -3.738; p < 0.000) with a strong effect size (d = 0.58). Significant differences were also found in levels of absorption according to age group. Persons aged 40 years and older (M = 30.32; SD = 4.61) had higher levels of absorption than people aged 29 to 39 years (M = 27.90; SD = 4.66) (t(200) = -3.377; p < 0.001) with a strong effect size (d = 0.53). No significant differences were evident between the dedication and absorption scores, according to gender.

Table 4
Student's t-tests for differences in vigor, dedication, and absorption scores, according to two occupational age groups and the gender of the participants

Dimension	Group	Mean (DP)	ΔM [99% IC]	T	P	D
Vigor	Gender: Male	27.42 (5.50)	-2.16 (-3.60 – -0.70)	-3.016	0.003	0.23
	Female	28.59 (4.93)				
	Age range: 29 to 39 years old	26.33 (5.22)	-2.80 (-4.30 – -1.30)	-3.466	0.001	0.48
	40 years or older	29.14 (5.21)				
Dedication	Gender: Male	26.68 (4.84)	-0.80 (-1.97 – 0.52)	-1.285	0.200	0.26
	Female	25.49 (4.22)				
	Age range: 29 to 39 years old	23.15 (4.14)	-2.56 (-3.88 – -1.25)	-3.738	0.000	0.58
	40 years or older	25.71 (4.53)				
Absorption	Gender: Male	29.42 (4.94)	-0.58 (-1.90 – 0.83)	-0.893	0.373	0.12
	Female	30.00 (4.44)				
	Age range: 29 to 39 years old	27.90 (4.66)	-2.42 (-3.79 – -1.06)	-3.377	0.001	0.53
	40 years or older	30.32 (4.61)				

Note: SD = standard deviation; ΔM = Mean difference between groups; p = Statistical significance; d = Cohen's d value.

Finally, the MANOVA sought to investigate the extent to which levels of work engagement varied for people who were in different phases of the Professional Teaching Career Cycle. The results revealed that there are statistically significant differences. Hochberg's Post-hoc tests showed that people who were in the Stabilization (M = 77.25; SD = 13.75) phase had lower work engagement scores than people who were in the Serenity or Conservatism (M = 90.41; SD = 7.79, p = 0.002) and Disengagement (M = 89.81; SD = 12.72, p = 0.009) phases.

Discussion

Given that work engagement is a construct that may vary according to working conditions, it is important to consider the elements that characterize the sample. Among those characteristics, it is worth highlighting the fact that it is a group of young and middle-aged adult professors, with extensive professional experience (primarily between 7 and 25 years). The data indicate an accumulation of knowledge and experience in the activity of teaching.

Participants in this study work in a public educational institution, which differs from the context of private institutions (Rowe & Bastos, 2010). Brazilian public educational institutions offer stability and ongoing opportunities for professional development to teachers, which is not the case in private institutions, for instance. However, some

Brazilian public universities face infrastructure problems related to classrooms, libraries, and laboratories, as well as shortages of teachers and technical administrative professionals (Sakurada, 2017). Nevertheless, despite the differences between types of institutions, research reveals that whether an institution is public or private does not impact the professors' connection to their careers (Mercali & Costa, 2019; Rowe & Bastos, 2010).

In this context, since the professors in the sample obtained an average overall work engagement score (Schaufeli & Bakker, 2004) with a slightly higher score for Dedication, these results are in line with similar evidence found in studies involving Higher Education professors in Brazil and Portugal (Araújo & Esteves, 2016; Caldas, Somensari, Costa, Siqueira & Claro, 2013; Dessbesell, Fabricio, Rotili, Grzybovski & Carneiro, 2017; Mercali & Costa, 2019; Paiva, Silva, Silva & Ferraz, 2017). According to Schaufeli, Dijkstra & Vazquez (2013), challenging jobs that confer greater autonomy and freedom of decision-making tend to provide higher levels of engagement. This particularly applies to jobs that entail assignments connected to social responsibility and which impact people more directly, as those related to health and education.

More prominent levels in the Dedication dimension were also found in the study performed by Mercali and Costa (2019). The sample shown was composed of 506 professors from different federative units of Brazil, and 56.9% were affiliated with federal institutions.

High levels in this dimension may indicate a high level of faculty member connection to their work, enthusiasm for their tasks and commitment to building their careers. All the abovementioned aspects lead professors to care about what happens in their daily routines, attributing positive meaning to teaching, researching, and extension activities. This, in turn, results in professors feeling proud of what they do (Schaufeli, Dijkstra & Vazquez, 2013).

The results of this study indicated that men showed higher levels of work engagement than women. However, no significant differences were found between the specific scores of Dedication and Absorption, but there were differences in relation to the Vigor dimension, that is, according to the results from the sample, the men investigated showed higher levels of Vigor than women. These results differ from other earlier studies involving professors that showed that gender does not statistically influence professors' work engagement (Araújo & Esteves, 2016; Magnan et al., 2016; Silva-Júnior, Ferreira & Valentini, 2020). However, it should be noted that the results of this investigation do not allow us to counter Schaufeli, Dijkstra, and Vazquez's (2013) assertion that men and women are almost equally engaged, since the magnitude of the difference in the overall level of engagement and the Vigor dimension between men and women was low. This indicates that said results may not have practical significance. The findings of the tests conducted to verify the correlations between Work Engagement and the variables of age, working age group, and phase of the teacher's professional career cycle indicated that the results converged.

The significant, positive, and moderate correlation found between age and the three dimensions of work engagement, as well as the differences related to working age groups, corroborate what Schaufeli, Dijkstra and Vazquez (2013) state, as do the results found by Guglielmi et al. (2016). They show that engagement differs in relation to age group and also career time, even though international studies indicate ambiguity regarding the role of age in work engagement (Magnan et al., 2016).

The results of this study revealed that people in the career consolidation phase (aged 40 years or older) showed higher levels of vigor, dedication, and absorption than professors in the professional development phase (between 29 and 39 years). As such, results ratify the findings described in the research of Araújo and Esteves (2016) and Magnan, et al. (2016), contrasting with the findings of Guglielmi et al. (2016) and Mercali and Costa (2019).

In Guglielmi et al.'s study (2016), for example, younger professors were found to be more engaged than their older colleagues. On the other hand, in Mercali and Costa's (2019) study, professors belonging to the professional development group showed more balanced results among the vigor, dedication, and absorption dimensions.

Nevertheless, it is important to state that, despite having higher mean scores for the dimensions, the professors investigated in this research are at lower percentiles when compared to the group in the professional development phase (19 to 39 years old). At issue here are those who were in the career consolidation phase, according to the normative studies of Vazquez et al. (2016).

The differences found confirm the importance of investigating the topic in the context of education because specific job characteristics can impact workers differently, especially when professional qualifications tend to be developed as the career is being built (Guglielmi et al., 2016).

Therefore, it is possible to infer that throughout the career of more experienced professors, other variables in the teachers' work context that were not the focus of analysis in this study, as work resources, autonomy, mastery of administrative and pedagogical processes, opportunities for personal and professional career growth, among others, could have been further developed. This would contribute to raising the levels of work engagement of the professionals who comprise this study sample (Hakanen, Bakker & Schaufeli, 2006).

This also explains why teachers in the Stabilization phase (4 to 6 years of activity) have lower levels of work engagement than teachers in the Serenity or Conservatism (25 to 35 years of teaching), and Disengagement (more than 36 years of teaching) phases, which are the final phases of Huberman's (2013) Professional Life Cycle of Teachers.

The Stabilization phase is characterized not only by the strengthening of professional identity, but also the feeling of greater job security, based on a personal commitment to the teaching activity. However, it is in the subsequent phases, Serenity or Conservatism and Disengagement, that the professor acts with greater tranquility (Huberman, 2013; Marchesi, 2008). According to the authors, in the phase of Serenity or Conservatism, teachers feel that they have mastered their activities (although they may go through a period of critical evaluation in which they look back at their past and see more positive aspects than in their current situation). And the last phase of the cycle, called Disengagement, can translate into a progressive detachment from the events taking place in the educational institution, according to Huberman (2013). This phase turns to the professors' interests and their own inner self, in a positive way. However, it is likely that the experience consolidated over the years contributes to higher levels of work engagement (Mesurado & Laudadío, 2019). The same applies to the possibility of greater dedication to activities with which professors identify themselves, even if, paradoxically, this phase is characterized by Huberman (2013) as one of disengagement.

Likewise, it is also considered that work engagement differs in relation to the length of time spent in work activities. Generally, people develop a more structured idea of what they want to do and feel more able to adapt their work activities to suit these desires as they mature. When they are young, they tend to accept working in activities that require more effort or they enjoy less in order to gain professional experience and learning (Schaufeli, Dijkstra & Vazquez, 2013).

Finally, some difficulties possibly encountered in the first years of teaching work can be viewed positively by teachers. Some examples of these difficulties include facing new situations in daily life, the need to carry out multiple tasks, and establishing bonds with superiors and peers. These difficulties include appropriating and adapting work methodology to different student profiles, among other concerns. These adversities have the potential to drive desires for continuous development and generate engagement. On the other hand, they can also make teachers more inclined to burnout and

exhaustion (Guglielmi et al., 2016). Therefore, the obstacles mentioned could justify the lower levels of work engagement among teachers with shorter careers found in this study.

Among the limitations of this study is the fact that it was conducted with participants from a single Brazilian federal public university. Notwithstanding the advantages of considering constant organizational variables in the analysis of the investigated phenomenon, this design does not reflect the reality of other educational institutions. The structure and characteristics of these educational institutions inherent to the management model practiced are particularized and influenced by political, economic, cultural, and ethical aspects that can have an impact on work engagement.

Given the importance and specificity of the work of higher education professors, analyzing their work engagement based on sociodemographic and career variables is especially relevant. Engaged professors tend to feel good at work, happier and more fulfilled. Moreover, their performance improves and they become capable of improving their students' performance and their preparation for the future.

The results of this study, along with the literature presented, mainly show that teachers at more advanced stages of their careers have higher levels of work engagement. As such, among the opportunities and proposals for future studies, we suggest the use of descriptive and qualitative methodologies to understand the possible drivers of work engagement for public Higher Education professors in Brazil.

As work engagement is a phenomenon that may fluctuate over time and situations, the theoretical model called Job Demands-Resources Model (JD-R model) is a relevant aid for further studies on the subject. This model is structured from studies in occupational health and positive psychology. It seeks to explain how demands and resources (personal and organizational) at work have a multiplying effect on energy drain and the motivational process (Bakker & Demerouti, 2017).

The contributions of this study, in theoretical terms, are aimed at a greater understanding of work engagement and the expansion of knowledge related to teacher well-being in different work situations. In conclusion, work engagement, a construct considered recent in psychological literature, contributes to the creation of more meaningful trajectories.

In practical terms, its results can help structure interventions aimed at people management practices in the public sector, focusing on the health, quality of life, well-being, and happiness of workers. These features allow them to achieve greater fulfillment throughout their career trajectories in Higher Education. Furthermore, as a predictor of individual and organizational performance, investment in actions that increase work engagement would enable greater effectiveness in public service. The outcome would positively impact results and generate value for society as a whole (Camões & Oliveira-Gomes, 2021).

References

Araújo, I. & Esteves, R. (2016). Engagement em docentes do ensino superior: uma abordagem exploratória. *Enfermería Universitaria*, 13 (2), 73-79. https://doi.org/10.1016/j.reu.2016.03.006

Bailey, C., Madden, A., Alfes, K., & Fletcher, L. (2017). The Meaning, Antecedents and Outcomes of Employee Engagement: A Narrative Synthesis. *International Journal of Management Reviews*, 19(1), 31–53. https://doi.org/10.1111/ijmr.12077

Bakker, A. (2011). An Evidence-Based Model of Work Engagement. *Current Directions in Psychological Science*, 20, 265-269. https://doi.org/10.1177/0963721411414534

Bakker, A. B., & Bal, P. M. (2010). Weekly Work Engagement and Performance: A Study Among Starting Teachers. *Journal of Occupational and Organizational Psychology*, 83(1), 189-206. https://doi.org/10.1348/096317909x402596

Bakker, A. B., & Demerouti, E. (2017). Job Demands-Resources Theory: Taking Stock and Looking Forward. *Journal of Occupational Health Psychology*, 22(3), 273–285. https://doi.org/10.1037/ocp0000056

Bakker A. B., & Schaufeli W. B. (2000). Burnout Contagion Processes Among Teachers 1. *Journal of Applied*

Social Psychology, 30(11), 2289–2308. https://doi.org/10.1111/j.1559-1816.2000.tb02437.x

Bakker, A., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008). Work Engagement: An Emerging Concept in Occupational Health Psychology. *Work and Stress*, 22, 187–200. https://doi.org/10.1080/02678370802393649

Budde, C., & Silva, N. (2020). Impactos na percepção de felicidade no trabalho após um processo de redução nas políticas e nas práticas de gestão de pessoas. *Psicología desde el Caribe*, 37(1), 40-69. https://doi.org/10.14482/psdc.37.1.305.56

Caldas, C. B., Somensari, P., Costa, S. N., Siqueira, M. M. M., & Claro, J. A. C. S. (2013). Satisfação e engajamento no trabalho: docentes temáticos e auxiliares da EAD de universidade privada brasileira. *Gerais: Revista Interinstitucional de Psicologia*, 6(2), 225-237. http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1983-82202013000200006&lng=pt&tlng=pt

Camões, M. R. S., & Oliveira Gomes, A. (2021). Engajamento no trabalho: Conceitos, teorias e agenda de pesquisa para o setor público. *Administração Pública e Gestão Social*, 13(3). https://doi.org/10.21118/apgs.v13i3.10572

Coaldrake, P. (1999). The Changing Climate of Australian Higher Education: An International Perspective. *Higher Education Management*, 11(1), 117–134.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Academic Press.

Dessbesell, V. H., Fabricio, A., Rotili, L., Grzybovski, D., & Carneiro, L. (2017). Engajamento no trabalho em docentes de Instituições de Ensino Superior no Rio Grande do Sul. *XXII Jornada de Pesquisa*, Ijuí. Anais. https://doi.org/10.6008/cbpc2179-684x.2018.002.0005

Field, L. K., & Buitendach, J. H. (2011). Happiness, Work Engagement, and Organizational Commitment of Support Staff at a Tertiary Education Institution in South Africa. *SA Journal of Industrial Psychology*, 37(1), 68-77. http://dx.doi.org/10.4102/sajip.v37i1.946

Fletcher, L., Bailey, C.,Alfes, K., & Madden, A. (2020). Mind the Context Gap: A Critical Review of Engagement within the Public Sector and an Agenda for Future Research. *The International Journal of Human Resource Management*. 6–46. https://doi.org/10.1080/09585192.2019.1674358

Geremia, H. C. & Silva, N. (2019). Engajamento no trabalho docente: uma revisão da literatura. In: S. Franco, & E. Escudero. (Org.). *El Presente Del Futuro Del Trabajo II: Psicología y organización del trabajo XVI*. 1ed. Montevideo–Uruguay: Psicolibros Universitario, v. II, p. 115-133. https://doi.org/10.15581/022.41525

Guglielmi, D., Bruni, I., Simbula, S., Fraccaroli, F., & Depolo, M. (2016). What Drives Teacher Engagement: A Study of Different Age Cohorts. *European Journal of Psychology of Education*, 31(3), 323-340. https://doi.org/10.1007/s10212-015-0263-8

Hakanen, J., Bakker, A., & Schaufeli, W. B. (2006). Burnout and Work Engagement Among Teachers. *Journal of School Psychology*, 43, 495–513. https://doi.org/10.1016/j.jsp.2005.11.001

Hair, J. F., Tatham, R. L., Anderson, R. E., & Black, W. (2005). *Análise Multivariada de Dados*. Porto Alegre: Bookman.

Han, J., Yin, H., Wang, J., & Zhang, J. (2019). Job Demands and Resources as Antecedents of University Teachers' Exhaustion, Engagement and Job Satisfaction. *Educational Psychology*, 1–18. https://doi.org/10.1080/01443410.2019.1674249

Haukoos, J. S., & Lewis, R. J. (2005). Advanced Statistics: Bootstrapping Confidence Intervals for Statistics With "Difficult" Distributions. *Academic emergency medicine*, 12(4), 360-365. https://doi.org/10.1197/j.aem.2004.11.018

Huberman, M. (2013). O ciclo de vida profissional dos professores. In: A. Nóvoa (Org.), *Vidas de professores*. Coleção Ciências da Educação (n. 4, pp. 31-61, 2.ed. Tradução de Maria dos Anjos Caseiro e Manuel Figueiredo Ferreira). Porto, Portugal: Porto Editora.

Isaia, S. M. de A. (2006). Desafios à docência superior: pressupostos a considerar. In: D. Ristoff, & P. Ristoff (Orgs.). *Docência na educação superior*. Coleção Educação Superior em Debate, 5. 63-84. INEP: Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. https://doi.org/10.5753/seadco.2020.14669

Lorente, L., & Vera, M. (2010). Las organizaciones saludables: "El engagement en el trabajo". *Gestión Práctica de Riesgos Laborales*, 73, 16-20. https://doi.org/10.7764/rts.78.37-48

Magnan, E. S., Vazquez, A. C. S., Pacico, J. C., & Hutz, C. S. (2016). Normatização da versão Brasileira da Escala *Utrecht* de Engajamento no Trabalho. *Avaliação Psicológica*, 15(2), 133-140. https://doi.org/10.15689/ap.2016.1502.01

Marchesi, A. (2008). *O bem-estar dos professores: competências, emoções e valores*. Porto Alegre: Artmed.

Mercali, G. D., & Costa, S. G. (2019). Antecedentes do engajamento no trabalho dos docentes de ensino superior no Brasil. *Revista de Administração Mackenzie*, 20(1). https://doi.org/10.1590/1678-6971/eramg190081

Mesurado, B., & Laudadío, J. (2019). Teaching Experience, Psychological Capital and Work Engagement. Their Relationship with Burnout on University Teachers. *Propósitos y Representaciones*, 7(3), 12-40. http://dx.doi.org/10.20511/pyr2019.v7n3.327

Paiva, M., Silva, R., Silva, S., & Ferraz, S. (2017). Engajamento no trabalho e clima para serviços em uma instituição federal de ensino superior. *Práticas em Gestão Pública Universitária*, 1(2), 316-337. https://doi.org/10.5007/1983-4535.2019v12n1p205

Rebolo, F., & Oliveira-Bueno, B. (2014). O bem-estar docente: limites e possibilidades para a felicidade do professor no trabalho. *Acta Scientiarum Education*, 36(2), 323-331. https://doi.org/10.4025/actascieduc.v36i2.21222

Ribeiro, A. D. S., & Silva, N. (2020). Sentido e significado de felicidade no trabalho para professores. *NAVUS: Revista de Gestão e Tecnologia*, 10,1-10. https://doi.org/10.22279/navus.2020.v10.p01-10.1266

Rowe, D. E. O., & Bastos, A. V. B. (2010). Vínculos com a carreira e produção acadêmica:

Comparando docentes de IES públicas e privadas. *Revista de Administração Contemporânea*, 14(6), 1011-1030. doi: https://doi.org/10.1590/S1415-65552010000700003

Sakurada, P. K. C. (2017). O sucateamento da universidade pública: A realidade dos cursos d eServiço Social da UFES e UFF. *Universidade e Sociedade*, 59, 70-81.

Salanova, M., & Schaufeli, W. B. (2009). *El engagement en el trabajo: Cuando el trabajo se convierte en pasión*. Madrid: Alianza Editorial. https://doi.org/10.5944/rppc.vol.3.num.2.1998.3860

Schaufeli, W. B. (2014). What is engagement? In: Truss, C. et al. (eds), *Employee Engagement in Theory and Practice*. London: Routledge, pp. 15-35.

Schaufeli, W. B., & Bakker, A. B. (2004). Job Demands, Job Resources and Their Relationship with Burnout and Engagement: A Multi-Sample Study. *Journal of Organizational Behavior*, 25, 293-315. https://doi.org/10.1002/job.248

Schaufeli, W. B., Dijkstra, P., & Vazquez, A. C. (2013). *Engajamento no trabalho*. São Paulo: Casa do Psicólogo.

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. (2002). The Measurement of Burnout and Engagement: A Confirmatory Factor Analytic Approach. *Journal of Happiness Studies*, 3, 71-92. https://doi.org/10.1023/a:1015630930326

Silva Júnior, D. I. da, Ferreira, M. C., & Valentini, F. (2020). Propriedades psicométricas da Escala de Engajamento no trabalho de Professores (EEP). *Psicologia: teoria e prática*, 22(1), 109-126. https://dx.doi.org/10.5935/1980-6906/psicologia.v22n1p109-126

Silva, N., Tolfo, S. da R., López, A. S., & Cedenõ, A. G. (2015). Psicologia Positiva nas Organizações, no Trabalho e em outros espaços de vida. In: Godoy, L., & Ansoleaga, E. (Compiladoras). *Um Campo em Tensíon o Tensíon entre campos: psicologia de lãs organizaciones y del trabajo em Iberoamérica*. pp. 389-401. Chile: Ril Editores. https://doi.org/10.36229/978-65-5866-042-2.cap.07

Vardi, I. (2009). The Impacts of Different Types of Workload Allocation Models on Academic Satisfaction and Working Life. *Higher Education*, 57(4), 499–508. https://doi.org/10.1007/s10734-008-9159-8

Vazquez, A. C. S., Magnan, E. S., Pacico, J. C., Hutz, C. S., & Schaufeli, W. B. (2015). Adaptation and Validation of the Brazilian Version of the Utrecht Work Engagement Scale. *Psycho-USF*, 20, 207-217. https://doi.org/10.1590/1413-82712015200202

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.105537

Development of Additive Reasoning in Young Children: The Case of Partitioning and the Successor Function[1]

ANA CRISTINA SANTANA ESPITIA
Escuela de Psicología, Universidad Pedagógica y Tecnológica de Colombia

YENNY OTÁLORA
Instituto de Investigaciones en Ciencias del Desarrollo, del Aprendizaje y Subjetividades CIDEAS, Facultad de Psicología, Universidad del Valle

HERNANDO TABORDA-OSORIO
Departamento de Psicología, Pontificia Universidad Javeriana

How to cite this article: Santana Espitia, A. C., Otálora, Y., and Taborda-Osorio, H. (2025). Development of additive reasoning in young children: The case of partitioning and the successor function. *Revista Colombiana de Psicología*, 34*(1)*, pp 93-110. https://revistas.unal.edu.co/index.php/psicologia/article/view/105537

Correspondence: Hernando Taborda-Osorio (https://orcid.org/0000-0001-6119-7642); Pontificia Universidad Javeriana; Bogotá, Colombia; Email: hernando.taborda@javeriana.edu.co

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: OCTOBER 28ST, 2022–ACCEPTED: NOVEMBER 17TH, 2023

1 This research article is product of the research projects "Aprendizaje de la función de sucesión del sistema de números naturales en niños preescolares", funded by MINCIENCIAS (Código 80740-162-2020) awarded to the first author ACSE; "Influencias del desarrollo del razonamiento numérico y espacial en el aprendizaje de la matemática formal" funded by Universidad del Valle (CI: 5332; Convocatoria Interna 132-2021 para presentación de Proyectos de Investigación y Creación Artística en las ciencias, las artes, las humanidades, las tecnologías y la innovación Modalidad-2) awarded to the second author YO and "Innovación en intervención educativa para el desarrollo del pensamiento matemático en la primera infancia", funded por MINCIENCIAS, MEN and UNITED WAY (Código 1203-1003-72878, CT 517-2020) awarded to the third author HTO.

Development of Additive Reasoning in Young Children: The Case of Partitioning and the Successor Function

Abstract

Additive reasoning is a fundamental mathematical skill that children learn during elementary school. However, previous studies have suggested that children start their learning process in preschool. The current research aims to examine how two additive reasoning skills, successor function and partitioning, emerge in the preschool years. To this purpose, a group of 56 children of 4 and 5 years of age were tested on three additive tasks, a cardinality task, and a counting task. The results show a similar developmental trajectory for children's performance on the successor function task and the partitioning tasks, with significantly better performance in 5-year-olds. The results also show that children's cardinality knowledge and counting skills are good predictors in both additive reasoning tasks. These findings suggest that preschool is a critical period for learning the additive structure of the number system and that knowledge of verbal counting boosts this acquisition.

Keywords: preschool children, numerical knowledge, additive reasoning, successor function, partitioning, child development.

Desarrollo del razonamiento aditivo en niños pequeños: El caso de la partición y la función de sucesión

Resumen

El razonamiento aditivo es una habilidad matemática fundamental que los niños aprenden durante la escuela primaria. Sin embargo, estudios anteriores han sugerido que los niños inician su proceso de aprendizaje en preescolar. La presente investigación pretende examinar cómo emergen dos habilidades de razonamiento aditivo, la función de sucesión y la partición, en los años preescolares. Para ello, un grupo de 56 niños de 4 y 5 años fueron evaluados en tres tareas aditivas, una tarea de cardinalidad y una tarea de conteo. Los resultados muestran una trayectoria de desarrollo similar para el rendimiento de los niños en la tarea de función de sucesión y en las tareas de partición, con un rendimiento significativamente mejor en los niños de 5 años. Los resultados también muestran que el conocimiento de cardinalidad y las habilidades de conteo de los niños son buenos predictores en ambas tareas de razonamiento aditivo. Estos resultados sugieren que la etapa preescolar es un periodo crítico para el aprendizaje de la estructura aditiva del sistema numérico y que el conocimiento del conteo verbal potencia esta adquisición.

***Palabras clave*:** niños preescolares, conocimiento numérico, razonamiento aditivo, función de sucesión, partición, desarrollo infantil.

A central component of children's mathematical thinking is their understanding of additive reasoning, which is one of the main goals of early math education (Chamorro, 2005; Fuson, 2019; Gilmore, 2023). Additive reasoning is the representation of the number system in terms of part-whole relations and the use of different mathematical principles to organize this relationship, as commutativity and inversion (Canobi et al., 2002; Ching & Nunes, 2017). This logical organization is expressed in the base-10 system used to represent written quantities and to calculate the result of arithmetic operations. For instance, the number 32 can be decomposed in three units of 10s and two units of 1s, and thus the whole is represented as the result of the addition of several parts (Bower et al., 2022; Nunes & Bryant, 1996). The mental manipulation of numbers to solve basic arithmetic problems also requires various additive reasoning strategies. In this way, mathematical principles as commutativity and associativity allow solvers to flexibly change the positions of numbers and compose quantities to find out the results. The development of additive reasoning moves beyond these notions towards more complex situations (Robinson & Dubé, 2013); however, it is worth studying the first steps of this development during the preschool years to better understand how children advance in their construction of formal mathematical knowledge.

There are several additive concepts whose development can be traced back to the preschool years (Kullberg et al., 2020; Prather & Alibali, 2009; Resnick, 1989); for example, the principles of commutativity, associativity, and additive composition. Other two related concepts, namely the successor function and partitioning, are critical to understand the natural number system. In the current research, we explore the development of the successor function and partitioning. Particularly, partitioning is an ability closely related to additive composition (Saxton & Cakir, 2006). Below we present a summary of the study of the concepts of additive composition, partitioning and successor function.

Additive Composition and Partitioning

Additive composition is the principle that numbers are composed of other numbers (Bermejo, 2004; Rodríguez et al., 2008). Studies show that this knowledge develops gradually from the preschool years onward (Bower et al., 2022; Krebs et al., 2003; Kullberg et al., 2020; Medina, 2023). Two types of tasks are generally used to assess the acquisition and development of this principle: the "shop task" and simple addition tasks. In the shop task, children are asked to pay for an item with play coins with different values (e.g., 5-dollar coins and 1-dollar coins). Children reveal knowledge of additive composition when they are able to compose the target value using coins with different values instead of using only one-unit coins (Carraher et al., 1985; Ching & Kong, 2022). In the simple addition task, children are asked to add two numbers (e.g., 3 + 5) and the researcher observes the strategies children use to solve the task (Fuson, 1988). Younger children use a "counting-all" strategy, where they count the total units one by one, while older children use a "counting-on" strategy, where they start counting from an added. The more advanced "counting-on" strategy is associated with knowledge of additive composition, as children presumably realize that the total number is composed of both addends (Krebs et al., 2003; Nunes & Bryant, 1996; Obando & Vásquez, 2008).

Using the above tasks, studies have revealed that knowledge of additive composition emerges between 5 and 6 years old (Bower et al., 2022). In studies with Western populations, children typically pass the shop task at 6 years old, but not before (Krebs et al., 2003). However, in a recent study conducted with a Chinese population a basic ability to compose units of ones and fives was observed in 5-year-olds (Ching & Kong, 2022). The development of the "counting-on" strategy follows a similar trajectory, with 6-year-olds displaying a more robust knowledge of additive composition than younger children (Krebs et al., 2003).

Another strategy for studying the development of additive composition is by using a "conceptual judgment task" with concrete material (Canobi et al., 2002; Canobi et al., 2003; Sophian et al., 1995). In an example of this task, children observed a researcher handing out candy to two different puppets in a way consistent with the principle of additive composition (e.g., one puppet with two boxes of 3 and 2 candies each, and other puppet with a box of 3 and 2 candies). Then, children were asked whether both puppets had the same number of candies or not. Consistent with previous findings, the results of this study showed good scores for 5-and 6-year-old children, but relatively low scores for 4-year-olds (Canobi et al., 2002).

Finally, children also have been tested on partitioning tasks (Saxton & Cakir, 2006; Kullberg & Björkund, 2020). Partitioning is the ability to divide any natural number into different subsets. Crucial to this ability is the understanding that the cardinal of the whole is equivalent to the cardinal of the subsets (Saxton & Cakir, 2006). In the partitioning task children are asked to count and report the sum total of a set of objects (e.g., 6 cubes). Then, the set is divided into two separate groups (e.g., 3 and 3 cubes) and children are again asked to report the total number of objects (divided-whole task). The task can also be presented in the reverse order, from two separate groups to one set (united-parts task). If the children provide the answer quickly without hesitation or by counting the whole set again, they are credited with knowledge of number partitioning. In this research (Saxton & Cakir, 2006), most of the 6-year-old children completed the partitioning task successfully. Partitioning is a type of knowledge related to additive composition, since both involve reasoning about part-whole relationships in the numerical domain. This ability has also been proposed to be a predictor in the acquisition of base-10 system knowledge (Saxton & Cakir, 2006).

Successor Function

The successor function has been proposed as one of the main logical foundations of the natural number system (Badiou, 2008; Buijsman, 2020). Accordingly, some researchers have investigated the emergence of this additive notion in childhood (Carey, 2009; Schneider et al., 2020; Schneider et al., 2021a). One of the main tasks to assess the acquisition and development of the successor function is the Unit Task (Sarnecka & Carey, 2008; Schneider et al., 2021b), where children observe a number of objects that are placed inside an opaque box, and after children name the total (e.g., N = 5 objects) they observe one or two other objects being placed inside the same box. Once the children observe this sequence, they are asked the critical question about the total number of objects in the box (N+1 or N+2). Presumably, children who answer this question correctly know that adding one unit to a previous numerical value represents a proportional increase of one unit in the numeral list. The findings show that children solve this task at the age of 4 years, only when they have mastered the cardinal principle, that is, when they know that the last number label in a counting sequence represents the total amount of objects in the set (Piantadosi et al., 2014; Spaepen et al., 2018).

However, recent studies have shown that the acquisition of the successor function is a more gradual process that depends on the counting range of children or how high they can count (Cheung et al., 2017; Davidson et al., 2012; Schneider et al., 2020; Schneider et al., 2021a, 2021b). The higher the counting range, the better the children's performance on the Unit Task. Thus, for instance, preschoolers who are medium counters (e. g., count well to 20) perform well on the Unit Task when the numbers are small, but at the same time perform poorly when the numbers are larger. This pattern of results has led some researchers to propose that the full acquisition of the successor function is a protracted process that extends through the preschool years as children improve their counting range (Cheung et al., 2017; Cho et al., 2024). This same protracted acquisition has been observed in various cultures, but with different patterns of development, revealing that the

particular counting system of each language may have an important influence on the acquisition of the successor function (Guerrero et al., 2020; Guerrero & Park, 2023; Schneider et al., 2020; Schneider et al., 2021b).

The Current Research

The literature review shows that the development of additive reasoning begins early in the preschool years. Additionally, studies on the development of the successor function show that the emergence of this notion depends both on the previous mastering of the cardinal principle and on the children's proficiency in counting (Cho et al., 2024; Sullivan et al., 2023; Wege et al., 2023). However, it is unknown how other additive notions emerge in the preschool years and whether the same knowledge of cardinality and counting skills have an effect on the development of these notions. The basic concept of partitioning seems to be already established by the age of 6 (Saxton & Cakir, 2006), but to our knowledge, no studies have shown its prior development. This is important as partitioning may be the earliest notion related to additive composition and its understanding can open the way to more complex numerical representations.

Accordingly, this study has three goals. First, to determine at what point in development children exhibit knowledge of both number partitioning and the successor function. Second, to investigate the possible role of children's knowledge of the cardinal principle and counting ability in the developmental trajectory of both number partitioning and the successor function. Three, to examine the relationship between the emergence of both additive notions, number partitioning and the successor function. Previous studies have suggested that the successor function is the conceptual core of children's understanding of the natural number system, and thus could be a precondition for learning other additive notions as number partitioning. Therefore, one possibility is that the development of the successor function predates the development of number partitioning.

To address these goals, we asked a group of 4- and 5-year-old children to solve three additive tasks: The Unit Task to measure children's knowledge of the successor function, the Divided-Whole Task, and the United-Parts Task to measure children's knowledge of number partitioning. All three tasks were preceded by a Cardinality Task and a Counting Task. The purpose of the Counting Task (Davidson et al., 2012) was both to identify the highest number correctly counted and to classify children into one of three counting ranges. The Cardinality Task was used to classify the children into two categories: knowers and no knowers of the cardinality principle. This assessment allowed us to determine the possible influence of the children's knowledge of cardinality on the development of both additive notions: partitioning and the successor function.

Importantly, this research was carried out during the Covid-19 pandemic and data collection took place amid the lockdown introduced across the country by the Colombian government in 2020 and 2021. Therefore, all children were tested online through specially designed tasks. The limitations associated with this contingency are discussed in the final section of this paper.

Method

Context and Participants

Study participants (n = 56; 24 boys and 32 girls) were 4 and 5 years old at the time of application, 28 children for each group (M= 60.36 months, SD= 6.76, Range 48-71 months). The sex distribution by age was as follows: Of the 28 4-year-old children, 14 were boys (50%) and 14 were girls (50%). Of the 28 5-year-old children, 10 were boys (37.7%) and 18 were girls (64.3%). Other 21 children were removed from the study due to parental interference during the testing session. All participants spoke Spanish as their first language.

Due to the health contingencies derived from the Covid-19 pandemic, a convenience sampling was carried out in which the invitation to participate in the research was made through direct contact with schools and kindergartens in Bogota, Colombia, and surrounding municipalities. All the institutions serve children from middle-income families. Parents interested in their children participating in the study completed a Google Forms registration form. Subsequently, a virtual session was held with the parents in which they were informed about the nature of the research and a verbal consent was read out to them, who in turn authorized their child's participation in the research. In addition, each child gave their informed assent. Both informed consent and informed assent were recorded on video. The ethical approval of the study was obtained from the Institutional Review Committee for Ethics in Research of the Pontificia Universidad Javeriana.

Measures and Data Collection

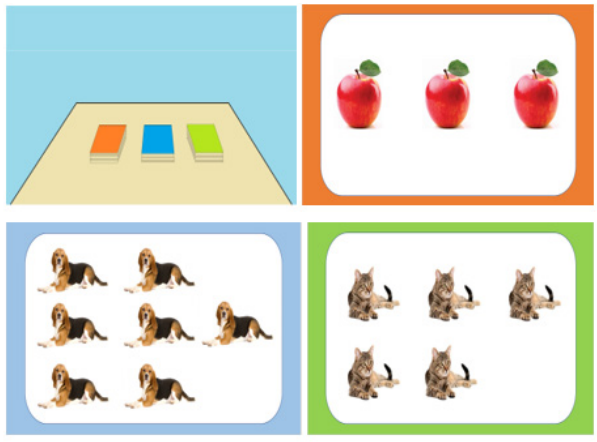
Highest Count Task

To identify the highest number correctly counted, children were asked: "Can you count as high as you can for me?" The experimenter registered counting errors, as omissions (e.g., "14, 15, 17") and cyclical repetitions (e.g., "29, 30, 21, 22"). The child was allowed to make a maximum of two errors in the application (not necessarily consecutive). On making the second counting error the child was asked to stop and the number counted before the error was recorded as the largest number counted. If the child reached 50 without making more than two errors, he/she was asked to stop counting. The counting ranges were defined as follows: 10-19 (low), 20-29 (medium), and 30-50 (high).

Cardinality Task

To assess children's understanding of cardinality, we adapted the "What's on this card?" (WOC) task from Gelman (1993) and Le Corre et al., (2006). Previous studies have shown the reliability of this task to assess children's knowledge of cardinality (Le Corre et al., 2006). The task was presented in PowerPoint slides and Adobe Animate. The children were presented with three decks of cards of various colors. The cards in each deck had different images: apples, dogs, and cats (see Figure 1). The researcher presented each card one by one and asked the child: "What is on this card?" The apple cards had 1 to 8 items and the dog and cat cards had 5 to 8 items. A correct response was scored when children said the correct number of items on the card. For all participants, the cards with the apples were presented first and in numerical ascending order, while the presentation order of the other cards were randomized in each deck.

Figure 1. *Material used in the Cardinality Task.*

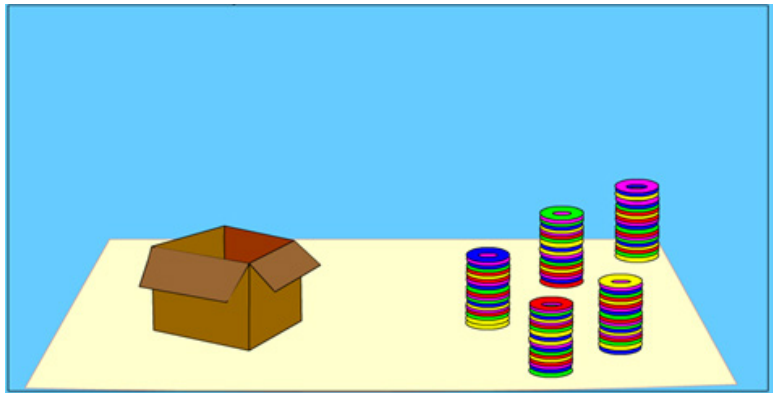


The application of the card game was stopped when the child made three consecutive errors (e.g., responses as "apples", "I don't know", or wrong numbers). The total score of the cardinality task was calculated based on the children's performance across the three decks in the numbers 5 to 8, for a total of 12 cards. If the children answered at least 8 of 12 questions correctly (66%), they were granted with cardinality knowledge.

Unit Task

The Unit Task was adapted from Davidson et al. (2012) and was set up in Adobe Animate. It was designed to assess children's understanding of the successor function. The task setup was presented on a blue background and a pale-yellow table in the foreground (see Figure 2). An opaque empty box and five stacks of colored rings were presented on the table.

Figure 2. *Unit Task Interface in Adobe Animate.*



At the beginning of each trial, the child was told that N rings will be placed in the box, then the video shows the corresponding N rings moving inside the box, all at once. After that, the experimenter asked a reminder question: "How many rings are in the box?" If the child answered incorrectly or failed to respond, the experimenter repeated the previous procedure by replaying the recording. Then, the child was told "Right! Now watch", as the experimenter added one or two more rings to the box. After that, the child was asked the critical question: "Now, how many rings are in the box in total, N or N+1 (or N+2)?" Once the child answered the question, the box was removed from the table in the video and a new box of a different color appeared from top to bottom, so that the child observed that the new box was empty.

All participants started with two familiarization trials (1+1 and 1+2). Afterwards, three conditions were used in the Unit Task: Small Numbers (all numbers in the arithmetic operation were in the 1-10 range), Medium Numbers (all numbers were in the 11-20 range), and Large Numbers (all numbers were in the 21-30 range). Four items were used for each condition: 4+1, 4+2, 5+1, and 5+2 for Small, 14+1, 14+2, 15+1, and 15+2 for Medium and 24+1, 24+2, 25+1, and 25+2 for Large. The number of trials administered varied according to the counting range of the participants. Consequently, children with a low counting range (Low Counters) were given only the 4 trials of the Small Numbers condition; children with a medium counting range (Medium Counters) were given the trials of the Small and Medium Numbers for a total of 8 trials; and children with a high counting range (High Counters) were given the trials of the Small, Medium, and Large Numbers for a total of 12 trials. The children who did not pass the Cardinality task were given only trials of the Small Numbers condition. The order in which the

choice alternatives (N+1 or N+2) were presented was counterbalanced across trials. The total score of this task was calculated by counting the number of correct trials.

Partitioning Tasks

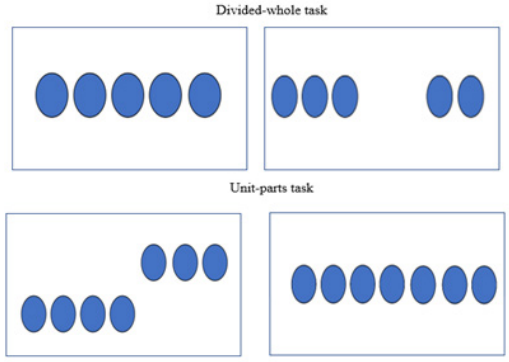
The partitioning tasks were adapted from Saxton and Cakir (2006) and they were set up in PowerPoint. In the Divided-whole task, children were shown a set of cubes on the screen and were asked to count and report the sum total. Once children reported the correct response, the cubes were divided into two sets through an animation video. Children were then again asked to report the sum total of cubes across the two groups ("please, tell me how many cubes are there in total all together now?"). The procedure for the United-part task was very similar to the previous task, except that children were first shown two separate sets of cubes on the screen and then both were united in a single set (see Figure 3 for examples of these tasks). Following Saxton and Cakir (2006), knowledge of partitioning was attributed when the child reported the correct answer without hesitation or by counting the cubes again. These tasks were applied in a counterbalanced manner across participants.

Two familiarization tasks were first presented to the children: one for the Divided-whole task, 3 (2 + 1), and another for the United-parts task, (2 + 2) 4. Afterwards, and as in the Unit Task, three conditions were used in the Partitioning tasks: Small Numbers (all numbers in the arithmetic operation were in the 1-10 range), Medium Numbers (all numbers were in the 11-20 range), and Large Numbers (all numbers were in the 21-30 range). Four items were used for each condition, two for the Divided-whole task and two for the United-parts task. The complete set of items is presented in Table 1. The number of trials administered varied according to the counting range of the participants in the same manner as in the Unit Task. The children who did not pass the Cardinality task were given only trials of the Small Numbers condition.

Table 1
Partitioning tasks according to count range

Condition	Item	Partitioning type	Stimuli
Familiarization	(3) 2+1	Divided-whole task	Orange cubes
	2+2 (4)	United-parts task	
Small	(5) 3+2	Divided-whole task	Blue circles
	(9) 6+3	Divided-whole task	
	4+3 (7)	United-parts task	
	7+2 (9)	United-parts task	
Medium	(14) 9+5	Divided-whole task	Red hearts
	(16) 12+4	Divided-whole task	
	11+6 (17)	United-parts task	
	13 + 2 (15)	United-parts task	
Large	(21) 15+6	Divided-whole task	Green triangles
	(25) 18+7	Divided-whole task	
	17+5 (22)	United-parts task	
	19 + 4 (23)	United-parts task	

Figure 3. *Selected sample of partitioning tasks.*



Procedure

The five tasks were delivered in two online sessions through the Zoom platform, each one lasting between 15-20 minutes. We set up test sessions based on previous online research studies (Johnston et al., 2019). Each child was accompanied by a parent during the sessions. At the beginning of each session, the parents were told to sit out of sight of the children and not to interfere during the tests. Then, the children were asked to sit in front of the computer screen at a comfortable distance to start the session. Before starting, we check the quality of sound and picture by asking the children several control questions. Once both the researcher and the participant were comfortable with the setup, the experiment was started.

Three tasks were delivered in the first session and two in the second session. Both sessions were recorded on video. In the first session, all children first completed the Highest Count Task and then the Cardinality Task. For half of the randomly selected participants, the third task of the first session was the Unit Task and for the other half were the Partitioning Tasks. In the second session, the children were given the missing task, either the Unit Task or the Partitioning Tasks. At the end of each session, the children rated on a 5-point Likert scale the degree of interest in the activities, and the quality of both the video and the sound. The children reported scores above 4 in the 3 aspects evaluated in both sessions. Therefore, they considered the tasks interesting and with good video and sound quality in both sessions.

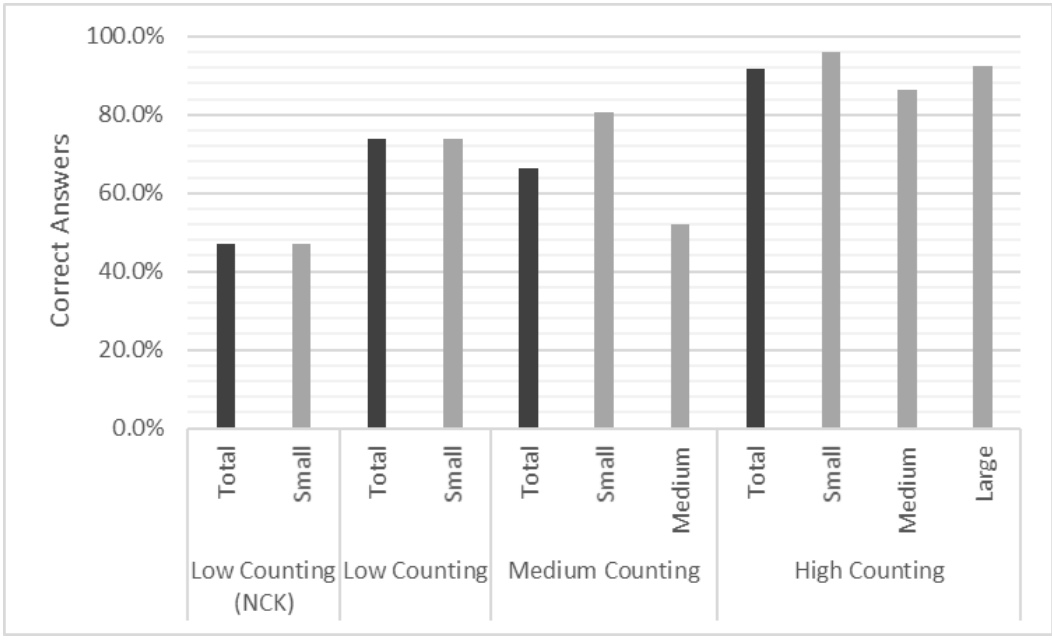
Results

The results show that out of 56 children, a total of 9 failed to pass the Cardinality Task (No Cardinality Knowledge group, NCK). Of the other 47 children, 21 were Low Counters (M = 14.5, SD = 3.8), 13 Medium Counters (M = 24.5, SD = 4.4), and 13 High Counters (M = 42.3, SD = 9.1). Following Davidson et al., (2012), the children's scores in both the Unit Task and The Partitioning Task were transformed into percentages for statistical testing. Preliminary analyses found no effect of Sex or counterbalance order; therefore, these variables were collapsed in further analyses. Below we present the results of the children's performance in each of the tasks.

Unit Task

The results shown in Figure 4 are discriminated by the three counting groups (Low Counters, Medium Counters, and High Counters) in the three numerical conditions (Small Numbers, Medium Numbers, and Large Numbers). To determine whether the children responded to this task by chance, we conducted a one-sample t test with 50 as the test value. The results with the percentages of success in the Small Numbers condition show that children's performance was significantly beyond chance (all $ps < .01$), except for those who did not pass the Cardinality Task, 47%, $t(8) = -0.26$, $p = 0.8$. Furthermore, the performance of children who failed the cardinality task (NCK) was significantly lower compared to children in the Low Counting group, $t(28) = -2.36$, $p = .02$. These results suggest that knowledge of the cardinal principle seems to be a cornerstone of the acquisition of the successor function.

Figure 4. *Percentage of correct answers in the Unit Task for High, Medium, and Low counters in the Small, Medium, and Large number conditions.*



A one-way analysis of variance (ANOVA) was performed on three counting groups to identify possible differences in knowledge of the successor function. First, we performed this analysis on Small Numbers across all three counting groups, and then on Medium Numbers between the Medium Counting and High Counting groups. The results for Small Numbers yielded a significant effect of counting range, $F(2, 44) = 4.3$, $p = .02$. Post hoc multiple comparisons with the Bonferroni test revealed significant differences only between the Low Counters and High Counters ($p = .01$). The results for the Medium Numbers also yielded a significant effect of counting range, $t(24) = -2.83$, $p < .01$. Thus, in general, the children who performed best on the counting task differed significantly from all other children on the Unit Task.

To determine whether knowledge of the successor function was homogeneous across the number conditions, we conducted comparisons between Small Numbers and Medium Numbers for the Medium Counting range and between Small, Medium, and Large Numbers conditions for the High Counting range. These analyses showed significant differences for the Medium Counting range, $t(12) = 2.4$, $p = .03$, but not for the High Counting range, $F(2, 24) = 1.66$, $p = .21$. These results show that the performance of children with the highest counting skills was homogeneous in all trials in the Unit Task. In contrast, knowledge of the successor function in the Medium Counting range appears to be less consolidated and specific to small numbers.

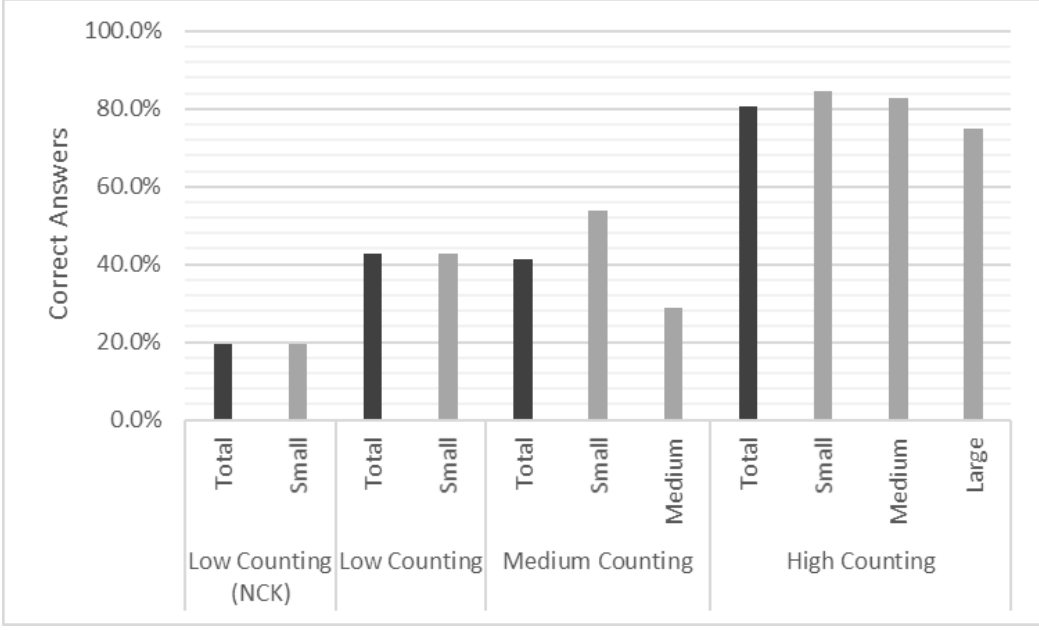
Finally, we examined the effect of age and counting on the children's performance in the Unit Task. The comparison between 4- and 5-year-old children revealed a statistically significant difference, $t(54) = -4.58$, $p < .01$, with 5-year-olds performing better than younger children (M = 85.5%, SD = 17.9 and M = 58.3%, SD = 25.7, respectively). A bivariate correlation between the performance on the Unit Task and the Counting Task shows a statistically significant association, $r = 0.4$, $p < .01$. This association partially holds out when controlling for age in months, $r = 0.26$, $p = .05$, revealing that counting ability is a good predictor of the children's performance in the Unit Task.

Partitioning Task

Figure 5 shows the results of the Partitioning Tasks in percentages, combining the results for both the Divided-Whole Task and the United-Parts Task. Previous analyses did not reveal significant differences between both tasks. As before, the results are discriminated by the three counting ranges: Low Counters, Medium Counters, and High Counters. A one-way analysis of variance (ANOVA) was performed to identify possible differences in knowledge of the successor function. First, we conducted this analysis on Small Numbers across all three counting groups, and then on Medium Numbers between the Medium Counting and High Counting groups. The results for Small Numbers yielded a significant effect of counting range, $F(2, 44) = 7.47$, $p < .01$. Post hoc multiple comparisons with the Bonferroni test revealed significant differences between the Low Counters and High Counters ($p < .01$), and between Medium Counters and High Counters ($p = .04$). The results for Medium Numbers also yielded a significant effect of counting range, $t(24) = -4.22$, $p < .01$. As in the Unit Task, the children who performed best on the counting task differed significantly from all other children on the Partitioning Task. Visual inspection of Figure 5 also shows a poor performance of the children who did not pass the cardinality task (NCK), their performance was significantly lower compared to children in the Low Counting condition, $t(25.2) = -2.21$, $p = .03$.

To determine whether knowledge of number partitioning was homogeneous across the number conditions, we performed comparisons between Small Numbers and Medium Numbers for the Medium Counting range and among Small, Medium, and Large Numbers conditions for the High Counting range. These analyses showed significant differences for the Medium Counting range, $t(12) = 3.12$, $p < .01$, but not for the High Counting range, $F(2, 24) = 0.95$, $p = .4$. Similar to children's performance on the Unit Task, these results show that performance for the children with the highest counting skills was homogeneous across trials in the Partitioning Task. Knowledge of number partitioning in the Medium Counting range seems to be less consolidated and specific to small numbers.

Figure 5. *Percentage of correct answers in the Partitioning Task for High, Medium, and Low counters in the Small, Medium, and Large number conditions.*



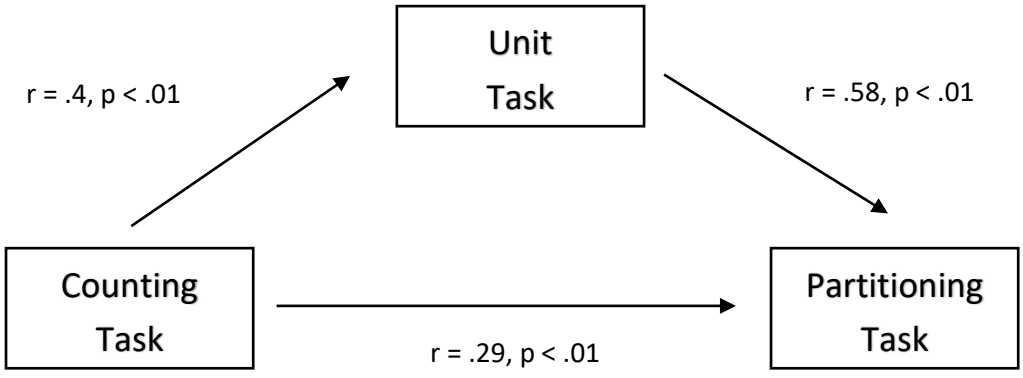
Next, we examined the effect of age and counting on the children's performance on the Partitioning Task. The comparison between 4- and 5-year-old children revealed a statistically significant difference, $t(54) = -3.64$, $p < .01$, with 5-year-olds performing better than younger children (M = 62.9%, SD = 33.9 and M = 32.1%, SD = 29.1, respectively). A bivariate correlation between the performance on the Partitioning Task and the Counting Task shows a statistically significant association, $r = 0.48$, $p < .01$. This association holds out when controlling for age in months, $r = 0.39$, $p < .01$, revealing that counting ability is also a good predictor of the children's performance in the Partitioning Task.

Relations Between the Unit Task and Partitioning Task

We compared children's performance between the Unit Task and the Partitioning Task across all children's Counting Ranges. The children's performance in the High Counting range did not reveal significant differences between both tasks (all *ps* > .05, controlling for multiple comparisons). In contrast, the children's performance in the Medium and Low Counting ranges did reveal significant differences in both Small, $t(20) = 4.65$, $p < .01$ for Low Counting; $t(12) = 2.8$, p = .03 for Medium Counting, and Medium Numbers conditions, $t(12) = 2.74$, $p = .03$. In all of these comparisons, children performed better on the Unit Task than on the Partitioning Task. These analyses reveal, in general, that only children with good counting skills performed similarly on the Unit and Partitioning Tasks, whereas children with lower counting skills show poor performance on the Partitioning task in all conditions.

The previous analyses show that most preschoolers in our sample still struggle with partitioning knowledge. However, there is a clear improvement over time. To find out the factors that can lead to a better performance in the Partitioning task, we conducted a mediation analysis to estimate whether the performance in the Unit Task mediates the association between the performance in the Counting Task and the Partitioning task (see Figure 6). The total effect of the Counting task on the Partitioning task had a $B = 0.48$, $p < .01$, [bootstrap confidence interval of 0.2 – 0.4]. When controlling for performance in the Unit Task the Beta was lower, but still significant, $B = 0.29$, $p = .01$ [bootstrap confidence interval of 0.1 – 0.3]. However, the indirect effect, although small, was statistically significant, $B = 0.19$, $p = .04$, [bootstrap confidence interval of 0.09 – 0.3]. These results suggest that the children's performance in the Unit Task partially mediates the association between the Counting Task and the Partitioning Task.

Figure 6. *Mediation analysis between Counting and Partitioning Task.*



Discussion

In the current study, 4- and 5-year-olds were tested on various numerical tasks to examine the developmental trajectory of early additive reasoning. The results show three main findings. First, both additive notions, successor function and partitioning, emerge throughout the preschool years with similar trajectories. Five-year-old children performed better on both tasks than four-year-olds. Moreover, the children's performance varies across the counting ranges of the additive tasks. The children with a high counting range performed significantly better on both tasks than all other children. However, the children with a medium and small counting range showed a similar performance in both additive tasks. To our knowledge, this is the first study to trace the developmental trajectory of number partitioning understanding in the preschool years and compares it to another additive notion.

The second finding is that both cardinality and counting knowledge have a strong effect on the emergence of additive reasoning. The children who failed to show cardinality knowledge performed poorly overall on both additive tasks. This finding suggests that cardinality is critical in the development of children's additive reasoning. This is in agreement with previous studies, where knowledge of cardinality has been shown to predict children's understanding of the successor function (Guerrero & Park, 2023; Schneider et al., 2021a, 2021b; Spaepen et al., 2018). Additionally, the strong correlation between counting proficiency and performance on both additive tasks suggests that the knowledge children learn from counting logic may contribute to the development of additive reasoning. This conclusion is reinforced by the fact that only children who are high performers in counting differ significantly from all other children.

Third, the strong correlation between both additive tasks suggests that there is a common underlying notion of addition that develops between 4 and 5 years old. However, the successor function seems to be an easier notion to acquire for children than the partitioning knowledge. Even in the group with the highest counting range there is an important number of trials in the partitioning tasks that children fail, while the number of trials in the Unit Task that children fail is low. Indeed, mediation analysis shows that knowledge of the successor function partially mediates the acquisition of number partitioning. Thus, although both tasks tap into a similar concept, they may differ regarding task complexity.

The results of the current study with the Unit Task replicate previous findings reported in other countries (Cheung et al., 2017; Davidson et al., 2012). Results in English language show that children with low and medium counting range have a mixed performance on the Unit Task. This pattern of results suggests that children who still struggle with the counting task have item-based knowledge of the successor function, rather than knowledge of an abstract general principle (Davidson et al., 2012). The current study goes further by showing that the developmental trajectory of the successor function could be generalized to other additive notions, such as number partitioning. Therefore, this research suggests that what is developing in the preschool years is a deeper understanding of the additive structure of natural numbers.

An open question is how this understanding develops and why counting proficiency is a good predictor of children's additive reasoning. One possibility suggested by others (Schneider et al., 2020), is that the learning of the productive linguistic rules of verbal counting may lead children to infer the N + 1 rule that governs the logic of the natural numbers. Thus, because the verbal counting system increases in units one by one (in Spanish: veintidós, veintitres, veinticuatro), it may allow children over time to infer that the N + 1 rule is a general principle of the natural number system. This hypothesis has been tested by studying children with different languages, some more opaque than others in the verbal counting (Schneider et al., 2020). Overall, the more opaque the verbal counting, the longer it takes children to

pass the Unit Task. However, the fact that counting is also a good predictor of number partitioning suggests that what children also learn from the verbal counting is that numbers are composed of other numbers. Both additive tasks, number partitioning and the successor function, shared this common notion. A critical step in this learning could be the acquisition of knowledge of the base-10 system. Children with the highest counting range may understand this knowledge better (Guerrero et al., 2020; Schneider et al., 2021a, 2021b; Wege, 2023), and thus, they could be better prepared to understand the additive nature of numbers.

Future studies should address the development of additive reasoning in a more comprehensive way by adding other types of part-whole relationships, as commutativity and associativity (Eaves et al., 2021; Guerrero & Park, 2023; Wege et al., 2020). Likewise, it is important to study the developmental consequences of this early understanding of additive knowledge on children's formal mathematics learning throughout primary school. Several studies have shown the significant effect that early mathematics has 2 to 4 years later on children's mathematical performance (Hirsch et al., 2018; Jordan et al., 2009). However, the long-term effect of early additive knowledge is not well understood (see Ching & Kong, 2022).

Educational Implications

Important educational implications could be drawn from the findings of the current study in order to inform practice and policy at the preschool level. Typically, kindergarten mathematical activities tend to focus mainly on rote counting (Solovieva et al., 2022). Even when tasks on counting small sets of objects are used, the prompts emphasize one-to-one correspondence among objects and the verbal counting sequence. However, the current study shows that between 4 and 5 years of age is a critical period for learning additive notions of the natural number system. Therefore, preschool curricula should include a wide variety of additive composition tasks to foster this learning further (Zúñiga, 2014). Additive reasoning is critical for success in school mathematics and is required for good performance in STEM disciplines. For instance, Geary et al. (2013) found that early numeracy skills, including additive reasoning, predicted math performance in 13-years-olds. Thus, instructors should pay more attention to the development of additive reasoning skills in preschool children (Björklund et al., 2021).

The findings of the current research also show an association between counting skills and children's additive reasoning skills. However, it leaves in the dark what drives this association. A reasonable hypothesis presented above is related to how children can begin to learn the additive structure of natural numbers from the logic of the verbal counting system; therefore, at the educational level, it is important for instructors to develop activities that can promote the understanding of this additive logic (Alsina, 2022; Flores et al., 2024; Santana et al., 2018). For example, instructors could implement additive composition activities as finding all the *partners* that form a number or forming a number from two partners, through varied representations of number and quantities (numerical words, visual resources, math symbols) (Fuson, 2019). Diverse studies have shown that young children from different economic and cultural backgrounds can participate in and profit from early instructional activities centered on mathematical abilities (Clements et al., 2007; Dyson et al., 2015; Fuson et al., 1997; Siegler & Ramani, 2008). Therefore, young children at the kindergarten level could benefit from activities that allow them to comprehend the N+1 rule that governs the number system along with activities where they have to compose numbers from other numbers and decompose them back.

Limitations

As a result of the restrictions related to the Covid-19 pandemic, the test sessions were carried out through online platforms. Under these circumstances it is difficult to control for environmental

factors and parental interference. In this study, we were very careful to avoid parental interference, but this increased the dropout rate of participants. Likewise, in relation to the test modality, all the numerical tasks were delivered through on-screen animations with non-manipulable objects. This could make it difficult for children to understand the mathematical situation presented in each task. However, it is worth noting the similarity between the current pattern of results on the Unit Task and previous studies. This could suggest that the children in our study had an appropriate understanding of the tasks. Finally, we believe that this research contributes to current efforts to develop online research strategies, as some potential advantages have been identified (Sheskin, et al., 2020). For example, online testing contributes to more diverse samples and can encourage family participation for longer periods and more sessions. Therefore, more effort should be devoted to studying the implications of online testing and developing tools to improve the efficiency of data collection.

References

Alsina, A. (2022). *Itinerarios didácticos para la enseñanza de las matemáticas (3-6 años).* GRAÓ.

Badiou, A. (2008). *Number and Numbers*. Polity Press.

Bermejo, V. (2004). *Cómo enseñar matemáticas para aprender mejor.* CCS.

Björklund, C., Ekdahl, A. L., & Kempe, U. R. (2021). Implementing a structural approach in preschool number activities. Principles of an intervention program reflected in learning. *Mathematical Thinking and Learning*, *23*(1), 72-94, https://doi.org/10.1080/10986065.2020.1756027

Bower, C. A., Mix, K. S., Yuan, L., & Smith, L. B. (2022). A network analysis of children's emerging place-value concepts. *Psychological Science, 33*(7), 1112-1127. https://doi.org/10.1177/09567976211070242

Buijsman, S. (2020). Two roads to the successor axiom. *Synthese, 197,* 1241–1261. https://doi.org/10.1007/s11229-018-1752-5

Canobi, K. H., Reeve, R. A., & Pattison, P. E. (2002). Young children's understanding of addition concepts. *Educational Psychology, 22*(5), 513-532. https://doi.org/10.1080/0144341022000023608

Canobi, K. H., Reeve, R. A., & Pattison, P. E. (2003). Patterns of knowledge in children's addition. *Developmental Psychology, 39*(3), 521–534. https://doi.org/10.1037/0012-1649.39.3.521

Carey, S. (2009). *The Origin of Concepts*. Oxford University Press.

Carraher, T. N., Carraher, D. W., & Schliemann, A. D. (1985). Mathematics in the streets and in schools. *British Journal of Developmental Psychology, 3*, 21-29. https://doi.org/10.1111/j.2044-835X.1985.tb00951.x

Chamorro, M. (2005). *Didáctica de las Matemáticas para Educación Infantil.* Pearson Education.

Cheung, P., Rubenson, M., & Barner, D. (2017). To infinity and beyond: Children generalize the successor function to all possible numbers years after learning to count. *Cognitive Psychology, 92*, 22-36. https://doi.org/ 10.1016/j.cogpsych.2016.11.002

Ching, B. H. H., & Kong, K. H. C. (2022). Understanding additive composition is important for symbolic numerical magnitude processing. *Cognitive Development*, *62*, 101170. https://doi.org/10.1016/j.cogdev.2022.101170

Ching, B. H. H., & Nunes, T. (2017). Children's understanding of the commutativity and complement principles: A latent profile analysis. *Learning and Instruction*, *47*, 65-79. https://doi.org/10.1016/j.learninstruc.2016.10.008

Cho, H.Y., Vasilyeva, M., & Laski, E. V. (2024) Statistical learning and mathematics knowledge: the case of arithmetic principles. *Frontiers in Developmental Psychology, 2:1370028*. https://doi.org/10.3389/fdpys.2024.1370028

Clements, D. H., & Sarama, J. (2007). Effects of a preschool mathematics curriculum: Summative research on the Building Blocks project. *Journal for Research in Mathematics Education*, *38*(2), 136-163. https://doi.org/10.2307/30034954

Davidson, K., Eng, K., & Barner, D. (2012). Does learning to count involve a semantic induction? *Cognition, 123*(1), 162-173. doi: 10.1016/j.cognition.2011.12.013

Dyson, N., Jordan, N. C., Beliakoff, A., & Hasinger-Das, B. (2015). A kindergarten number-sense

intervention with contrasting practice conditions for low-achieving children. *Journal for Research in Mathematics Education, 46*(3), 331-370. doi: 10.5951/jresematheduc.46.3.0331

Eaves, J., Gilmore, C., & Attridge, N. (2021). Conceptual knowledge of the associativity principle: A review of the literature and an agenda for future research. *Trends in Neuroscience and Education, 23:100152.* doi: 10.1016/j.tine.2021.100152

Flores, P., Coelho, E., Mourão-Carvalhal, M.I. & Forte, P. (2024) Motor activities to improve maths performance in pre-school children with typical development. *Frontiers in Psychology, 15*:1332741. doi: 10.3389/fpsyg.2024.1332741

Fuson, K. C. (1988). *Children's counting and concepts of number.* Springer-Verlag Publishing.

Fuson, K. C., Wearne, D., Hiebert, J. C., Murray, H. G., Human, P. G., Olivier, A. I., Carpenter, T. P., & Fennema, E. (1997). Children's conceptual structures for multidigit numbers and methods of multidigit addition and subtraction. *Journal for Research in Mathematics Education*, 28(2), 130-162. https://doi.org/10.2307/749759

Fuson K. (2019). Relating math words, visual images, and math symbols for understanding and competence. *International Journal of Disability, Development and Education*, *66*(2) 119-132, DOI: 10.1080/1034912X.2018.1535109

Geary, D., Hoard, M., Nugent, L., & Bailey, D. H. (2013). Adolescents' functional numeracy is predicted by their school entry number system knowledge. *PLOS ONE 8*(1): e54651. https://doi.org/10.1371/journal.pone.0054651

Gelman, R. (1993). A rational-constructivist account of early learning about numbers and objects. In D. L. Medin (Ed.). *The psychology of learning and motivation* (pp. 61-96). Academic Press.

Gilmore, C. (2023). Understanding the complexities of mathematical cognition: A multi-level framework. *Quarterly Journal of Experimental Psychology. 76*(9), 1953-1972. doi: 10.1177/17470218231175325.

Guerrero, D., Hwang, J., Boutin, B., Roeper, T., & Park, J. (2020). Is thirty-two three tens and two ones? The embedded structure of cardinal numbers. *Cognition, 203*(3), 104331. https://doi.org/10.1016/j.cognition.2020.104331

Guerrero, D., & Park, J. (2023). Arithmetic thinking as the basis of children's generative number concepts. *Developmental Review, 67*: 101062. https://doi.org/10.1016/j.dr.2022.101062

Hirsch, S., Lambert, K., Coppens, K., & Moeller, K. (2018). Basic numerical competences in large-scale assessment data: Structure and long-term relevance. *Journal of Experimental Child Psychology, 167,* 32-48. https://doi.org/10.1016/j.jecp.2017.09.015

Johnston, A. M., Sheskin, M., & Keil, F. (2019). Learning the relevance of relevance and the trouble with truth: Evaluating explanatory relevance across childhood. *Journal of Cognition and Development, 20*(4), 552-572. https://doi.org/10.1080/15248372.2019.1631167

Jordan, N. C., Kaplan, D., Ramineni, C., & Locuniak, M. N. (2009). Early math matters: Kindergarten number competence and later mathematics outcomes. *Developmental psychology, 45*(3), 850-867. https://doi.org/10.1037/a0014939

Krebs, G., Squire, S., & Bryant, P. (2003). Children's understanding of the additive composition of number and of the decimal structure: what is the relationship? *International Journal of Educational Research, 39*(7), 677-694. https://doi.org/10.1016/j.ijer.2004.10.003

Kullberg, A., & Björklund, C. (2020). Preschoolers' different ways of structuring part-part-whole relations with finger patterns when solving an arithmetic task. *ZDM Mathematics Education, 52*, 767–778. https://doi.org/10.1007/s11858-019-01119-8

Kullberg, A., Björklund, C., Brkovic, I., & Kempe, U. R. (2020). Effects of learning addition and subtraction in preschool by making the first ten numbers and their relations visible with finger patterns. *Educational Studies in Mathematics, 103*, 157-172. https://doi.org/10.1007/s10649-019-09927-1

Le Corre, M., Brannon, E. M., Van de Walle, G., & Carey, S. (2006). Re-visiting the competence/performance debate in the acquisition of the counting principles. *Cognitive Psychology, 52*(2), 130-169. https://doi.org/10.1016/j.cogpsych.2005.07.002

Medina, D. A. (2023). Comprensión del valor de posición: equivalencia numérica y composición aditiva como

facilitadores en la escritura de numerales. *Avances en Psicología Latinoamericana, 41*(2), 1-23. https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.9882

Nunes, T., & Bryant, P. (1996). *Children doing mathematics*. Blackwell.

Obando, G., & Vásquez, N. (Octubre, 2008). *Pensamiento numérico del preescolar a la educación básica* [curso]. 2018. 9 Encuentro Colombiano de Matemática Educativa. Valledupar, Colombia. http://funes.uniandes.edu.co/933/1/1Cursos.pdf

Piantadosi, S. T., Jara-Ettinger, J., & Gibson, E. (2014). Children's learning of number words in an indigenous farming-foraging group. *Developmental Science, 17,* 553-563. https://doi.org/10.1111/desc.12078

Prather, R. W., & Alibali, M. W. (2009). The development of arithmetic principle knowledge: How do we know what learners know? *Developmental Review, 29*(4), 221-248. https://doi.org/10.1016/j.dr.2009.09.001

Resnick, L. B. (1989). Developing mathematical knowledge. *American Psychologist, 44*(2), 162-169. https://doi.org/10.1037/0003-066X.44.2.162

Robinson, K. M., & Dubé, A. K. (2013). Children's additive concepts: Promoting understanding and the role of inhibition. *Learning and Individual Differences, 23,* 101-107. https://doi.org/10.1016/j.lindif.2012.07.016

Rodríguez, P., Lago, M., Caballero, S., Dopico, C., Jiménez, L., & Solbes, I. (2008). El desarrollo de las estrategias infantiles. Un estudio sobre el razonamiento aditivo y multiplicativo. *Anales de Psicología, 24*(2), 240-252. https://www.redalyc.org/pdf/167/16711589007.pdf

Santana-Espitia, A. C., Fajardo-Santamaría, J. A., & Herrera-Rojas, A. N. (2018). El aprendizaje situado de la adición y la sustracción. *Revista Latinoamericana de Etnomatemáticas, 11*(2), 98-119. https://www.revista.etnomatematica.org/index.php/RevLatEm/article/view/515/440

Sarnecka, B. W., & Carey, S. (2008). How counting represents number: What children must learn and when they learn it. *Cognition, 108*(3), 662-674. https://doi.org/10.1016/j.cognition.2008.05.007

Saxton, M., & Cakir, K. (2006). Counting-on, trading and partitioning: Effects of training and prior knowledge on performance on base-10 tasks. *Child Development, 77*(3), 767-785. https://doi.org/10.1111/j.1467-8624.2006.00902.x

Schneider, R. M., Pankonin, A., Schachner, A., & Barner, D. (2021a). Starting small: Exploring the origins of successor function knowledge. *Developmental Science 24*(4):*e13091*. https://doi.org/10.1111/desc.13091

Schneider, R. M., Sullivan, J., Guo, K., & Barner, D. (2021b). What counts? Sources of knowledge in children's acquisition of the successor function. *Child Development, 92*(4):e476-e492. https://doi.org/10.1111/cdev.13524

Schneider, R. M., Sullivan, J., Marušič, F., Žaucer, R., Biswas, P., Mišmaš, P., Plesničar, V., & Barner, D. (2020). Do children use language structure to discover the recursive rules of counting? *Cognitive Psychology, 117,* 101263. https://doi.org/10.1016/j.cogpsych.2019.101263

Sheskin, M., Scott, K., Mills, C. M., Bergelson, E., Bonawitz, E., Spelke, E. S., Fei-Fei, L., Keil, F. C., Gweon, H., Tenenbaum, J. B., Jara-Ettinger, J., Adolph, K. E., Rhodes, M., Frank, M. C., Mehr, S. A., & Schulz, L. (2020). Online developmental science to foster innovation, access, and impact. *Trends in Cognitive Sciences, 24*(9), 675-678. https://doi.org/10.1016/j.tics.2020.06.004

Siegler, R. S., & Ramani, G. B. (2008). Playing linear numerical board games promotes low-income children's numerical development. *Developmental Science, 11*, 655-661. https://doi.org/10.1111/j.1467-7687.2008.00714.x

Solovieva, Y., Baltazar-Ramos, A. M., Quintanar-Rojas, L., Escotto-Córdova, E. A., & Sidneva, A. (2022). Analysis of mathematics teaching programmes at preschool age based on activity theory. *Culture and Education*, *34*(1), 72-101. https://doi.org/10.1080/11356405.2021.2006910

Sophian, C., Harley, H., & Manos Martin, C. S. (1995). Relational and representational aspects of early number development. *Cognition and Instruction, 13*(2), 253–268. https://doi.org/10.1207/s1532690xci1302_4

Spaepen, E., Gunderson, E., Gibson, D., Goldin-Meadow, S., & Levine, S. (2018). Meaning before order: Cardinal principle knowledge predicts improvement in understanding the successor principle and exact ordering.

Cognition, 180, 59-81. https://doi.org/10.1016/j.cognition.2018.06.012

Sullivan, J., Cramer-Benjamin, S., Alvarez, J., & Barner, D. (2023). Everything is infinite: Children's beliefs about endless space, time, and number. Open Mind, *7*, 715–731. https://doi.org/10.1162/opmi_a_00104

Wege, T. E., Batchelor, S., Inglis, M., Mistry, H., & Schlimm, D. (2020). Iconicity in mathematical notation: Commutativity and symmetry. *Journal of Numerical Cognition, 6*(3), 378-392. https://doi.org/10.5964/jnc.v6i3.314

Wege, T. E., Gilmore, C., & Inglis, M. (2023, preprint). Children's early understanding of the successor function. https://doi.org/10.31234/osf.io/5aytf

Zúñiga, M. (2014). El aprendizaje de la descomposición aditiva en la educación infantil: Una propuesta para niños y niñas de 5 y 6 años. *EDMA 0-6: Educación Matemática en la Infancia, 3*(2), 84-113. https://revistas.uva.es/index.php/edmain/article/view/5842/4361

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.109781

Psychometric Validation of the Risky Sexual Behaviors Scale in Mexican Adults

ÁNGEL EDUARDO VELASCO ROJANO
Instituto Nacional de Rehabilitación, Universidad Nacional Autónoma de México

ALEJANDRA GARCÍA-SAISÓ
Facultad de Psicología, Universidad Nacional Autónoma de México

JORGE LUIS MONTES DOMÍNGUEZ
Universidad Autónoma de Occidente

YIBLIA K. SALGADO CEDANO
Facultad de Psicología, Universidad Nacional Autónoma de México

ABIGAIL CASAS-MUÑOZ
Instituto Nacional de Pediatría CEAVI-P, Universidad Nacional Autónoma de México

AARÓN RODRÍGUEZ-CABALLERO
Instituto Nacional de Pediatría CEAVI-P, Universidad Nacional Autónoma de México

How to cite this article: Velasco Rojano, A. E., García-Saisó, A., Montes-Domínguez, J. L., Salgado-Cedano, Y. K., Casas-Muñoz, A. and Rodríguez-Caballero, A. (2025). Psychometric Validation of the Risky Sexual Behaviors Scale in Mexican Adults. *Revista Colombiana de Psicología, 34(1).* pp 111-123. https://revistas.unal.edu.co/index.php/psicologia/article/view/109781

Correspondence: Ángel Eduardo Velasco Rojano (https://orcid.org/0000-0003-0858-4568); Instituto Nacional de Pediatría, Universidad Nacional Autónoma de México; México; e-mail: eduardorojanova@gmail.com

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: JUNE 28TH, 2023–ACCEPTED: FEBRUARY 19TH, 2024

Psychometric Validation of the Risky Sexual Behaviors Scale in Mexican Adults

Abstract

Sexually transmitted infections (STIs) are a growing public health problem in Latin America. One key factor in diminishing their spread is the reduction of risky sexual behaviors, which requires reliable and valid information on the subject. This study aimed to validate a scale for measuring risky sexual behaviors in adults from Mexico City. We worked with 750 participants (56.66% women and 43.34% men) between 18 and 60. An initial version of the scale was administered online after obtaining informed consent. The scale's distribution, discrimination, reliability, and validity were analyzed. A 23-item scale was obtained with good reliability (ordinal α = .91). It exhibited a six-factor structure that explained 47% of the variance and demonstrated good fit ($\chi^2/gl = 2.84$, $p < .01$; CFI = .96; RMSEA = .05, 95% CI [.04-.05]; SRMR = .08). The scale is reliable and valid for measuring risky sexual behaviors in Mexican adults.

***Keywords*:** Psychometric analysis, risky sexual behavior, adults, Mexicans.

Validación psicométrica de la escala de conductas sexuales de riesgo en adultos mexicanos

Resumen

Las infecciones de transmisión sexual son un problema de salud pública que va en aumento en América Latina, un factor clave para reducirlas es disminuir las conductas sexuales de riesgo, por lo que se requiere información confiable y válida al respecto. El objetivo fue validar una escala para medir conductas sexuales de riesgo en adultos de la Ciudad de México. Se trabajó con 750 participantes, 56.66% mujeres y 43.34% hombres, entre los 18 y los 60 años. Se aplicó una versión inicial de la escala en línea después de obtener consentimiento informado. Se llevó a cabo el análisis de la distribución, discriminación, confiabilidad y validez de escala. Se obtuvo una escala con 23 reactivos, buena confiabilidad (α ordinal=.91), con una estructura con seis factores que explica el 47% de la varianza y tiene adecuado ajuste ($\chi 2/gl=2.84$, $p<.01$; CFI=.96; RMSEA=.05 95%IC (.04-.05); SRMR=.08). La escala es confiable y válida para medir conductas sexuales de riesgo en adultos mexicanos.

***Palabras clave*:** Análisis psicométrico, conductas sexuales de riesgo, adultos, mexicanos.

Introduction

Sexually transmitted infections (STIS) and Human Immunodeficiency Virus (HIV) are significant current public health problems in Latin America (United Nations Organization, 2020). Official figures on new HIV infections show a 5% increase in new cases between 2010 and 2021, resulting in 2.2 million diagnosed individuals in the region. Despite improvements in treatment coverage, more must be done to ensure prompt diagnosis and enrollment in care. About 30% of diagnosed individuals are estimated not to receive antiretroviral therapy (Joint United Nations Programme on HIV/AIDS, UNAIDS 2022).

The United Nations has called for promoting human rights for diagnosed individuals and vulnerable groups to reduce new HIV infections and address inequality. Additionally, societies must be better prepared to overcome diseases (UN, 2022). One critical action to achieve these goals is educating and empowering community members about sexuality (Alfonso & Figueroa, 2017; UNAIDS, 2022).

To successfully implement interventions that prioritize specific populations, providing information that caters to their unique needs and experiences without passing judgment is crucial. Emphasizing the significance of sexual and reproductive healthcare instead of relying on ineffective prohibitive measures that have been previously used is essential. Therefore, the access to reliable information is necessary (Alfonso, Santillano, Figueroa, Rodríguez, & García, 2020).

One key aspect to investigate is risky sexual behaviors, which, according to various authors, can potentially increase the likelihood of harmful outcomes. These behaviors include early sexual debut, unprotected sex, exchanging sex for money or goods, sexualized substance consumption, having sex with casual partners, having sex with multiple partners, and sharing sex toys (Mirzaei, Ahmadi, Saadat, & Ramezani, 2016; Rodríguez & Becerra, 2022; Saeteros, Pérez, & Sanabria, 2015).

Different fields, as medicine, psychiatry, psychology, anthropology, and public policy, have studied risky sexual behaviors. They measure them using questionnaires or alternative forms (Mirzaei et al., 2016).

The alternative forms include self-report behavior records and biological markers. Behavior records consist of diaries or logs of sexual activity over a specific period, aiming to obtain dynamic information about sexual behaviors (Morrison-Beedy, Carey, Feng, & Tu, 2008). Various potential biases can affect the accuracy of sexual contact reports. Some examples include not considering the total number of sexual encounters based on their definition, difficulty recalling specific details, and the influence of social desirability (Mirzaei et al., 2016; Schroder, Carey, & Vanable, 2003). Detecting personal biological markers for studies like prostate antigen or Y chromosome in vaginal fluids is more accurate but more complex and expensive (Giguère et al., 2019; Mirzaei et al., 2016).

Another approach to tackling these potential challenges is to measure risky sexual behaviors through questionnaires. If these questionnaires exhibit robust psychometric properties, they are less prone to biases than behavioral records and more straightforward to administer than biological markers. Questionnaires assessing risky sexual behaviors can generally be categorized into two primary types: surveys that target broader population sectors and specific questionnaires tailored for smaller populations (Mirzaei et al., 2016).

Questionnaires for measuring risky sexual behaviors generally vary in two characteristics. The first is their focus, which can be general, covering many risk behaviors (Mercer, Wellings, & Johnson, 2014; Raghupathy & Hahn-Smith, 2011), or specific to a particular behavior, for example, having sex without using a condom (Giguère et al., 2019; Rodrigues, Lopes, Pereira, Prada, & Garrido, 2020). Research studies vary in their target populations based on conditions that make them vulnerable, as age, sex work, or specific professions among

university students. Examples include studies by Pengpid & Peltzer (2021), Thepthien & Celyn (2022) for adolescents, Castilla et al. (1999) for adults, and Giguère et al. (2019) for sex workers. Some studies also focus on university students in some professions (Badillo, Mendoza, Barreto, & Díaz, 2020) or people with disabilities (Maart & Jelsma, 2010).

In Mexico, surveys conducted at a national level gather information on the sexual and reproductive health of adolescents and adults. These surveys also cover risky sexual behaviors, as the National Health and Nutrition Survey (Shamah-Levy et al., 2022). However, this survey does not include all the risky behaviors identified in the literature.

Additional data is required to enhance the control and prevention of STDs, as the existing literature is inadequate. Developing and psychometrically validating an instrument to measure risky sexual behaviors will contribute to a low-cost, high-quality tool for research development. This tool will generate reliable information on the prevalence of these behaviors and their association with public health issues as teenage pregnancies, sexually transmitted infections, and exposure to violence (Moral & Garza, 2016).

Therefore, this study aimed to develop and psychometrically validate a scale to measure risky sexual behaviors in adults in Mexico City.

Method

Study Type

An instrumental psychometric study was conducted to determine the properties of measurement instruments. Instrumental studies aim for this purpose (Montero & León, 2002).

Participants

The study included 750 adults from Mexico City selected non-probabilistically by convenience, with 56.66% (425) females and 43.34% (325) males. The participants' ages ranged from 18 to 60 years, with an average age of 26.50 (SD = 6.57). In terms of sexual preference or orientation, 36% (270) identified as heterosexual, 34% (255) as homosexual, and 30% (225) as bisexual or pansexual. Regarding the participants' educational level, 4.76% (20) had primary education, 35.71% (150) had secondary education, and 59.52% (250) had university education.

To determine the appropriate sample size for RMSEA, a power analysis was conducted with 43 items, 946 degrees of freedom, a type 1 error probability of $\alpha = 0.05$, and a desired statistical power of $1\text{-}\beta = 0.80$ (MacCallum, Browne, & Sugawara, 1996). This analysis resulted in a minimum sample size of 375 participants, an exceeded number.

The sample was divided into two balanced parts for analysis. This approach allowed for both exploratory and confirmatory studies with different samples, resulting in a more accurate representation of the relationships between variables and reducing the need to rely on the unique characteristics of a single sample (Paniagua, Alvarado, Olivares, Romero-Suárez, & Aguayo-Estremera, 2022).

Instrument

An initial scale version constructed using the Delphi methodology was applied (Dragostinov et al., 2022). Initially, a group of six experts, consisting of three physicians and three psychologists with experience in providing sexual education to adolescents, reviewed the definitions of six risky sexual behaviors proposed in the literature (Mirzaei et al., 2016; Rodríguez & Becerra, 2022; Saeteros, Pérez, & Sanabria, 2015): unprotected sex, transactional sex, sexualized substance consumption, sex with casual partners, sex with multiple partners, and sharing sex toys.

After reviewing the definitions, they proposed items to measure each behavior, forming an initial pool of 100 items. By consensus, they selected the items that best represented each behavior. For the behavior of sexualized substance consumption, they selected eight items corresponding to the main substances identified for sexualized use.

They selected seven items for the other behaviors, resulting in a version with 43 items.

The items were statements with five Likert-type response options in frequency, ranging from "never" to "always". Additionally, an open-ended question was included: *How old were you when you had sexual intercourse for the first time?* To assess concurrent validity, a behavioral record was kept of the participants' number of different sexual partners over six months.

Data Collection Procedure

Potential participants were contacted through social media and received an invitation explaining the purpose of the study. After obtaining informed consent, the scale was administered using an online survey system between June 13th and 25th, 2022. At the end of the survey, participants were thanked for their participation.

Ethical Considerations

This study followed the Ethical Principles for Research Involving Human Subjects established in the Declaration of Helsinki and the Regulation of the General Health Law on Health Research. An institutional research ethics committee approved the study, with record number 276/2023 (Regulation of the General Health Law on Health Research, 2014; Helsinki Declaration, 1964).

Before the study, the participants were provided with clear information about the purpose of the research and the voluntary nature of their participation. Informed consent was obtained, ensuring they understood they had the right to refuse or withdraw from the study without facing any consequences. It was explained that the study did not incur any costs or offer direct payment or benefits for participation. A privacy notice was provided by the General Law on the Protection of Personal Data Held by Obligated Subjects. It explained the mechanisms in place to safeguard the confidentiality of personal information and uphold individuals' ARCO rights (General Law on the Protection of Personal Data Held by Obligated Subjects, 2017).

For the security of the participants' information, only the researchers had access to the database generated by the electronic system. They agreed to keep the information confidential and not to transfer it. Moreover, no data on participants' names, surnames, email addresses, or postal addresses were collected. The only personal information collected was the participants' gender and age.

Statistical Data Analysis Procedure

To psychometrically validate the scale, evidence was obtained for four basic psychometric properties, according to Edwards and Wirth (2009): distribution, discrimination, reliability, and construct validity. Specific analyses were planned for this purpose.

A frequency distribution analysis was conducted in terms of percentages to examine the distribution of responses, accompanied by the Anderson-Darling univariate normality test and the Royston multivariate normality test. These tests were chosen as they are suitable for the sample size used in scale validation (Wijekularathna, Manage, & Scariano, 2019) using the R software with the MVN package (Korkmaz, Goksuluk, & Zararsiz, 2014).

Two analyses were performed for the distribution and construct validity based on factorial structure, each using a different half of the sample. First, an exploratory factor analysis with minimum least squares extraction and oblique rotation was conducted to suit the data type (Fabrigar, Wegener, MacCallum, & Strahan, 1999). This analysis was performed using the R software with the psych package (Revelle, 2022).

Subsequently, confirmatory factor analysis was conducted with the second half of the sample since a prior hypothesis about its structure was derived from the exploratory factor analysis (Edwards & Wirth, 2009). Two structures were compared to confirm that the structure obtained in the exploratory analysis provided the best fit. The first

structure had one factor, while the second from the exploratory analysis had six factors.

The identification was performed by fixing the loading of the first item to one to define the metric of the latent variable (Kenny & Milán, 2012). A robust estimation method, diagonally weighted least squares (DWLS), was chosen due to its suitability for working with ordinal data that deviates from normality (Li, 2016; West, Taylor, & Wu, 2012). To determine if an item was adequately related to the underlying latent variable, indicating adequate discriminatory power, a lambda value > 0.40 was sought (Whittaker, 2012).

Multiple criteria were considered to evaluate the model fit. The chi-square test, divided by its degrees of freedom, needs to have a value of less than three, regardless of its probability (La Du & Tanaka, 1989). Additionally, both the standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA) had to be less than or equal to .08 (MacCallum, Browne, & Sugawara, 1996). Finally, the comparative fit index (CFI) had to be at least .95 (Hu & Bentler, 1999). The analysis was performed using the R software with the Lavaan package (Rosseel, 2012).

To assess reliability, an analysis of internal consistency was conducted using the appropriate ordinal Alpha coefficient for the scale's data type (Trizano & Alvarado, 2016). This analysis was performed using the R software with the psych package (Revelle, 2022).

To obtain evidence of concurrent validity, Pearson product-moment correlations were calculated between the scale's factor scores and the behavioral record of the number of sexual partners. This analysis was also conducted using the R software with the psych package (Revelle, 2022).

Results

Based on the frequency distribution analysis, it was found that all response options were selected for each item. However, the group did not follow a normal distribution in the Royston multivariate normality test and individually in the Anderson-Darling univariate normality test, as seen in Table 1. (Royston = 8605.12, $p < .01$)

Table 1
Items distribution analysis

Item	Response option percentage					Anderson-Darling normality test
	Never	Few times	Some times	Many times	Always	
1	14.15	9.74	19.75	28.17	28.17	34.75**
2	92.79	4.13	1.6	1.2	0.26	242.49**
3	41.12	23.36	23.89	10.14	1.46	48.28**
4	83.57	10.41	3.73	1.73	0.53	186.45**
5	19.75	7.2	24.69	17.62	30.7	36.99**
6	87.18	4.67	4.27	1.6	2.26	210.83**
7	95.46	2.13	1.46	0.4	0.53	260.17**
8	57.94	13.08	12.95	7.47	8.54	88.20**
9	68.35	19.22	8.01	3.02	1.2	118.12**
10	83.44	11.08	2.67	1.46	1.33	184.35**
11	36.98	9.07	20.56	18.55	14.81	43.21**
12	14.68	7.34	19.62	25.5	32.84	39.99**
13	90.38	4.27	2.93	1.86	0.53	229.31**
14	81.17	13.08	3.73	1.2	0.8	172.17**
15	94.92	3.33	1.2	0.26	0.26	256.16**

16	72.76	10.68	12.41	3.2	0.93	139.34**
17	75.56	6.54	8.41	4.13	5.34	154.03**
18	25.23	3.2	9.47	16.28	45.79	76.15**
19	75.43	10.01	10.28	2.93	1.33	149.85**
20	24.43	11.21	13.75	22.96	27.63	40.94**
21	63.55	12.68	12.28	9.07	2.4	104.92**
22	90.25	4.67	2.67	1.33	1.06	226.88**
23	77.16	10.01	10.68	1.06	1.06	158.21**
24	94.39	2.13	1.86	1.06	0.53	254.73**
25	96.12	2.01	1.33	0.4	0.13	265.77**
26	93.59	2.8	2.26	0.93	0.4	249.21**
27	66.75	15.88	8.94	2.53	5.87	117.27**
28	23.36	4.01	11.08	17.48	44.05	69.16**
29	67.69	14.01	10.28	4.8	3.2	117.93**
30	53.4	21.89	14.28	3.07	7.34	75.90**
31	84.93	11.08	3.07	0.53	0.4	193.44**
32	97.73	1.20	0.67	0.13	0.27	275.10**
33	33.64	3.74	10.55	12.82	39.25	70.39**
34	89.19	3.60	3.74	1.47	2.00	222.97**
35	46.33	12.68	20.83	14.15	6.01	56.92**
36	14.95	6.27	18.82	19.49	40.45	50.07**
37	57.01	20.82	11.88	9.07	1.20	84.43**
38	62.08	13.08	16.68	4.67	3.47	97.54**
39	79.57	8.41	9.21	1.60	1.20	169.47**
40	90.91	4.93	2.93	0.66	0.53	230.59**
41	93.05	3.33	2.26	0.80	0.53	244.78**
42	22.69	1.20	7.61	4.53	63.95	125.21**
43	91.58	3.73	2.26	1.73	0.66	236.42**

**p<.01, Source: Own elaboration

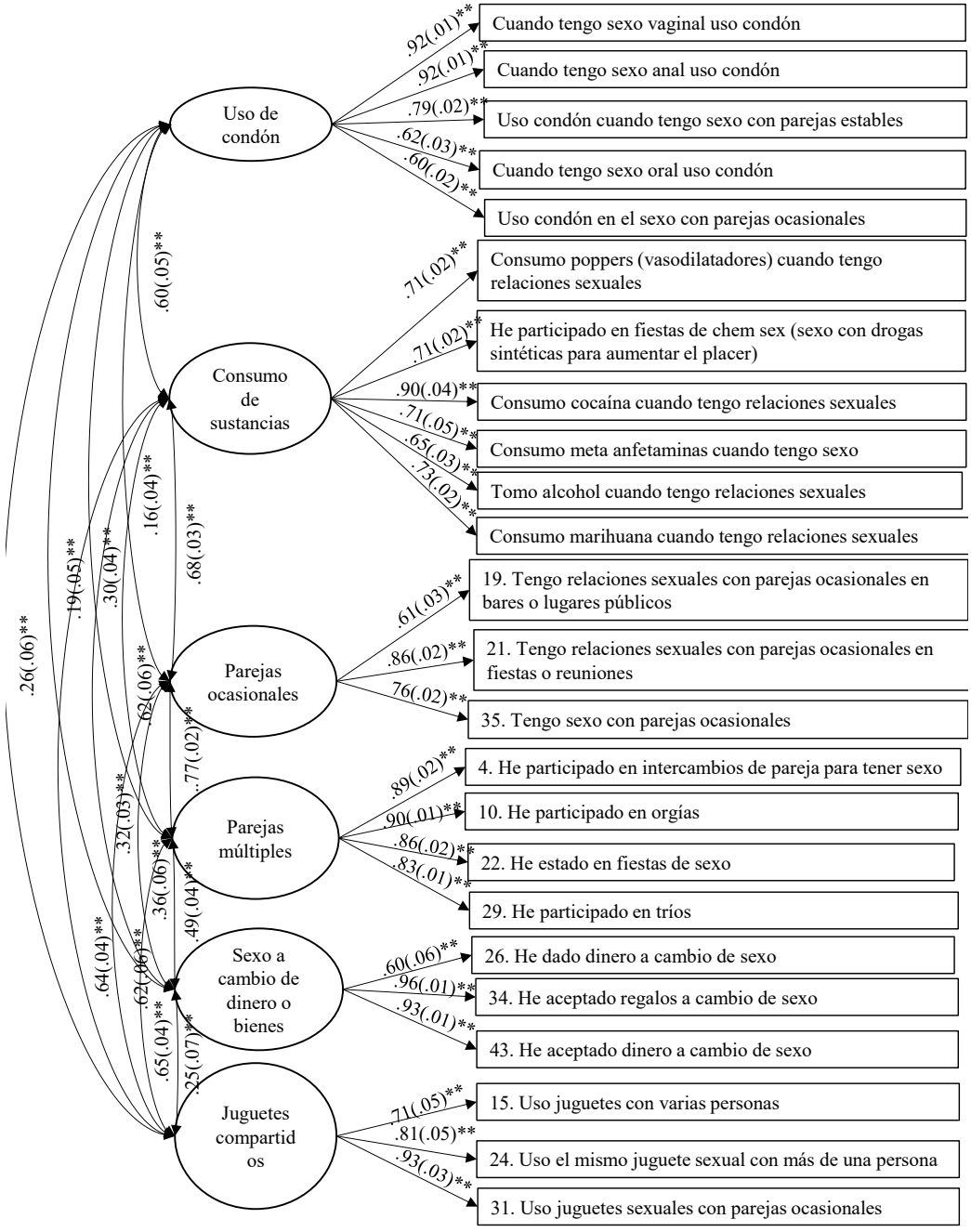
For item discrimination and evidence of construct validity, the structure of the scale was examined through an exploratory factor analysis using unweighted least squares extraction and oblique rotation. A six-factor structure was found, explaining 47% of the variance. In this analysis, 19 items were eliminated due to factor loadings below or equal to .40. The Standardized factor loadings are presented in Table 2.

Table 2
Standardized factor loadings from the exploratory factor analysis with unweighted least squares extraction and oblique rotation

Item	F1. Condomless sex	F2. Substance use in sex	F3. Sex with multiple partners	F4. Casual sex	F5. Pay or charge for sex	F6. Use of sexual toys	Communalities
3	0.91**	-0.03	0	-0.01	-0.04	0.01	0.8
12	0.88**	-0.02	0.02	-0.02	-0.06	0.03	0.77
20	0.82**	-0.01	-0.02	0	0.08	-0.04	0.68
27	0.79**	0.03	-0.06	-0.06	-0.01	0.03	0.65
28	0.74**	-0.07	0.07	0.02	0.1	-0.07	0.53
25	0.07	0.74**	0.06	0.04	-0.1	-0.04	0.59
39	-0.14	0.73**	0.08	0.1	0.04	-0.1	0.54
2	0.14	0.65**	-0.03	0.01	-0.05	-0.01	0.5
7	0.06	0.62**	0.02	0.12	-0.12	0.11	0.48
32	-0.04	0.56**	0.02	-0.08	0.2	-0.09	0.36
37	-0.02	0.53**	-0.08	-0.09	0.42	0.02	0.52
10	-0.03	0.06	0.82**	-0.07	0	0.06	0.72
4	-0.01	-0.04	0.73**	-0.04	0.06	-0.01	0.53
22	0.08	0	0.63**	-0.1	0.01	0.08	0.47
29	0.03	0	0.47**	0.03	0.01	0.33	0.43
19	-0.03	-0.02	-0.06	0.85**	0.08	-0.01	0.74
21	-0.05	0.04	-0.08	0.78**	0.06	-0.01	0.66
35	-0.07	0.06	-0.07	0.76**	0.06	-0.01	0.63
34	0.08	-0.04	0.12	0.34	0.66**	-0.02	0.59
43	0.11	-0.07	0.08	0.31	0.53**	-0.01	0.41
26	0.09	-0.06	0.04	0.38	0.49**	0.01	0.42
31	0.05	-0.01	0.09	-0.02	-0.01	0.66**	0.49
24	-0.03	-0.03	-0.18	-0.05	0.07	0.52**	0.25
15	-0.17	0	0.04	-0.02	0.01	0.47**	0.24
Eigenvalues	4.94	4.73	3.34	2.97	2.23	2.03	
Explained variance %	11%	22%	8%	7%	5%	5%	58%
variance %							

**p<.01, Source: Own elaboration

Subsequently, a confirmatory factor analysis was conducted using diagonally weighted least squares estimation. The results showed that the one-dimensional structure had a poor overall fit for explaining the data (*χ2/df=16.53, p<.01; CFI=.63; RMSEA=.14, 95% CI [.14-.15]; SRMR=.37*). However, the six-factor model obtained from the exploratory factor analysis demonstrated good fit across all indices (*χ2/df=2.84, p<.01; CFI=.96; RMSEA=.05, 95% CI [.04-.05]; SRMR=.08*). The standardized solution of the confirmatory factor analysis is presented in Figure 1.



The reliability of the total scale was good (*ordinal alpha*=.91). The factors' reliability was also good condomless sex (*ordinal alpha*=.88), substance use during sex (*ordinal alpha*=.87), multiple partner sex (*ordinal alpha*=.91), casual partner sex (*ordinal alpha*=.78), sex in exchange for payment (*ordinal alpha*=.90), and shared use of sexual toys (*ordinal alpha*=.87).

Regarding convergent validity, the various factors within the scale displayed significant positive correlations, ranging from low to moderate, with a behavioral log that recorded the number of sexual partners over the past six months. These factors included engaging in unprotected sex (r=.19, p<.001), substance use during sexual activity (r=.21 p<.001), having multiple partners (r=.42 p<.001), engaging in casual sex (r=.39 p<.001), exchanging sex for payment (r=.19 p<.001), and sharing sexual toys (*r=.17 p<.001*).

Discussion

The main objective of this study was to develop and psychometrically validate a scale to measure risky sexual behaviors in adults from Mexico City. The scale underwent thorough analysis to assess its distribution, discrimination, reliability, and validity properties (Edwards & Wirth, 2009).

The psychometric analysis observed that all items exhibited distributions that deviated from a normal probability distribution, aligning with expectations for the measured construct. This suggests that the items effectively captured the variability of risky sexual behaviors. Furthermore, all retained items demonstrated discriminatory solid power, as indicated by their significant and substantial factor loadings exceeding .60 (Whittaker, 2012). The scale also showed good internal consistency, with ordinal alpha values equal to or higher than .80, indicating high reliability (Trizano & Alvarado, 2016).

Regarding the scale's validity, the results provided evidence supporting its construct validity. The coherence between the exploratory and confirmatory analysis structures, with the best-fitting structure aligning with the existing theory on risky sexual behaviors, reinforces the scale's validity (Ondé, 2020; Ondé & Alvarado, 2022). Additionally, the significant and appropriately directed correlations with the behavioral record indicate convergent validity, although the magnitudes of the correlations were not exceptionally high. This can be attributed to the inherent variability of behavioral records and the possibility that they may not capture all aspects related to risky behaviors (Mirzaei et al., 2016; Rodríguez & Becerra, 2022; Saeteros, Pérez, & Sanabria, 2015).

The final version of the scale includes reliable information on six well-established risky sexual behaviors: unprotected sex, transactional sex, sexualized substance consumption, sex with casual partners, sex with multiple partners, and sharing sex toys documented in the literature (Mirzaei et al., 2016; Rodríguez & Becerra, 2022; Saeteros, Pérez, & Sanabria, 2015). An additional question assessing early sexual initiation was included but required a different format for analysis due to its unique nature.

The validated scale can be valuable for researching risky sexual behaviors among Mexican adults. Providing reliable assessment tools can contribute to developing effective interventions aimed at reducing sexually transmitted diseases, particularly among prioritized populations (Alfonso et al., 2020).

However, there are limitations to consider. The study's sample was limited to residents of Mexico City, warranting further research to explore the scale's properties in nationally representative samples and internationally for other countries and world regions as the Americas. Furthermore, although convergent validity was established through correlations with a behavioral record, exploring other methods to ensure validity is essential, as behavioral records may have specific limitations. In conclusion, the developed scale exhibits reliability and validity in measuring risky sexual behaviors among Mexican adults. Its comprehensive assessment of various dimensions

of risk can offer valuable insights for research and intervention efforts in this domain.

References

Alfonso, L., Santillano, I., Figueroa, L., Rodríguez, A .E., & García, L. (2020). Prevención de las conductas sexuales de riesgo en adolescentes del municipio Consolación del Sur. *Revista de Ciencias Médicas de Pinar del Río, 24*(4), e4318. Recuperado de http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1561-31942020000400011&lng=es&tlng=es

Alfonso, L., & Figueroa, L. (2017). Conductas sexuales de riesgo en adolescentes desde el contexto cubano. *Revista de Ciencias Médicas de Pinar del Río, 21*(2), 143-151. Recuperado de http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1561-31942017000200020&lng=es&tlng=es

Badillo, M., Mendoza, X., Barreto, M., & Díaz, A. (2020). Risky sexual behaviors and associated factors among university students in Barranquilla, Colombia, 2019. *Enfermería global*, *19*(59), 422-449. https://dx.doi.org/10.6018/eglobal.412161

Castilla, J., Barrio, G., Belza, M. J., & de la Fuente, L. (1999). Drug and alcohol consumption and sexual risk behavior among young adults: Results from a national survey. *Drug and Alcohol Dependence*, *56*(1), 47-53. https://doi.org/10.1016/S0376-8716(99)00008-3

Dragostinov, Y., Harðardóttir, D., McKenna, P. E., Robb, D. A., Nesset, B., Ahmad, M. I., Romeo, M., Lim, M. I., Yu, C., Jang, Y., Diab, M., Cangelosi, A., Demiris, Y., Hastie, H., & Rajendran, G. (2022). Preliminary psychometric scale development using the mixed methods Delphi technique. *Methods in Psychology, 7*, 100103. https://doi.org/10.1016/j.metip.2022.100103

Edwards, M. C., & Wirth, R. J. (2009). Measurement and the study of change. *Research in Human Development, 6*(2–3), 74–96. https://doi.org/10.1080/15427600902911163

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*(3), 272–299. https://doi.org/10.1037/1082-989X.4.3.272

Giguère, K., Béhanzin, L., Guédou, F. A., Leblond, F. A., Goma-Matsétsé, E., Zannou, D. M., Affolabi, D., Kêkê, R. K., Gangbo, F., Bachabi, M., & Alary, M. (2019). Biological validation of self-reported unprotected sex and comparison of underreporting over two different recall periods among female sex workers in Benin. *Open Forum Infectious Diseases, 6*(2), ofz010, https://doi.org/10.1093/ofid/ofz010

Hernández, R., Fernández, C., & Baptista, M. P. (2014). *Metodología de la investigación*. McGraw Hill.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Kenny, D. A., & Milan, S. (2012). Identification: A nontechnical discussion of a technical issue. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp.145–163). New York: Guilford Press.

Korkmaz, S., Goksuluk, D., & Zararsiz, G. (2014). MVN: An R package for assessing Multivariate Normality. *The R Journal. 6.* 151-162. https://doi.org/10.32614/RJ-2014-031

La Du, T. J., & Tanaka, J. S. (1989). Influence of sample size, estimation method, and model specification on goodness-of-fit assessments in structural equation models. *Journal of Applied Psychology, 74*(4), 625–635. https://doi.org/10.1037/0021-9010.74.4.625

Li, C. H. (2016). The performance of ML, DWLS, and ULS estimation with robust corrections in structural equation models with ordinal variables. *Psychological Methods, 21*(3), 369–387. https://doi.org/10.1037/met0000093

Maart, S., & Jelsma, J. (2010). The sexual behavior of physically disabled adolescents. *Disability and rehabilitation, 32*(6), 438–443. https://doi.org/10.3109/09638280902846368

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*, 130-149. https://doi.org/10.1037/1082-989X.1.2.130

Mercer, C. H., Wellings, K., & Johnson, A. M. (2014). What is new about Natsal-3? *Sexually transmitted infections, 90*(2), 80–81. https://doi.org/10.1136/sextrans-2013-051292

Mirzaei, M., Ahmadi, K., Saadat, S. H., & Ramezani, M. A. (2016). Instruments of high-risk sexual behavior assessment: A systematic review. *Materia Socio-Medica, 28*(1), 46–50. https://doi.org/10.5455/msm.2016.28.46-50

Montero, I., & León, O. (2002). Clasificación y descripción de las metodologías de investigación en Psicología. *International Journal of Clinical and Health Psychology, 2*(3), 503-508.

Moral, J., & Garza, D. (2016). Validación local de una escala de conductas sexuales de riesgo en adolescentes escolarizados mexicanos. *Revista Internacional de Psicología, 15*(2), 1-56. https://doi.org/10.33670/18181023.v15i02.226

Morrison-Beedy, D., Carey, M. P., Feng, C., & Tu, X. M. (2008). Predicting sexual risk behaviors among adolescent and young women using a prospective diary method. *Research in Nursing & Health, 31*, 329–340. https://doi.org/10.1002/nur.20263

Ondé, D. (2020). Revisión del concepto de causalidad en el marco del análisis factorial confirmatorio. *Revista Iberoamericana de Diagnóstico y Evaluación RIDEP, 54*(1), 103-117. https://doi.org/10.21865/RIDEP54.1.09

Ondé, D., & Alvarado, J. M. (2022). Contribución de los modelos factoriales confirmatorios a la evaluación de estructura interna desde la perspectiva de la validez. *Revista Iberoamericana de Diagnóstico y Evaluación Psicológica. RIDEP, 66*(5), 5-21. https://doi.org/10.21865/RIDEP66.5.01

Organización de las Naciones Unidas ONU. (1 de diciembre de 2020). El VIH, un grave problema de salud pública en América Latina exacerbado por la pandemia. *Noticias ONU Mirada global Historias humanas*. https://news.un.org/es/story/2020/12/1484902

Organización de las Naciones Unidas ONU. (10 de octubre de 2022). ONUSIDA convoca reunión de emergencia ante la subida de contagios por VIH en 28 naciones. *Noticias ONU Mirada global Historias humanas*. https://news.un.org/es/story/2022/10/1516037

Paniagua, D., Alvarado, J. M., Olivares, M., Romero-Suárez, M., & Aguayo-Estremera, R. (2022). Estudio de seguimiento de las recomendaciones sobre análisis factorial exploratorio en RIDEP. *Revista Iberoamericana de Diagnóstico y Evaluación Psicológica. RIDEP, 66*(5), 127-139. https://doi.org/10.21865/RIDEP66.5.10

Pengpid, S., & Peltzer, K. (2021). Sexual risk behaviour and its correlates among adolescents in Mozambique: Results from a national school survey in 2015, SAHARA-J. *Journal of Social Aspects of HIV/AIDS, 18*(1), 26-32, https://doi.org/10.1080/17290376.2020.1858947

Programa Conjunto de las Naciones Unidas sobre el VIH/sida ONUSIDA. (2022). *In danger: UNAIDS Global AIDS Update 2022*. Geneva: Programa Conjunto de las Naciones Unidas sobre el VIH/sida ONUSIDA. Recuperado de https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update_en.pdf

Raghupathy, S., & Hahn-Smith, S. (2011). Reliability of the high school Youth Risk Behavior Survey when administered online. *International Quarterly of community health education, 32*(2), 135–148. https://doi.org/10.2190/IQ.32.2.d

Revelle, W. (2022). *Psych: Procedures for Psychological, Psychometric, and Personality Research*. Northwestern University, Evanston, Illinois. R package version 2.2.5, retrieved June 9, 2022, from https://CRAN.R-project.org/package=psych

Rodrigues, D. L., Lopes, D., Pereira, M., Prada, M., & Garrido, M. V. (2020). Predictors of condomless sex and sexual health behaviors in a sample of Portuguese single adults. *The Journal of sexual medicine, 17*(1), 26–36. https://doi.org/10.1016/j.jsxm.2019.10.005

Rodríguez, L. F., & Becerra, A. (2022). Percepciones asociadas a conductas sexuales de riesgo. *Horizonte Sanitario, 21*(2), 292-298. https://doi.org/10.19136/hs.a21n2.4562

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*(2), 1-36. https://doi.org/10.18637/jss.v048.i02

Shamah-Levy, T., Romero-Martínez, M., Barrientos-Gutiérrez, T., Cuevas-Nasu, L., Bautista-Arredondo, S., Colchero, M. A., Gaona-Pineda, E. B., Lazcano-Ponce, E., Martínez-Barnetche, J., Alpuche-Arana, C., & Rivera-Dommarco, J. (2022). *Encuesta Nacional de Salud y Nutrición 2021 sobre Covid-19. Resultados nacionales*. Cuernavaca, México: Instituto Nacional de Salud Pública. https://doi.org/10.21149/12280

Saeteros, R., Pérez, J., & Sanabria, G. (2015). Conducta de riesgo y problemas sexuales y reproductivos de estudiantes universitarios ecuatorianos. *Humanidades Médicas, 15*(3), 421-439. Recuperado de http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1727812020150003000003&lng=es&tlng=es

Schroder, K. E., Carey, M. P., & Vanable, P. A. (2003). Methodological challenges in research on sexual risk behavior: I. Item content, scaling, and analytical data options. *Annals of behavioral medicine: a publication of the Society of Behavioral Medicine, 26*(2), 76–103. https://doi.org/10.1207/S15324796ABM2602_02

Sociedad Mexicana de Psicología. (2007). *Código ético del psicólogo*. Trillas. http://www.psicologia.unam.mx/documentos/pdf/comite_etica/CODIGO_ETICO_SMP.pdf

Thepthien, B., & Celyn. (2022) Risky sexual behavior and associated factors among sexually-experienced adolescents in Bangkok, Thailand: findings From a school web-based survey. *Reproductive Health, 19*, 127. https://doi.org/10.1186/s12978-022-01429-3

Trizano-Hermosilla, I., & Alvarado, J. M. (2016). Best alternatives to Cronbach's Alpha reliability in realistic conditions: Congeneric and asymmetrical measurements. *Frontiers in Psychology, 7*, 769. https://doi.org/10.3389/fpsyg.2016.00769

West, S. G., Taylor, A. B., & Wu, W. (2012). Model fit and model selection in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of Structural Equation Modeling* (pp. 209-231). New York: Guilford Press.

Wijekularathna, D. K., Manage A. W., & Scariano, S. M. (2019). Power analysis of several normality tests: A Monte Carlo simulation study. *Communications in Statistics–Simulation and Computation, 51*(3), 757-773. https://doi.org/10.1080/03610918.2019.1658780

Whittaker, A. (2012). *Research skills for social work*. London: Sage.

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.111641

Anxiety and Anxiety Disorders among Mexican Children and Adolescents

SUSANA CASTAÑOS CERVANTES

Escuela de Psicología, Facultad de Ciencias de la Salud, Universidad Panamericana, Campus Mixcoac, Ciudad de México, México

ANGELICA OJEDA GARCÍA

Departamento de Psicología, Universidad Iberoamericana, Ciudad de México, México

How to cite this article: Castaños Cervantes, S. and Ojeda García, A. (2025). Anxiety and Anxiety Disorders among Mexican Children and Adolescents. *Revista Colombiana de Psicología*, *34*(1), pp 125-143 https://revistas.unal.edu.co/index.php/psicologia/article/view/11164

Correspondence: Susana Castaños Cervantes (https://orcid.org/0000-0002-3394-6404); Universidad Panamericana, Guadalajara, México. Email: scastanosco2@gmail.com

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: OCTOBER 16TH, 2023–ACCEPTED: AUGUST 16TH, 2024

Anxiety and Anxiety Disorders Among Mexican Children and Adolescents

Abstract

Anxiety and anxiety disorders are more common in children than adults, with an estimated prevalence of 9-21%, indicating a critical mental health issue in childhood. Without early culturally competent and transdiagnostic treatment, anxiety and anxiety disorders can lead to severe negative consequences in all life domains and extend to adulthood, causing impairment and increasing the cost for the individual and society. In Mexico, the prevalence of anxiety disorders among children and adolescents is still ambiguous. Gender and age differences have yet to be addressed, and most childhood cases of anxiety remain undetected and are left untreated. This cross-sectional research examined gender and age differences in anxiety and specific phobia (SP), social anxiety (SA), obsessive-compulsive disorder (OCD), and separation anxiety disorder (SAD) in a sample of 889 Mexican children and adolescents selected randomly. Several statistical analyses were conducted: descriptive, correlation, and gender and age differences. The main results revealed an interaction effect (gender x age group) for SP, SAD, and OCD. The findings obtained will help design culturally competent and gender and age-specific intervention strategies for addressing anxiety and its various disorders in Mexican children and adolescents, thus contributing to them having healthier developmental trajectories.

Keywords: internalizing disorders, gender, age, childhood, adolescence.

Ansiedad y trastornos de ansiedad en niñas, niños y adolescentes mexicanos

Resumen

La ansiedad y los trastornos de ansiedad son más comunes en la niñez que en la adultez, con una prevalencia del 9-21%. Sin un tratamiento temprano, oportuno, culturalmente competente y transdiagnóstico, repercuten negativamente en todos los ámbitos de la vida extendiéndose hasta la edad adulta, causando deterioro e incapacidad y aumentando el costo para el individuo y la sociedad. En México, la prevalencia de ansiedad y sus diversos trastornos en la niñez es desconocida, las diferencias por género y edad todavía no se han abordado y la mayoría de los casos no se detectan ni se tratan. Esta investigación transversal examinó las diferencias por género y edad en ansiedad, fobia específica (FE), ansiedad social (AS), trastorno obsesivo compulsivo (TOC) y trastorno de ansiedad social (TAS) en una muestra de 889 menores mexicanos seleccionados aleatoriamente. Se realizaron análisis descriptivos, de correlación, de diferencias y de varianza. Los principales resultados revelaron un efecto de interacción (género x grupo de edad) para FE, TAS y TOC. Los hallazgos obtenidos contribuirán a elaborar estrategias de intervención culturalmente competentes y específicas por género y edad para abordar la ansiedad y sus diversos trastornos en menores mexicanos, favoreciendo el que tengan un desarrollo socioemocional más saludable.

Palabras clave: ansiedad, trastornos de ansiedad, niñez, adolescencia, sexo.

Anxiety is an uncontrollable, diffuse, unpleasant, and persistent state of negative affect, characterized by apprehensive anticipation regarding unpredictable and unavoidable future danger and accompanied by physiological symptoms of tension and a constant state of heightened vigilance (Barlow, 2002). If early, effective, and culturally competent transdiagnostic treatment is not provided, anxiety can lead to presenting anxiety disorders, the most common mental disorders worldwide before and after the COVID-19 pandemic (Martínez-Fierro et al., 2022).

Anxiety disorders have severe negative consequences in all life domains, as job performance, schoolwork, health, and personal relationships, because they hinder an individual's ability to function normally (American Psychiatric Association, 2022). These disorders mostly begin during childhood, with an average onset age of ten. They often include separation anxiety disorder (SAD), obsessive-compulsive disorder (OCD), specific phobia (SP), social anxiety (SA), panic disorder, agoraphobia, and generalized anxiety disorder (Craske & Stein, 2016).

Globally, anxiety disorders show a continuous increase in prevalence, particularly in certain regions as low- and middle-income countries (LMICs), Latin America, incidence, DALY rates, and associated social and economic burdens (Javaid et al., 2023). The COVID-19 pandemic, according to the World Health Organization (WHO, 2022), exacerbated 25% of the levels of anxiety, which were already a health burden worldwide. The Health at a Glance 2021 Report of the Organization for Economic Cooperation and Development (OECD, 2021) stated that Mexico was one of the countries with higher mental health affectations due to the COVID-19 pandemic. Moreover, during the COVID-19 pandemic, children and adolescents had a higher prevalence of psychological and psychiatric disorders, as stress, anxiety disorders, depressive disorders, suicide risk, and eating disorders. The prevalence of anxiety symptoms was reported at 18.9% among children and adolescents. The rate of mild anxiety was 27%, and moderate anxiety was 7.4% (Xie et al., 2020). The proportion of mild to severe anxiety symptoms was 37.4% (Zhou et al., 2020). The increase in anxiety and anxiety disorders was associated with confinement, social distancing, lack of a stimulating psychosocial context allowing development and growth, and socioeconomic deterioration (Saurabh & Ranjan, 2020), which generated risks to the well-being of children and adolescents (Arantes de Araújo et al., 2021).

Among children and adolescents, anxiety and anxiety disorders affect nearly 1 in 12 children and 1 in 4 adolescents (Kowalchuk et al., 2022). A meta-analysis of 41 studies of children aged 4–18 years in 27 countries found a global prevalence of 65% for anxiety (Polanczyk et al., 2015). Yet, anxiety and anxiety disorders remain largely unrecognized and untreated worldwide (WHO, 2021), particularly in LMICs, as Mexico, and no enduring preventive measures are still available, and, along with frequent therapy resistance, clinical needs remain unaddressed (Penninx et al., 2021). Therefore, it is imperative to invest in tackling these problems, especially because they were exacerbated during and after the COVID-19 pandemic.

In Mexico, 35% of the population consists of children and adolescents, of whom more than 51.1% live in poverty (United Nations Children's Fund [UNICEF Mexico], 2018). Even though the number of epidemiological studies about anxiety and anxiety disorders within Mexico is limited, it is estimated that 39.4% of Mexican children and adolescents present anxiety (Kieling et al., 2011) and that it has increased exponentially throughout the years, specifically as a consequence of the COVID-19 pandemic (López et al., 2021), and among both genders and all group ages (Caraveo-Anduaga & Martínez-Vélez, 2019). Nonetheless, most individuals needing mental health services receive no treatment (Suárez & Kazdin, 2023). Furthermore, three years into the pandemic, Mexico still does not have specific programs to attend to and prioritize mental health based on sufficient and specialized services. Since 2012, there have been only two

programs that do not deal with specialized services but instead refer to actions that indirectly provide psychological care or can plan and coordinate public policy actions on a mental health branch. Also, a specific budget for addressing the mental health needs of children and adolescents has yet to be included in public policies and legislation (World Vision Mexico, 2022).

To effectively address anxiety and anxiety disorders in this Latin population of an LMIC, timely, accurate disease detection and adequate treatment administration are needed, including individualized, more effective approaches for treatment with precision medicine (Penninx et al., 2021). A multilevel approach focused on mental health promotion and prevention is also required because it is crucial to adequately address the needs of anxious children and adolescents, avoiding institutionalization and over-medicalization, prioritizing non-pharmacological approaches, and respecting their rights in line with the United Nations Convention on the Rights of the Child (WHO, 2021). Moreover, it is pivotal to consider socioeconomic status (SES), sex, and age in schooled children and adolescents when addressing anxiety and its disorders. Sex and age are high-impact sociodemographic factors that interfere directly with young people suffering from anxiety (Pereira-Soares & Nunes-Baptista, 2019). For example, Latin girls are usually at a heightened risk for anxiety symptoms (Quiñones-Camacho & Davis, 2022). Schools are often a primary location for receiving psychological services, with 80% of children worldwide relying on school-based services to address their mental health needs (Racine et al., 2021). Lastly, SES can be a risk or protective factor for anxiety and anxiety disorders, depending on its level. Usually, lower SES is a risk factor. In comparison, higher SES is a protective factor since it corresponds to an improved family-quality environment and appropriate mental healthcare access (Reiss, 2013).

This cross-sectional correlational study determined the prevalence of anxiety and SP, SA, SAD, and OCD. It also examined differences by gender and age in a group of Mexican low-SES schooled children and teenagers.

Cognitive Theory (Beck et al., 1985) was the theoretical framework of reference that guided this research. This theory emphasizes the critical role of the mind's cognitions in determining behavior. These cognitions include a person's thoughts, feelings, beliefs, and perceptions. It also describes how people's perceptions of, or spontaneous thoughts about, situations influence their emotional, behavioral (and often physiological) reactions. The developmental psychopathology perspective (Cicchetti & Cohen, 1995; Masten & Braswell, 1991) was also used to consider external (family, social, and cultural environment) and internal (genetic, cognitive) risk and protective factors that contribute to the process and outcome of childhood anxiety.

Girls would present higher indexes of anxiety and its disorders than boys.

A significant two-way interaction effect of age group x gender in anxiety and its disorders would be obtained.

Method

Research Design

A cross-sectional design was used to examine anxiety and anxiety disorders among a sample of Mexican children simultaneously without establishing causality (Lee, 2018).

Participants

Participants included 889 children (476 boys and 413 girls) ages 6-15 years old ($M[SD]$=9.54[2.286]). Approximately 80-100 participants belonged to each grade from first to ninth. Using a simple random sampling method, participants were recruited from several low-SES public elementary and middle schools in Mexico City. All participants were required to 1) reside within the selected school during the data collection period and 2) consent to participate in the study. Participants with insufficient capacity to provide

informed consent, insufficient proficiency in Spanish (spoken) to answer assessment questions, and a primary diagnosis of intellectual disability, head injury, or substance misuse were excluded.

Measurement

Spence Children's Anxiety Scale (SCAS): Adapted to the Mexican population by Hernández et al. (2010). It consists of 38 items rated on a 3-point Likert scale from 0 (Never) to 3 (Often) that assess anxiety. Besides its correspondence to DSM-IV-TR classification, it has an adequate internal consistency (α = 0.80 to 0.93). The cut point to determine the presence of anxiety is 92.

Anxiety Disorders Inventory (ITA-UNAM): Developed for the Mexican population by Hernández et al. (2003) (α = 0.96). It consists of 122 items grouped in four scales that assess several anxiety disorders: OCD (27 items), SP (52 items), SA (27 items), and SAD (16 items). The cut points to determine the presence of these disorders are 106 for SP, 32 for SAD, 47 for SA, and 58 for OCD.

Procedure

The researchers worked with public elementary and middle schools to acquire access to this population. These collaborating institutions were informed of the study's purpose and methods and assured that researchers would follow ethical procedures and guidelines specified by the Mexican General Law of Health (Cámara de Diputados del H. Congreso de la Union, 1984) and the American Psychological Association (APA, 2017). Informed consent was obtained after the study's aims were discussed with the directors of the collaborating institutions, the prospective participants, and their parents or legal guardians. The collaborating institutions and the children's parents or legal guardians provided informed written consent. All eligible participants were invited to collaborate in this study voluntarily and received information about the study's general objectives, use of data, and confidentiality agreement. Participants consenting to the study provided their written consent or fingerprint as written consent when they exhibited reading and writing difficulties. The appropriate measures were taken into account to protect access to the fingerprints by applying the general institutional policies and procedures to secure the information, which included having authorized access to restricted data and to the office buildings where the information is safely placed and secured. Participants received information about the study's general objectives, use of data, and confidentiality agreement. Researchers took care to answer participants' questions without biasing participation choice. Participants were empowered to refuse to answer any question or to discontinue study participation at any time.

The research took place in collaborating institutions' on-site classrooms. Assessment questions were adapted to the participants' cognitive level of understanding, considering their age, developmental level, and evolving capacities. Participants were individually interviewed, and the researchers recorded responses on questionnaires using Google Forms. While interviews lasted approximately 30 to 45 minutes each, no time limit was established.

The collaborating institution's Committee of Ethics and Review Board reviewed and approved this study. This review serves as the Mexican equivalent of an American IRB Review.

Data Analyses

Statistical analyses were carried out using SPSS version 25. These included descriptive correlation analyses employing Pearson correlation and gender differences using Student's t-test. Likewise, the gender odds ratio was calculated using crosstabs. The size effect of the odds ratio was assessed with Cohen's d (Chen et al., 2010; Domínguez-Lara, 2018). Also, the researchers conducted a 2 (gender: boys and girls) x 3 (age group: 6-8 [n=297], 9-10 [n=283], and 11-15 [n=309] years old) factorial analysis of variance to examine differences in anxiety and its various disorders between boys and girls and their corresponding age group. Significant main effects for the gender

factor and interaction effects were analyzed using Bonferroni Correction. The main effects for the factor group of age were analyzed by carrying out posthoc tests with the Tukey-HSD Test.

Results

Results showed that 12% of the sample presented anxiety, 16% SP, 27% SA, 24% SAD, and 18% OCD. A higher prevalence of anxiety and these disorders was observed in girls than in boys and the 9 to 10-year-old group. Compared to boys, girls were found to be 2.3 times more associated with anxiety symptoms, 1.8 times more associated with SP, 1.6 times more associated with SAD, 1.4 times more associated with obsessive-compulsive disorder, and 1.172 times more associated with SA (Table 1). Gender differences were significant according to the Student's t-test on all study variables (Table 2).

Table 1
Odds Ratio by Gender regarding Study Variables (N=889)

Study Variables	OR	95% CI		Size Effect[a]
Anxiety Symptoms	2.305	1.570	3.383	Low
SP	1.844	1.352	2.514	Low
SAD	1.648	1.294	2.100	Low
OCD	1.432	1.076	1.906	Insignificant
SA	1.172	0.942	1.429	Insignificant

Notes: Abbreviations: OR: Odds Ratio, CI: Confidence Interval, SP: Specific Phobia, SAD: Separation Anxiety Disorder, OCD: Obsessive Compulsive Disorder, SA: Social Anxiety.
[a]Size effect according to Cohen's d.

Table 2
Gender Differences among Study Variables using Student's t-test (N=889)

Study Variables	Gender		Levene's Test		Student's t-Test				
	Girl	Boy	F	p Value	t	df	p Value	95% CI	
	M(SD)	M(SD)						Lower Limit	Upper Limit
Anxiety Symptoms	78.66(13.480)	73.80(12.380)	2.374	0.124	-5.610	887	0.000	-6.56992	-3.16452
SP	91.03(20.800)	81.14(19.640)	0.514	0.474	-7.287	887	0.000	-12.55434	-7.22646
SAD	27.39(7.850)	24.93(7.070)	6.908	0.009	-4.882	836.244	0.000	-3.45081	-1.47171
SA	39.83(10.300)	38.05(11.190)	2.795	0.095	-2.449	887	0.015	-3.19932	-0.35245
OCD	47.98(13.290)	44.23(12.930)	0.008	0.931	-4.258	887	0.000	-5.47745	-2.02098

Notes. Abbreviations: M: Mean, SD: Standard Deviation, df: degrees of freedom, CI: Confidence Interval, SP: Specific Phobia, SAD: Separation Anxiety Disorder, OCD: Obsessive Compulsive Disorder, SA: Social Anxiety.

Findings obtained with Pearson's correlation (Table 3) revealed that, in general, correlations between study variables were relatively higher for girls than boys, except for SP and SAD, SP and SA, SA and SAD, and OCD and SA, which were higher in boys than in girls. Also, this analysis showed that anxiety was positively associated with SP, SAD, SA, and OCD for both boys and girls. Furthermore, all anxiety disorders were positively correlated in both genders.

Table 3
Correlation Analysis of Study Variables by Gender (N=889)

Study Variables	1	2	3	4	5	M	SD
1. Anxiety	—-	0.456**	0.392**	0.322**	0.319**	73.790	12.380
2. SP	0.522**	—-	0.752**	0.623**	0.569**	81.140	19.640
3. SAD	0.543**	0.669**	—-	0.600**	0.554**	24.930	7.070
4. SA	0.361**	0.599**	0.522**	—-	0.616**	38.050	11.190
5. OCD	0.462**	0.647**	0.641**	0.540**	—-	44.230	12.930
M	78.660	91.020	27.390	39.830	47.980		
SD	13.480	20.790	7.850	10.300	13.290		

Notes. Abbreviations: M: Mean, SD: Standard Deviation, SP: Specific Phobia, SAD: Separation Anxiety Disorder, OCD: Obsessive Compulsive Disorder, SA: Social Anxiety.

Intercorrelations for boys (n=476) are presented above the diagonal, and intercorrelations for girls (n=413) below the diagonal. Means and standard deviations for male participants are displayed in the vertical columns and means, and standard deviations for female participants are displayed in the horizontal rows. For all study variables, scores were positive, and the higher the scores, the higher the probability of those disorders being correlated.

**p<.01

The factorial variance analysis outcomes showed that a significant interaction effect (gender x age group) was obtained for SP, SAD, and OCD. Significant main effects for gender and group of age were obtained for anxiety and SA (Table 4).

Table 4
Factorial Analysis of Variance with Anxiety and Anxiety Disorders as Dependent Variables and Age Group and Gender as Factors (N=889)

Anxiety				
Factors	**df**	**F**	**p-value**	η^2
Age Group	2	5.969	0.003	0.013
Gender	1	32.238	0.000	0.035
Age Group x Gender	2	.827	0.438	0.002
Error	883			
Total	889			
SP				
Factors	**df**	**F**	**p-value**	η^2
Age Group	2	17.564	0.000	0.038
Gender	1	54.351	0.000	0.058
Age Group x Gender	2	3.488	0.031	0.008
Error	883			
Total	889			
SA				
Factors	**df**	*F*	**p-value**	η^2
Age Group	2	6.457	0.002	0.014
Gender	1	5.946	0.015	0.007
Age Group x Gender	2	2.830	0.060	0.006
Error	883			
Total	889			

SAD				
Factors	**df**	*F*	**p-value**	η^2
Age Group	2	22.093	0.000	0.048
Gender	1	26.039	0.000	0.029
Age Group x Gender	2	3.354	0.035	0.008
Error	883			
Total	889			
OCD				
Factors	**df**	*F*	**p-value**	η^2
Age Group	2	23.879	0.000	0.051
Gender	1	18.285	0.000	0.020
Age Group x Gender	2	7.719	0.000	0.017
Error	883			
Total	889			

Notes. Abbreviations: df: degrees of freedom, η2: Eta squared for measuring size effect, SP: Specific Phobia, SAD: Separation Anxiety Disorder, OCD: Obsessive Compulsive Disorder, SA: Social Anxiety.

Regarding the main effects of gender, results obtained with Bonferroni Correction revealed that girls significantly exhibit more anxiety, $F_{(1,883)}$=32.238, p<.000, and SA, $F_{(1,883)}$=5.946, p=.015, than boys. Concerning the main effects of age group, findings obtained with the Tukey-HSD Test showed that participants in the 9 to 10-year-old group significantly presented more anxiety than those in the 11 to 15-year-old group (p<.05) and a higher index of SA in comparison to participants in the 6 to 8-year-old group (p<.05) (Table 5).

Table 5
Significant Main Effects for Anxiety and SA (N=889)

Anxiety				
Factors	*M*	*Standard Error*	95% CI	
Gender			Lower Limit	Upper Limit
Boys	73.818	0.589	72.663	74.974
Girls	78.725*	0.633	77.483	79.967
Age Group				
6-8 years old	75.952	0.750	74.480	77.424
9-10 years old	78.243	0.764	76.743	79.743
11-15 years old	74.619	0.731	73.185	76.053
SA				
Factors	*M*	*Standard Error*	95% CI	
Gender			Lower Limit	Upper Limit
Boys	38.075	0.491	37.111	39.039
Girls	39.832*	0.528	38.797	40.868
Age Group				
6-8 years old	37.792	0.625	36.565	39.020
9-10 years old	40.786	0.637	39.535	42.037
11-15 years old	38.282	0.609	37.087	39.478

Notes. Abbreviations: M: Mean, SD: Standard Deviation, CI: Confidence Interval, SA: Social Anxiety.

*Mean difference was significant at p<.05.

For interaction effects, outcomes revealed significantly higher indexes of SP, SAD, and OCD in girls than in boys, particularly in the 9-10 and 11-15 age groups (Table 6).

Table 6
Significant Interaction Effects for SP, SAD, and OCD (N=889)

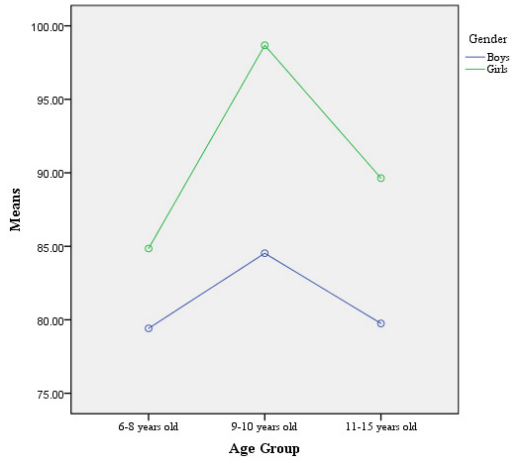
SP					
Age Group	**Gender**	*M*	***Standard Error***	**95% CI**	
				Lower Limit	**Upper Limit**
6-8 years old	Boy	79.416	1.536	76.401	82.430
	Girl	84.847*	1.729	81.454	88.241
9-10 years old	Boy	84.527	1.616	81.356	87.698
	Girl	98.677*	1.716	95.309	102.044
11-15 years old	Boy	79.750	1.564	76.680	82.820
	Girl	89.638*	1.621	86.456	92.819
SAD					
Age Group	**Gender**	*M*	***Standard Error***	**95% CI**	
				Lower Limit	**Upper Limit**
6-8 years old	Boy	24.964	0.563	23.858	26.070
	Girl	26.107	0.634	24.862	27.352
9-10 years old	Boy	26.347	0.593	25.183	27.510
	Girl	30.564*	0.629	29.329	31.799
11-15 years old	Boy	23.563	0.574	22.436	24.689
	Girl	25.685*	0.595	24.517	26.852
OCD					
Age Group	**Gender**	*M*	***Standard Error***	**95% CI**	
				Lower Limit	**Upper Limit**
6-8 years old	Boy	42.681	0.986	40.745	44.617
	Girl	42.084	1.110	39.905	44.263
9-10 years old	Boy	45.840	1.038	43.804	47.876
	Girl	53.564*	1.102	51.401	55.727
11-15 years old	Boy	44.325	1.005	42.353	46.297
	Girl	48.174*	1.041	46.131	50.218

Notes. Abbreviations: M: Mean, CI: Confidence Interval, SP: Specific Phobia, SAD: Separation Anxiety Disorder, OCD: Obsessive Compulsive Disorder.

*Mean difference was significant at p<.05. n=166 boys, n=131 girls in the 6-8 years old group, n=150 boys, n= 133 girls in the 9-10 years old group, n=160 boys, n=149 girls in the 11-15 years old group.

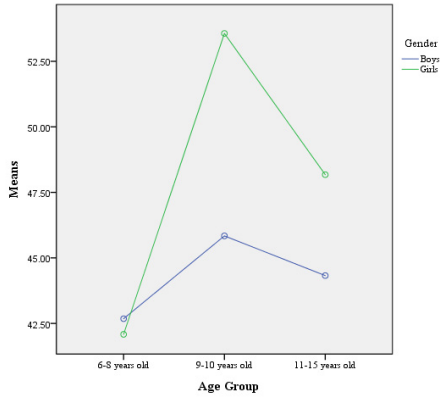
Concerning interaction effects for an SP, results obtained with Bonferroni Correction demonstrated that girls in the 6-8 age group present a significantly higher level of an SP than their male peers, $F_{(1,883)}$=5.517, p=.019. Also, female participants in the 9 to 10-year-old group are significantly more prone to exhibiting SP than boys of the same age, $F_{(1,883)}$=36.045, p<.000. A similar effect was found in girls in the 11 to 15-year-old group in comparison with male participants of their age $F_{(1,883)}$=19.262, p<.000. Regardless of gender, the 9 to 11-year-old group had the highest level of SP in comparison with the rest of the age groups (6-8 and 11-15 years old). The difference between the 6-8 and 11-15 groups was insignificant (Figure 1).

Figure 1.
Interaction effects of Gender x Age Group for Specific Phobia



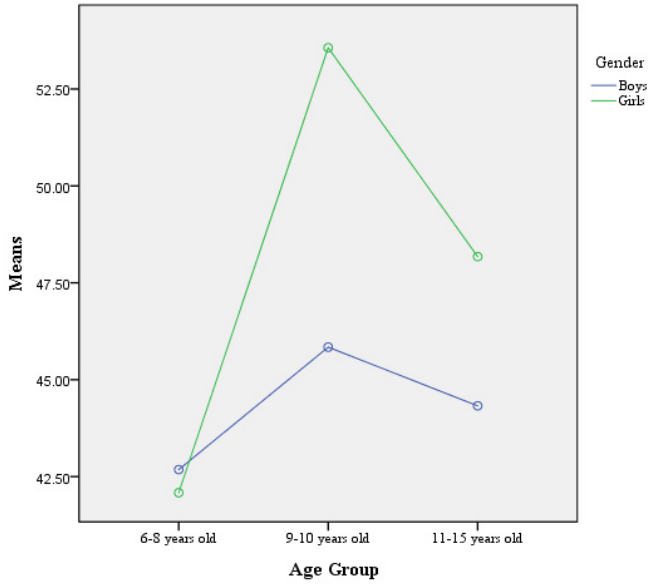
Regarding interaction effects for SAD, findings obtained with Bonferroni Correction showed that girls in the 9 to 10-year-old group present a significantly higher level of SAD than their male peers, $F_{(1,883)}$=23.794, p<.000. Also, female participants in the 11 to 15-year-old group are significantly more prone to exhibiting SAD than boys of the same age, $F_{(1,883)}$=6.594, p=.010. Regardless of gender, the 9-11 age group had the highest level of SAD compared to the rest (6-8 and 11-15 years old). The difference between the 6-8 and 11-15 groups was significant at p<.05 (Figure 2).

Figure 3.
Interaction effects of Gender x Age Group for Obsessive-Compulsive Disorder



Concerning the interaction effects for OCD, outcomes obtained with Bonferroni Correction demonstrated that girls in the 9 to 10-year-old group present a significantly higher index of OCD than boys of the same age, $F_{(1,883)}$=26.043, p<.000. A similar effect was found in girls in the 11 to 15-year-old group in comparison with their male peers $F_{(1,883)}$=7.080, p<.008. Regardless of gender, the 9-11 age group had the highest level of OCD compared to the rest (6-8 and 11-15 years old). The difference between the 6-8 and 11-15 groups was significant at p<.05 (Figure 3).

Figure 3.
Interaction effects of Gender x Age Group for Obsessive-Compulsive Disorder



Discussion

Anxiety disorders are one of the most common forms of psychopathology that affect children and adolescents. Unfortunately, most of them remain undiagnosed and not treated (Connolly & Bernstein, 2007). Growing evidence suggests that Latin children have a heightened risk for anxiety symptoms (McLaughlin et al., 2007) and that anxiety disorders are one of the emerging public health problems in many LMICs (Quiñones-Camacho & Davis, 2022) as Mexico. However, Mexico is still lacking in epidemiological and correlational studies concerning anxiety and anxiety disorders during childhood and adolescence, and screening of this problem, particularly in non-clinical samples, is seldom carried out even though it is crucial for adequately identifying children and adolescents at risk for this type of problem, measuring or tracking the levels of symptoms, and evaluating the progress made with interventions (Bandelow et al., 2017).

This study's findings align with previous research conducted in developing countries in which anxiety is highly prevalent, more frequent in girls than boys, and significantly associated with age (Anjum et al., 2022).

The high prevalence of anxiety and anxiety disorders may be because the sample belongs to a low socioeconomic status. Economic hardship is usually associated with an increased risk for anxiety, particularly in 6-11-year-old children. Living in poverty or within families struggling to meet essential physical needs, including food and shelter, can lead to severe emotional distress (Zare et al., 2018). Therefore, growing up in a disadvantaged environment is related to more frequent symptoms of mental problems.[37] Likewise, similar to other

studies (Madasu et al., 2019; Moalla et al., 2023), the most common anxiety disorders were SA, followed by SAD, OCD, and SP. Correlation analysis revealed that anxiety disorders are interrelated for both girls and boys, which may be explained because anxiety disorders are highly comorbid with each other (Goldstein-Piekarski et al., 2016). The fact that SA was the most prevalent anxiety disorder may be because individuals from collectivistic cultures have a higher fear of negative evaluation (Schreier et al., 2010). In collectivistic cultures, individuals are seen as embedded within their group identity, and the notion of a separate, autonomous self is deemphasized. Therefore, collectivistic cultures prioritize the group over the individual and value group goals, group harmony, maintaining relationships and order, and duties and obligations (Koydemir & Essau, 2018). Consequently, being part of the group, its recognition and acceptance, and group conformity and allegiance are essential to avoid social rejection, social exclusion, and ostracism, particularly during childhood and adolescence, where peer influence strongly shapes psychological development (Mitic et al., 2021). Peer groups can provide an arena in which children and adolescents can learn, clarify, and maintain norms for social behaviors and practice these behaviors, promoting socioemotional competence when individuals attempt to form their identity and establish autonomy from their parents. Thus, social relationships —both quantity and quality— affect mental health, health behavior, physical health, and mortality risk (Umberson & Montes, 2010). These outcomes highlight the need to consider the critical role of the mind's cognitions in determining behavior, as stated by Cognitive Theory (Beck et al., 1985), and the external risk and protective factors contributing to childhood anxiety's process and outcome according to the developmental psychopathology perspective (Cicchetti & Cohen, 1995; Masten & Braswell, 1991).

Regarding gender differences, as in previous studies (Klaufus et al., 2022; Madasu et al., 2019), anxiety and anxiety disorders were more prevalent in girls than boys. These results may be explained because ethnic, cultural, and family norms and social identity elements may influence how anxiety is experienced and expressed. Anxiety symptomatology is generally related to gender norms and community-level gender norms perceptions, all of which provide evidence that gender norm perceptions appear to play a role in mental health sex disparities (Koenig et al., 2021). As such, women and men adhere to gender-congruent stereotypes when experiencing anxiety or anxiety disorders to fit with traditional gender roles. Adherence to traditional male roles may prompt men to suppress feminine stereotypical symptoms. In contrast, women may express more feminine stereotypical symptoms (Mumang et al., 2021). In Mexico, traditional social roles (Díaz-Guerrrero, 2007) strongly associate women with being expressive, emotional, frail, and vulnerable, enabling them to openly express their emotional distress and difficulties and vent their emotions. In contrast, men work to alter their own experience of negative emotions and events resulting from stressful sources in a way in which their manliness is not compromised or threatened, hence avoiding social disapproval and fitting social expectations. Ideals of masculinity often discourage men from awareness and expression of psychic pain and admission of weaknesses and vulnerabilities. The masking of emotional distress or problems may be a face-saving strategy for many men who are less skilled at emotional expression and bound by expectations that men must be strong and invincible (Falicov, 2003).

The development of symptoms of anxiety disorders is associated with an increased vulnerability with age (Orgilés et al., 2012). Separation anxiety, SP, and OCD appear particularly common in children between the ages 6-9 years (Mohammadi et al., 2020) or 4-11 (Spence et al., 2018), while previous studies have found that social phobia is not significantly associated with age (Moalla et al., 2023; Olivares et al., 2010) or that SA symptoms frequently appear between the ages of 14-17 (Zolog et al., 2011). Moreover,

anxiety disorders have a higher comorbidity since age 10 (Mohammadi et al., 2020). The outcomes of this research indicated that the age range 9-10 was associated with a higher prevalence of anxiety symptoms and anxiety disorders, especially in girls, which could be explained because it is the typical average age of onset for psychopathology and the ages where comorbidity between anxiety disorders usually take place (Lijster et al., 2017). These findings suggest that considering the heterogeneity of the developmental trajectories of anxiety across ages is vital because not all children fit into a particular pattern (Allan et al., 2014). Hence, for adequate diagnosis and treatment, current models of the etiology of maladaptive anxiety in children assume an intricate interaction between various biological, developmental, psychological, social, cultural, and environmental components (Ollendick & Grills, 2016). SAD is expected between 6-9 years in response to coping with the temporary absence of caregivers in preschool. It tends to decrease with age due to the departure from problems associated with the normative challenges of separation from caregivers during the early school years (Ahlen & Ghaderi, 2020). Symptoms of SP have a median age of onset at eight years old (Wardenaar et al., 2017). It tends to decrease with age (Hale et al., 2008). Nonetheless, childhood phobias and anxiety disorders do not have a single etiological pathway—they are multiply determined by child- and parent-centered variables (de Vries et al., 2019). As such, it is crucial to consider the idea of goodness-of-fit between child factors (e.g., temperament) and the surrounding environment (e.g., parenting behaviors) when studying psychopathology in childhood and adolescence. OCD tends to appear between 6-9 years. However, children are less likely to have insight into the irrationality of their obsessions and compulsions because their meta-cognitive skills are still being developed (Geller et al., 2001). Furthermore, children need to differentiate true compulsions from regular routines or ritualized behaviors, typically transient and without cause for concern. To be considered a compulsion a behavior must be distressing or impairing (Krebs & Heyman, 2015). Finally, SA symptoms increase between the ages of 8.5 and 14 years because preadolescence has been linked to challenges associated with generalized anxiety (e.g., fears concerning danger and death) (Weems & Costa, 2005). Adolescence has been associated with challenges associated with SA (e.g., fear of negative evaluations by others) (Westenberg et al., 2007).

Conclusions

In conclusion, the results of this research are similar and consistent to those found in other studies conducted in developing countries. Moreover, this study highlights the need to consider high-impact sociodemographic factors as gender and age associated with anxiety in children and adolescents since the age of onset can vary widely as well as the age trajectory of psychopathology and gender affects how psychopathology is experienced and presented, and for adequately tackling the problem, reducing the enormous burden of disease from anxiety disorders, and designing and conducting mental health promotion and prevention interventions aimed to strengthen children's capacity to regulate emotions, cope with adverse or stressful circumstances, establish quality relationships, and build resilience. In addition, it is crucial to provide schools with effective and sustainable intervention strategies since most schooled children rely on school-based services to address their mental health needs. Lastly, the findings emphasize the importance of early identification, prevention, and timely treatment of children and adolescents in developing countries, focusing on the Latinx population.

This study had a few limitations that should be considered. The study was based on self-reported screening tools and only included cross-sectional data. In addition, the researchers did not conduct any diagnostic interviews and focused primarily on gender and age-based differences. Moreover, only schooled children ages 6–15 from lower socioeconomic status were included, so conclusions cannot be generalized. Future research should

consider other risk and protective factors (e.g., family dynamics, personal strengths, adverse childhood experiences) of anxiety and anxiety disorders, including diagnostic interviews and a more comprehensive age range (e.g., 6-18 years), samples from other socioeconomic status, non-schooled samples, and longitudinal data.

Nonetheless, the strengths of this study include the fact that children's anxiety symptoms ranged from no symptoms to clinical levels and that data showed a tendency of age and gender-related differences in anxiety and anxiety disorders. Previous studies have not evaluated these differences between subgroups of children in Mexico. Finally, this research adds to the growing body of literature on the field and helps identify evidence gaps in the Latinx population.

Clinical Implications

Systematically screening for child anxiety problems should be repeated frequently to adequately identify symptomatology, address the problem, promote mental health, and prevent the development and maintenance of psychopathology. Besides self-report instruments, it is necessary to include diagnostic interviews and parental assessments to appropriately identify culture-specific symptomatology and transdiagnostic risk and protective factors for understanding etiological processes and preventing multiple internalizing disorders rather than focusing on syndrome-specific risks (Schweizer et al., 2021). Caregivers should be included when developing and conducting interventions because parental behavior influences children's anxiety symptoms and is imperative for understanding causes and designing interventions. Multi-cultural brief cognitive behavioral therapy (CBT) would be the best intervention strategy as CBT has the best and broadest level of evidence across all anxiety disorders (Hoyer & Lueken, 2021). However, these effective and cost-effective programs require a multilevel approach with varied delivery platforms as digital media, health or social care settings, schools, or the community – and diverse strategies to reach children and adolescents, particularly the most vulnerable. Furthermore, gender-specific personalized approaches are needed to identify the most effective intervention, or combination thereof, for each anxious child and teenager within a stepped model of care that provides access to evidence-based services for different levels of need (Dowell et al., 2018).

Declarations

Acknowledgments
The authors would like to express their gratitude to all institutions for their assistance in planning and developing this research.

Geolocation information
This study was conducted at several public schools in Mexico City, Mexico.

Competing Interest
The authors have no competing interests to declare relevant to this article's content.

Financial Support (Funding) and Interests
This study is part of a non-funded research. There are no financial interests to report.

Disclosure Statement
No financial interest or benefit has arisen from the direct applications of this research.

Data Availability
Not available

Code Availability
Non-applicable

Compliance with Ethical Standards
Ethical Statements
The authors would like to assert that they have abided by the Ethical Principles of Psychologists and the Code of Conduct as set out by the APA and the Mexican General Law of Health. The institutions' Committee of Research and Ethics

gave ethical approval. This review serves as the Mexican equivalent to an American IRB Review.

Research Involving Human Participants
This research complies with international, national, and institutional standards for research involving human participants.

Conflict of Interest
The authors declare that they have no conflict of interest.

Informed Consent
Informed consent was obtained from legal guardians (i.e., parents of the children) and children themselves.

Author Contributions: The first and corresponding author of the manuscript was responsible for data collection, analysis, and interpretation, the conception and design of the study, and drafting and preparing the manuscript. The second author critically revised the manuscript.

References

Ahlen, J., & Ghaderi, A. (2020). Dimension-specific symptom patterns in trajectories of broad anxiety: A longitudinal prospective study in school-aged children. *Development and Psychopathology*, *32*(1), 31–41. https://doi.org/10.1017/S0954579418001384

Allan, N. P., Capron, D. W., Lejuez, C. W., Reynolds, E. K., MacPherson, L., & Schmidt, N. B. (2014). Developmental trajectories of anxiety symptoms in early adolescence: The influence of anxiety sensitivity. *Journal of Abnormal Child Psychology*, *42*(4), 589–600. https://doi.org/10.1007/s10802-013-9806-0

American Psychiatric Association. (2022). Anxiety Disorders. In *Diagnostic and Statistical Manual of Mental Disorders (5th edition, text revision, pp. 215–231).* American Psychiatric Association.

American Psychological Association. (2017). *Ethical principles of psychologists and code of conduct.* American Psychological Association. Retrieved from: https://www.apa.org/ethics/code/ethics-code-2017.pdf

Anjum, A., Hossain, S., Hasan, M. T., Uddin, M. E., & Sikder, M. T. (2022). Anxiety among urban, semi-urban and rural school adolescents in Dhaka, Bangladesh: Investigating prevalence and associated factors. *PloS One*, *17*(1), e0262716. https://doi.org/10.1371/journal.pone.0262716

Arantes de Araújo, L. A., Veloso, C. F., Souza, M. C., Azevedo, J. M. C., & Tarro, G. (2021). The potential impact of the COVID-19 pandemic on child growth and development: a systematic review. *Jornal de Pediatría*, *97*(4), 369–377. https://doi.org/10.1016/j.jped.2020.08.008

Bandelow, B., Michaelis, S., & Wedekind, D. (2017). Treatment of anxiety disorders. *Dialogues in Clinical Neuroscience*, *19*(2), 93–107. https://doi.org/10.31887/DCNS.2017.19.2/bbandelow

Barlow, D. H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic.* 2nd edition. Guilford Press.

Beck, A., Emery, G., & Greenberg, R. (1985). *Anxiety disorders and phobias: A cognitive perspective*. Basic Books.

Camara de Diputados del H. Congreso de la Union. (1984). *Mexican General Law of Health. Mexican General Law of Health* (Updated May 29, 2023). Retrieved from: https://www.diputados.gob.mx/LeyesBiblio/pdf/LGS.pdf

Caraveo-Anduaga, J. J., & Martínez-Vélez, N. A. (2019). Salud mental infantil: una prioridad a considerar [Children's mental health: A priority to consider]. *Salud Pública de Mexico*,*61*(4), 514–523. https://doi.org/10.21149/9727

Chen, H., Cohen, P., & Chen, S. (2010). How big is a big odds ratio? Interpreting the magnitudes of odds ratios in epidemiological studies. *Commun Stat Simul Comput*, *39*(4), 860-864. https://doi.org/10.1080/03610911003650383

Cicchetti, D., & Cohen, D. J. (1995). Perspectives on developmental psychopathology. In D. Cicchetti & D.J. Cohen, Eds. *Developmental psychopathology: Vol. 1. Theory and methods* (pp. 3-20). Wiley.

Connolly, S. D., Bernstein, G. A., & Work Group on Quality Issues. (2007). Practice parameters for the assessment and treatment of children and adolescents with anxiety

disorders. *Journal of the American Academy of Child Adolescent Psychiatry*, *46*(2), 267–283. https://doi.org/10.1097/01.chi.0000246070.23695.06

Craske, M. G., & Stein, M. B. (2016). Anxiety. *The Lancet*, *388*(10063), 3048-3059. https://doi.org/10.1016/S0140-6736(16)30381-6

de Vries, Y. A., Al-Hamzawi, A., Alonso, J., Borges, G., Bruffaerts, R., Bunting, B., Caldas-de-Almeida, J. M., Cia, A. H., De Girolamo, G., Dinolova, R. V., Esan, O., Florescu, S., Gureje, O., Haro, J. M., Hu, C., Karam, E. G., Karam, A., Kawakami, N., Kiejna, A., Kovess-Masfety, V., … WHO World Mental Health Survey Collaborators. (2019). Childhood generalized SP as an early marker of internalizing psychopathology across the lifespan: Results from the World Mental Health Surveys. *BMC Medicine*, *17*(1), 101. https://doi.org/10.1186/s12916-019-1328-3

Díaz-Guerrero, R. (2007). *Mexican psychology. Discovery of the ethnopsychology*. Trillas.

Domínguez-Lara, S. (2018). Odds-ratios and their interpretation as effect size in research. *Educ. Medica, 19*(1), 65-66. https://doi.org/10.1016/j.edumed.2017.01.008

Dowell, T., Donovan, C. L., Farrell, L. J., & Waters, A. (2018). Treatment of anxiety in children and adolescents. *Current Treatment Options in Psychiatry*, *5*, 98–112. https://doi.org/10.1007/s40501-018-0136-2

Falicov, C. (2003). Culture, society, and gender in depression. *Journal of Family Therapy*, *25*(4), 371–387. https://doi.org/10.1111/1467-6427.00256

Geller, D. A., Biederman, J., Faraone, S., Agranat, A., Cradock, K., Hagermoser, L., Kim, G., Frazier, J., & Coffey, B. J. (2001). Developmental aspects of obsessive-compulsive disorder: Findings in children, adolescents, and adults. *The Journal of Nervous and Mental Disease*, *189*(7), 471–477. https://doi.org/10.1097/00005053-200107000-00009

Goldstein-Piekarski, A. N., Williams, L. M., & Humphreys, K. (2016). A trans-diagnostic review of anxiety disorder comorbidity and the impact of multiple exclusion criteria on studying clinical outcomes in anxiety disorders. *Translational Psychiatry*, *6*(6), e847. https://doi.org/10.1038/tp.2016.108

Hale, W. W., 3rd, Raaijmakers, Q., Muris, P., van Hoof, A., & Meeus, W. (2008). Developmental trajectories of adolescent anxiety disorder symptoms: A 5-year prospective community study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(5), 556–564. https://doi.org/10.1097/CHI.0b013e3181676583

Hernández, L., Bermúdez, G., Gil, F., Salazar, R., Uribe, Z., & Zermeño, L. (2003). *Inventario de trastornos de ansiedad. Proyecto de investigación DGAPA IN-304102, prevención y tratamiento de la disfunción psicológica infantil [Anxiety disorders inventory. Research proyect DGAPA IN-304102, prevention and treatment of childhood psychological dysfunction]*. Mexico: Faculty of Psychology, National Autonomous University of Mexico.

Hernández, L., Bermúdez, G., Spence, S., González, M., Martínez, J., Aguilar, J., & Gallejos, J. (2010). Spanish version of the Spence Children's Anxiety Scale (SCALE). *Revista Latinoamerica de Psicología, 42*(1), 13-24.

Hoyer, J., & Lueken, U. (2021). Psychotherapie der Angststörungen: State of the Art [Psychotherapy of anxiety disorders: State of the art]. *Der Nervenarzt*, *92*(5), 441–449. https://doi.org/10.1007/s00115-021-01069-1

Javaid, S. F., Hashim, I. J., Hashim, M. J., Stip, E., Samad, M. A., & Ahbabi, A. A. (2023). Epidemiology of anxiety disorders: Global burden and sociodemographic associations. *Middle East Current Psychiatry*, *30*(1), 1–11. https://doi.org/10.1186/s43045-023-00315-3

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., Rohde, L. A., Srinath, S., Ulkuer, N., & Rahman, A. (2011). Child and adolescent mental health worldwide: Evidence for action. *Lancet (London, England)*, *378*(9801), 1515–1525. https://doi.org/10.1016/S0140-6736(11)60827-1

Klaufus, L., Verlinden, E., van der Wal, M., Cuijpers, P., Chinapaw, M., & Smit, F. (2022). Adolescent anxiety and depression: Burden of disease study in 53,894 secondary school pupils in the Netherlands. *BMC Psychiatry*, *22*(1), 225. https://doi.org/10.1186/s12888-022-03868-5

Koenig, L. R., Blum, R. W., Shervington, D., Green, J., Li, M., Tabana, H., & Moreau, C. (2021). Unequal gender norms are related to symptoms of depression among young adolescents: A cross-sectional, cross-cultural

study. *Journal of Adolescent Health*, *69*(1), S47-S55. https://doi.org/10.1016/j.jadohealth.2021.01.023

Kowalchuk, A., Gonzalez, S. J., & Zoorob, R.J. (2022). Anxiety disorders in children and adolescents. *American Family Physician*, *106*(6), 657-664. https://www.aafp.org/pubs/afp/issues/2022/1200/anxiety-disorders-children-adolescents.html

Koydemir, S., & Essau, C.A. (2018). Anxiety and Anxiety Disorders in young people: A cross-cultural perspective. In M. Hodes, S. Shur-Fen Gau & P.J. De Vries PJ (Eds.). *Understanding Uniqueness and Diversity in Child and Adolescent Mental Health* (pp. 115-134). Academic Press. https://doi.org/10.1016/B978-0-12-815310-9.00005-8

Krebs, G., & Heyman, I. (2015). OCD in children and adolescents. *Archives of disease in childhood*, *100*(5), 495–499. https://doi.org/10.1136/archdischild-2014-306934

Lee, L. (2018). Design of observational studies. In J. Gallin, F. Ognibene & L. Lee (Eds.) *Principles and Practice of Clinical Research*. Fourth Edition. Academic Press; 2018:231-248.

Lijster, J. M., Dierckx, B., Utens, E. M., Verhulst, F. C., Zieldorff, C., Dieleman, G. C., & Legerstee, J. S. (2017). The age of onset of Anxiety Disorders. *Canadian Journal of Psychiatry. Revue canadienne de psychiatrie*, *62*(4), 237–246. https://doi.org/10.1177/0706743716640757

López, M., Núñez, J., Vázquez, P., Guillén, E., & Bracho, E. (2021). Anxiety in children and adolescents due to COVID-19 quarantine. An online survey. *Acta Med GA*, *19*(4), 519-523. https://doi.org/10.35366/102539

Madasu, S., Malhotra, S., Kant, S., Sagar, R., Mishra, A. K., Misra, P., & Ahamed, F. (2019). Anxiety Disorders among adolescents in a rural area of Northern India using screen for Child Anxiety-Related Emotional Disorders Tool: A community-based study. *Indian Journal of Community Medicine: Official publication of Indian Association of Preventive & Social Medicine*, *44*(4), 317–321. https://doi.org/10.4103/ijcm.IJCM_359_18

Martinez-Fierro, M. L., Ayala-Haro, A. E., Pinedo-Hurtado, M. E., Solis-Galvan, J. A., Garza-Veloz, I., Velazquez-Lopez, Z. Y., Camacho-Martinez, A. G., Avila-Carrasco, L., Vazquez-Reyes, S., Velasco-Elizondo, P., Mauricio-Gonzalez, A., & Ortiz-Castro, Y. (2022). Usefulness of a mobile application (Mentali) for anxiety and depression screening in medical students and description of the associated triggering Factors. *Brain sciences*, *12*(9), 1223. https://doi.org/10.3390/brainsci12091223

Masten, A. S., & Braswell, L. (1991). Developmental psychopathology: An integrative framework. In: Martin PR (Ed.). *Handbook of behavior therapy and psychological science: An integrative approach* (pp- 35–56). Pergamon.

McLaughlin, K. A., Hilt, L. M., & Nolen-Hoeksema, S. (2007). Racial/ethnic differences in internalizing and externalizing symptoms in adolescents. *Journal of Abnormal Child Psychology*, *35*(5), 801–816. https://doi.org/10.1007/s10802-007-9128-1

Mitic, M., Woodcock, K. A., Amering, M., Krammer, I., Stiehl, K. A. M., Zehetmayer, S., & Schrank, B. (2021). Toward an integrated model of supportive peer relationships in early adolescence: A systematic review and exploratory meta-analysis. *Frontiers in Psychology*, *12*, 589403. https://doi.org/10.3389/fpsyg.2021.589403

Moalla, M., Reagu, S., Alabdulla, M., Khan, Y. S., Takish, Z., Emadie, B. A., Elwerfellie, M. M., Narasimhan, S., & Nazzal, H. (2023). A study of anxiety symptoms in children and adolescents during the COVID-19 pandemic in Qatar. *Psychiatry International*, *4*(2), 136-146. https://doi.org/10.3390/psychiatryint4020016

Mohammadi, M. R., Badrfam, R., Khaleghi, A., Hooshyari, Z., Ahmadi, N., & Zandifar, A. (2020). Prevalence, comorbidity and predictor of SAD in children and adolescents. *The Psychiatric Quarterly*, *91*(4), 1415–1429. https://doi.org/10.1007/s11126-020-09778-7

Mumang, A. A., Syamsuddin, S., Maria, I. L., & Yusuf, I. (2021). Gender differences in depression in the general population of Indonesia: Confounding effects. *Depression Research and Treatment*, *2021*, 3162445. https://doi.org/10.1155/2021/3162445

OECD. (2021). *Health at a Glance 2021: OECD Indicators*. OECD Publishing. https://doi.org/10.1787/ae3016b9-en

Olivares, J., Sánchez-García, R., López-Pina, J. A., & Rosa-Alcázar, A. I. (2010). Psychometric properties

of the Social Phobia and Anxiety Inventory for Children in a Spanish sample. *The Spanish Journal of Psychology*, *13*(2), 961–969. https://doi.org/10.1017/s1138741600002602

Ollendick, T. H., & Grills, A. E. (2016). Perceived Control, family environment, and the etiology of child anxiety-revisited. *Behavior Therapy*, *47*(5), 633–642. https://doi.org/10.1016/j.beth.2016.01.007

Orgilés, M., Méndez, X., Espada, J. P., Carballo, J. L., & Piqueras, J. A. (2012). Anxiety disorder symptoms in children and adolescents: Differences by age and gender in a community sample. *Revista de Psiquiatría y Salud Mental*, *5*(2), 115–120. https://doi.org/10.1016/j.rpsm.2012.01.005

Penninx, B. W. J. H., Pine, D. S., Holmes, E. A., & Reif, A. (2021). Anxiety disorders. *The Lancet*, *397*(10277), 914–927. https://doi.org/10.1016/S0140-6736(21)00359–7

Pereira-Soares, T. F., & Nunes-Baptista, M. (2019). Children and Young Anxiety Scale CYAS: Scale Development and psychometric properties in Brazilian sample. *International Journal of Psychological Research*, *12*(2), 37–47. https://doi.org/10.21500/20112084.4203

Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *56*(3), 345–365. https://doi.org/10.1111/jcpp.12381

Quiñones-Camacho, L.E. & Davis, E.L. (2022). Caregiver socialization of reappraisal and children's cognitive flexibility jointly predict latinx children's anxiety. *J Child Fam Stud, 31*, 404-1414. https://doi.org/10.1007/s10826-021-02145-5

Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global Prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics*, *175*(11), 1142–1150. https://doi.org/10.1001/jamapediatrics.2021.2482

Reiss F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. *Social Science & Medicine (1982)*, *90*, 24–31. https://doi.org/10.1016/j.socscimed.2013.04.026

Saurabh, K., & Ranjan, S. (2020). Compliance and psychological impact of quarantine in children and adolescents due to Covid-19 pandemic. *Indian Journal of Pediatrics*, *87*(7), 532–536. https://doi.org/10.1007/s12098-020-03347-3

Schreier, S. S., Heinrichs, N., Alden, L., Rapee, R. M., Hofmann, S. G., Chen, J., Oh, K. J., & Bögels, S. (2010). SA and social norms in individualistic and collectivistic countries. *Depression and Anxiety*, *27*(12), 1128–1134. https://doi.org/10.1002/da.20746

Schweizer, T. H., Snyder, H. R., Young, J. F., & Hankin, B. L. (2021). Prospective prediction of depression and anxiety by integrating negative emotionality and cognitive vulnerabilities in children and adolescents. *Research on Child and Adolescent Psychopathology*, *49*(12), 1607–1621. https://doi.org/10.1007/s10802-021-00839-4

Spence, S. H., Zubrick, S. R., & Lawrence, D. (2018). A profile of social, separation and generalized anxiety disorders in an Australian nationally representative sample of children and adolescents: Prevalence, comorbidity, and correlates. *The Australian and New Zealand Journal of Psychiatry*, *52*(5), 446–460. https://doi.org/10.1177/0004867417741981

Suárez, K., & Kazdin, A. (2023). Child mental health and the treatment gap in Mexico. *Psicología y Salud*, *33*(1), 5-18. https://doi.org/10.25009/pys.v33i1.2768

Umberson, D., & Montez, J. K. (2010). Social relationships and health: A Flashpoint for health policy. *Journal of Health and Social Behavior*, *51*(Suppl), S54. https://doi.org/10.1177/0022146510383501

UNICEF Mexico. (2018). *The agenda for childhood and adolescence 2019-2024*. UNICEF Mexico. Retrieved from: https://www.unicef.org/mexico/informes/la-agenda-de-la-infancia-y-la-adolescencia-2019-2024

Wardenaar, K. J., Lim, C. C. W., Al-Hamzawi, A. O., Alonso, J., Andrade, L. H., Benjet, C., Bunting, B., de Girolamo, G., Demyttenaere, K., Florescu, S. E., Gureje, O., Hisateru, T., Hu, C., Huang, Y., Karam, E., Kiejna, A., Lepine, J. P., Navarro-Mateu, F., Oakley Browne, M., Piazza, M., … de Jonge, P. (2017). The cross-national epidemiology of SP in the World Mental Health Surveys. *Psychological Medicine*, *47*(10), 1744–1760. https://doi.org/10.1017/S0033291717000174

Weems, C. F., & Costa, N. M. (2005). Developmental differences in the expression of childhood anxiety symptoms and fears. *Journal of the American Academy of Child and Adolescent Psychiatry*, *44*(7), 656–663. https://doi.org/10.1097/01.chi.0000162583.25829.4b

Westenberg, P. M., Gullone, E., Bokhorst, C. L., Heyne, D. A., & King, N. J. (2007). Social evaluation fear in childhood and adolescence: Normative developmental course and continuity of individual differences. *British Journal of Developmental Psychology, 25*(3), 471–483. https://doi.org/10.1348/026151006X173099

WHO. (2021). *Mental health in adolescents*. World Health Organization. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

WHO. (2022). *COVID-19 pandemic triggers 25% increase in prevalence of anxiety and depression worldwide. Wake-up call to all countries to step up mental health services and support*. World Health Organization. Retrieved from: https://www.who.int/news/item/02-03-2022-covid-19-pandemic-triggers-25-increase-in-prevalence-of-anxiety-and-depression-worldwide

World Vision Mexico. (2022). *Is the mental health of children and young people contemplated in the budget?* World Vision Mexico. Retrieved from: https://www.worldvisionmexico.org.mx/blog/la-salud-mental-de-ninas-ninos-y-adolescentes?hs_amp=true

Xie, X., Xue, Q., Zhou, Y., Zhu, K., Liu, Q., Zhang, J., & Song, R. (2020). Mental health status among children in home confinement during the Coronavirus disease 2019 outbreak in Hubei province, China. *JAMA pediatrics*, *174*(9), 898–900. https://doi.org/10.1001/jamapediatrics.2020.1619

Zare, M., Narayan, M., Lasway, A., Kitsantas, P., Wojtusiak, J., & Oetjen, Ch. (2018). Influence of adverse childhood experiences on anxiety and depression in children aged 6 to 11 years. *Pediatric Nursing, 44*(6), 267. https://www.proquest.com/scholarly-journals/influence-adverse-childhood-experiences-on/docview/2160299040/se-2

Zhou, S. J., Zhang, L. G., Wang, L. L., Guo, Z. C., Wang, J. Q., Chen, J. C., Liu, M., Chen, X., & Chen, J. X. (2020). Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *European child & adolescent psychiatry*, *29*(6), 749–758. https://doi.org/10.1007/s00787-020-01541-4.OK

Zolog, T.C., Claustre, M., Billabriga, M.C.J., Bonillo, A., Canals, J., Hernández, C., Romero, K. & Domènech, E. (2011). Age, gender and negative life events in anxiety and depression self-reports at preadolescence and early adolescence. *Ansiedad y Estres*, *17*(2-3), 113–124. Retrieved from: https://www.ansiedadyestres.es/sites/default/files/rev/ucm/2011/anyes2011a9.pdf.

DOI: HTTPS://DOI.ORG/10.15446/RCP.V34N1.115255

Visual Nudges and Smoking Prevention: Exploring Implicit and Explicit Emotional Responses to Graphic Health Warnings

JOHANNA SÁNCHEZ-MORA

Departamento de Psicología, Universidad Nacional de Colombia, Bogotá, Colombia

RICARDO M. TAMAYO

Departamento de Psicología, Universidad Nacional de Colombia, Bogotá, Colombia

How to cite this article: Sánchez-Mora, J. and Tamayo, R. M. (2025). Visual Nudges and Smoking Prevention: Exploring Implicit and Explicit Emotional Responses to Graphic Health Warnings. *Revista Colombiana de Psicología*, *34*(1). pp 145–160. https://revistas.unal.edu.co/index.php/psicologia/article/view/115255

Correspondence: Johanna Sánchez-Mora (https://orcid.org/0000-0001-7333-4974), Departamento de Psicología, Universidad Nacional de Colombia, Bogotá, Colombia. Email: cijsanchezmo@unal.edu.co

SCIENTIFIC RESEARCH ARTICLE

RECEIVED: JULY 24TH, 2024–ACCEPTED: JULY 26TH, 2024

Visual Nudges and Smoking Prevention: Exploring Implicit and Explicit Emotional Responses to Graphic Health Warnings

Abstract

This article presents two studies (N = 301) investigating the implicit and explicit effects of graphic health warnings (GHWs) on smoking prevention. Framed within the intersection of implicit cognition and bounded rationality models, we aim to characterize GHWs as Type 1 nudges driven by automatic processing and evaluate the consistency of observed effects with this characterization. In the first study, participants performed the Affect Misattribution Procedure (AMP) with a prime exposure time of 75 milliseconds (ms). Participants were randomly assigned to an experimental condition with graphic warnings as primes or a control condition with neutral images from the International Affective Picture System (IAPS). Results indicated that graphic warnings produced significantly more negative valence and faster implicit evaluations of the target stimuli compared to neutral images. The second study utilized a modified AMP where participants evaluated the valence of the prime images directly, with an extended exposure time of 500ms. This study also demonstrated significant differences in both image valence and reaction times, consistent with the findings from the first study, indicating explicit effects of the graphic warnings. Our findings suggest a translation process from implicit to explicit effects, shedding light on the relationship between automatic and controlled processing in the context of nudges. These results have key implications for understanding the cognitive mechanisms underlying health warnings and optimizing their design for public health interventions.

Keywords: nudges, graphic health warnings, automatic processing, controlled processing, implicit cognition, smoking.

Empujones visuales y prevención del tabaquismo: Exploración de las respuestas emocionales implícitas y explícitas a las advertencias sanitarias gráficas

Resumen

Este artículo presenta dos estudios (N = 301) en los que se investigaron los efectos implícitos y explícitos de las advertencias sanitarias gráficas (GHW) en la prevención del tabaquismo. Enmarcados en la intersección de los modelos de cognición implícita y racionalidad limitada, pretendemos caracterizar las advertencias sanitarias gráficas como empujones de tipo 1 impulsados por el procesamiento automático y evaluar la coherencia de los efectos observados con esta caracterización. En el primer estudio, los participantes realizaron el Procedimiento de Mala Atribución del Afecto (AMP) con un tiempo de exposición primario de 75 milisegundos (ms). Los participantes fueron asignados aleatoriamente a una condición experimental con advertencias gráficas como imprimación o a una condición de control con imágenes neutras del Sistema Internacional de Imágenes Afectivas (IAPS). Los resultados indicaron que las advertencias gráficas producían significativamente más valencia negativa y evaluaciones implícitas más rápidas de los estímulos objetivo en comparación con las imágenes neutras. El segundo estudio utilizó un PGA modificado en el que los participantes evaluaron directamente la valencia de las imágenes primarias, con un tiempo de exposición ampliado de 500 ms. Este estudio también demostró diferencias significativas tanto en la valencia de las imágenes como en los tiempos de reacción, en consonancia con los resultados del primer estudio, lo que indica efectos explícitos de las advertencias gráficas. Nuestros resultados sugieren un proceso de traslación de los efectos implícitos a los explícitos, arrojando luz sobre la relación entre el procesamiento automático y el controlado en el contexto de los codazos. Estos resultados tienen implicaciones clave para comprender los mecanismos cognitivos subyacentes a las advertencias sanitarias y optimizar su diseño para intervenciones de salud pública.

Palabras clave: nudges, advertencias sanitarias gráficas, procesamiento automático, procesamiento controlado, cognición implícita, tabaquismo.

Nudge theory advocates subtly altering the context in which decisions are made to guide behavior toward better choices without restricting people's freedom (e.g., Thaler & Ganser, 2015). This approach has had a significant impact on public health policy (Thaler & Sunstein, 2009). For example, nudges can improve dietary choices, vaccination rates, and physical activity (Kovács, 2021). As smoking remains one of the leading causes of preventable disease and death worldwide, it might become a critical target for nudge-based public health interventions (Hoffman & Tan, 2015).

Graphic health warnings (GHWs) on cigarette packs act as powerful nudges to discourage smoking (Francis, et al., 2017). They typically include images depicting the dire health consequences of smoking (e.g., diseased lungs, oral cancer, etc.) that immediately evoke negative emotional responses (Hammond et al., 2007; Hammond, 2011; Madera-Carrillo et al., 2015) and, unlike traditional informational messages that rely on cognitive elaboration and comprehension, these negative feelings of vulnerability can quickly promote quit intentions and prevent smoking initiation (Pang, 2021).

Despite the widespread implementation of GHWs through MPOWER[1] policies, there is a significant gap in understanding how implicit emotional reactions to these warnings interact with explicit cognitive processing (Bogliacino et al., 2015; Drovandi et al., 2019; Erceg-Hurn & Steed, 2011; Hall et al., 2018). This gap hinders the optimal design and implementation of GHWs. Understanding the psychological mechanisms behind these responses is crucial because nudge theory, which supports the use of GHWs, relies on behavioral economics and bounded rationality principles that recognize the impact of emotional and cognitive biases on decision making.

1 These are six evidence-based strategies recommended by the World Health Organization (WHO) to reduce tobacco use and exposure: Monitor tobacco use, Protect people from tobacco smoke, Offer help to quit, Warn about tobacco dangers, Enforce bans on advertising, and Raise taxes on tobacco. https://www.who.int/initiatives/mpower

Bounded Rationality

Bounded rationality (Simon, 2000; Kahneman, 2003a, 2003b) suggests that temporary emotional or cognitive states may override rational decisions. For example, advertisements that portray smoking as sophisticated and social may make it seem appealing despite known long-term health risks (Slovic, 2001). However, GHWs may redirect risk perceptions towards more healthy options (Bansal-Travers et al., 2011; Slovic, 2003; Thaler & Sunstein, 2009). Thus, GHWs act as nudges, effectively alerting the public to the dangers of smoking and serving as cost-effective health promotion tools (Benartzi et al., 2017).

The reported efficacy of nudges in multiple contexts, ranging from tax compliance (Cialdini et al., 1990; Coleman, 1996), to reducing littering (Kolodko et al., 2016; see also alcohol reduction, Perkins, 2003; household energy management, Schultz et al., 2007), motivated us to explore the potential of GHWs as nudges. Specifically, within the framework of bounded rationality, which focuses on the interaction between automatic (system 1) and controlled (system 2) processing. System 1, which is faster and more emotional, may often lead to suboptimal decisions for well-being that are detached from normative rationality (Kahneman, 2003b). In contrast, System 2, characterized as deliberative and logical, often guides individuals to behave rationally and maximize their well-being (Kahneman, 2003b). Thaler and Sunstein (2009) proposed that nudges, including GHWs, are effective because they channel System 1 tendencies in everyday situations where System 2 processing is often limited by time and cognitive load.

Implicit Cognition

Bounded rationality is closely related to implicit cognition, which posits that many cognitive processes occur automatically and without people's explicit awareness (Corneille & Hütter, 2020). Both approaches address critical questions about involuntary and automatic processing in human cognition. Implicit cognition has its origins in

memory and learning research and highlights the fact that some efficient cognitive processes do not necessarily require conscious and deliberate effort. For example, pioneering studies have shown that amnesic patients, while highly impaired on tasks involving conscious learning (e.g., free recall and recognition), perform effectively on tasks that do not require conscious memory (e.g., skill acquisition, object completion, lexical decision tasks, Graf & Schacter, 1985; Schacter & Graf, 1986; Warrington & Weiskrantz, 1968; Weiskrantz & Warrington, 1979). Both bounded rationality and implicit cognition suggest a distinction between systems or processes based on the degree of conscious control exerted by individuals. Specifically, the division between System 1 and System 2 in bounded rationality largely overlaps with the distinction between implicit and explicit processes in implicit cognition (Corneille & Hütter, 2020). System 1 is characterized as fast, automatic, and unconscious, whereas System 2 is slow, deliberate, and conscious. Similarly, in cognitive research, implicit processes are considered automatic, nondeliberative, and incidental, while explicit processes are considered controlled, deliberative, and intentional (Frensch & Rünger, 2003).

On the one hand, nudge theory, which aims to achieve quick social outcomes, often focuses on taking advantage of System 1 processes to influence behavior efficiently. On the other hand, implicit cognition investigates the psychological mechanisms that support behavior, enhancing our understanding of how nudges operate at a deeper cognitive level. Both theories acknowledge cognitive and heuristic biases that influence human judgment and decision-making (Corneille & Hütter, 2020; Kahneman, 2003b).

Importantly, research on implicit cognition has examined whether implicit and explicit systems operate independently or interact (Willingham & Goedert-Eschmann, 1999). Sleep studies, for instance, suggest that implicitly acquired knowledge can become explicit during sleep, as procedural skills are processed offline, facilitating knowledge consolidation (Fischer et al., 2006; Sánchez-Mora & Tamayo, 2021). This interaction model can inform research that seeks to explain how nudges work by characterizing the mechanisms that translate implicit effects, as immediate fear, into explicit outcomes, as attitudes toward smoking (e.g., Hollands et al., 2016). Consequently, type 1 nudges may initially act implicitly but eventually facilitate explicit effects through an analogous transition process.

Some evidence indicates that GHWs can significantly alter implicit attitudes towards smoking. For example, a study by Bogliacino et al. (2015) demonstrated that exposure to GHWs leads to more negative implicit evaluations of smoking-related stimuli and that these emotional changes significantly influence later smoking decisions. Similarly, Macy et al. (2016) found that young adults exposed to GHWs exhibited more negative implicit attitudes toward smoking than those exposed to text-only warnings (Wiers & Stacy, 2006).

Implicit Processing of Graphic Health Warnings

The effectiveness of GHWs can be partly attributed to their ability to engage System 1 processing. This view is supported for instance by findings from Peters et al. (2007), who observed that images demand less cognitive effort and elicit stronger emotional reactions than text-only messages. Consequently, GHWs are more likely to capture attention and trigger immediate emotional responses, leading to greater, or at least more evident, behavioral impact. However, since explicit processing involves conscious and reflective thought, which is typically slower and more deliberate (Kahneman, 2003b), it is not clear how GHWs influence both implicit and explicit processing (Drovandi et al., 2019; Gantiva et al., 2022). Some evidence suggests that GHWs may also support explicit attitudes and intentions over time. For example, a study by Noar et al. (2016) found that GHWs increased the intentions to quit smoking more effectively than text-only warnings, indicating a possible shift from implicit

to explicit processing. Furthermore, Evans et al. (2017) reported that graphic warnings led to higher levels of fear and disgust, which were associated with increased quit intentions, suggesting that the emotional reactions triggered by GHWs can translate into explicit behavioral intentions (Jansen et al., 2006; Smith & De Houwer, 2015; Wang et al., 2015). This reinforces our view of a gap in the literature regarding the need to explore the transition from implicit to explicit processing to understand more precisely the formation of explicit attitudes toward smoking.

Clearly, it is essential to investigate how initial automatic responses to GHWs evolve into conscious and reflective evaluations over time. This understanding can help refine the use of graphic warnings to maximize their impact on smoking cessation and prevention (Parada et al., 2017). In this paper, we aim to address this gap by examining both implicit and explicit emotional responses to GHWs. By exploring how warnings affect automated and controlled processing, we can gain deeper insights into their effectiveness as a public health intervention. This research can additionally inform practical evidence-based strategies for enhancing public health campaigns aimed at reducing smoking prevalence.

Overview of the Experiments

Our research examines whether early emotional reactions to GHWs are automatic and implicit, and how these reactions develop into conscious, explicit judgments. Specifically, we investigate whether GHWs induce implicit effects with brief exposure times and if longer exposure times facilitate explicit evaluations. We conducted two complementary studies using the AMP to measure these effects. In the first experiment, participants were exposed to GHWs presented as primes for short times (75 ms) in the experimental condition and neutral images from IAPS in the control condition. We hypothesize that would exhibit more negative implicit evaluations of the target stimuli. In the second experiment, we extended the prime exposure time (to 500 ms) to measure explicit responses, hypothesizing that evaluations would be more negative in the experimental condition, reflecting the transition from implicit to explicit processing.

Additionally, in both experiments, we collected measures of the reaction times (RTs) participants required to judge the primes (Experiment 1) or the targets (Experiment 2). We collected and analyzed these latencies because current models suggest that RTs can helpfully describe the time course of the evidence accumulation of the cognitive process required to reach a simple decision (e.g., Berkovich & Meiran, 2024; Brown & Heathcote, 2008), in our case valence rating decisions. RTs have the potential to supports the view that our experimental manipulation taps into the time course of the transition from implicit to explicit processing.

Experiment 1: Implicit Effects

The first study evaluated the implicit reactions produced by GHWs. Using the standard AMP, we assessed the perceived pleasantness of a neutral target stimulus (a kanji character) following a prime (either a graphic warning or a neutral image). Participants were assigned to one of two conditions based on the type of prime stimulus presented in each trial. The experimental group viewed GHW primes, while the control group viewed neutral primes from the IAPS. We hypothesized that implicit pleasantness judgments would be more negative for the experimental group than for the control group. Both studies were approved by the ethics committee of the Faculty of Human Sciences of the National University of Colombia (B.FCH.1.002-190-22).

Method

Participants

We recruited 150 undergraduates (85 women and 65 men) who participated for partial course credit. A power analysis (Power = 0.80, α = .05) indicated that samples for experiments with a simple factorial design and two conditions should include approximately 129 participants to detect moderate (η^2 = 0.06) or high (η^2 = 1.38) effect sizes (Fong et al., 2010). To account for potential participant withdrawal and data loss, we aimed for 150 participants. The sample size and all study aspects were preregistered on aspredicted.org (https://aspredicted.org/8mf27.pdf). Participants were randomly assigned to either the experimental or control condition. The experimental group included 75 participants (43 female), aged 20-34 years (M = 23.8, SD = 2.9). The control group included 75 participants (42 female), aged 20-43 years (M = 23.7, SD = 3.3).).

Instruments

We collected demographic information and smoking history and used this as control variables in the analyses.

Affect Misattribution Procedure (AMP). This experimental task involves the presentation of a prime stimulus (GHW or IAPS) for 75 ms, followed by a black screen for 125 ms and a target stimulus (a kanji) for 100ms. After the target, a visual noise mask appears and a 4-point rating scale (-2 very unpleasant, -1 slightly unpleasant, +1 slightly pleasant, +2 very pleasant) is displayed at the bottom of the screen (Payne et al., 2005; Payne et al., 2008).

Need to Smoke. We used the short version of the Questionnaire of Smoking Urges (QSU-brief; Cox et al., 2001), a 10-item self-report measure on a 7-point Likert scale (e.g., "I want to smoke right now"), with higher scores indicating a greater need to smoke (Tiffany & Drobes, 1991). Non-smokers received the minimum score for all items (range 0-70).

Nicotine Dependence. Participants completed the first item of the Fagerström Test for Nicotine Dependence (FTND) to assess nicotine dependence (Heatherton et al., 1991). This scale measures dependence through a Likert scale (range 0-10).

Frequency and History of Smoking. Smoking frequency was assessed by asking participants how many cigarettes they smoke per week or day. Smoking history was determined by asking participants their age when they started smoking, whether they have ever quit, the number of quit attempts, and how soon after waking they smoke their first cigarette.

Procedure

Participants were tested in individual cubicles equipped with PCs and QWERTY keyboards. First, they completed a sociodemographic questionnaire. Next, they performed the AMP task, implemented by Inquisit 4 testing software, providing valence ratings as described above. Participants were instructed to judge the targets and avoid any influence of the prime on their judgments, making this clearly an implicit task as instructions directed attention toward the targets (not the valence primes). The software measured the RTs from the onset of the rating scale on the screen to the key press corresponding to each of the 4-point rating scale values. Finally, participants completed questionnaires on smoking attitudes and smoking status. The entire procedure, including debriefing, took approximately 10 minutes.

Results

The participants in this experiment had a mean age of 23.7 (SD = 3.1). 85 (56.7%) were female, 65 were male. The participants were middle class (M=2.81 (SD = 0.8) on the 1-6 scale used by the national government). A total of 37 participants were smokers. On nicotine dependence (range 0-10), smoking participants had a mean of 3.0 (SD = 0.62). On the need to smoke scale (range 0-70), the mean was 6.5 (SD = 0.96). 10% percent

of smoking participants reported needing to smoke between 31 to 60 minutes after waking up, 5% between 6 to 30 minutes after the same moment, and the rest more than 60 minutes after. Average cigarette consumption was 0.44 (SD = 0.14) per day. Occasional smokers reported smoking 0.57 (SD = 0.15) days per week. The also reported smoking on average 0.51 cigarettes (SD = 0.12) the days they smoke and smoking 1.56 cigarettes a week on average (SD = 0.49). Participants reported starting smoking at 17.22 (SD = 2.91). The 77.5% of smoking participants reported having tried to quit smoking.

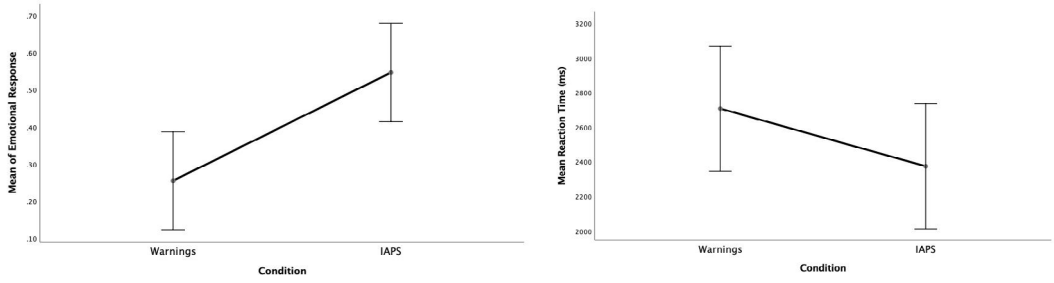
Main Results

We used a one-way ANOVA with condition (GHWs vs. IAPS) as a fixed factor. Each analysis included the average emotional ratings and the average RTs from the 36 trials in the AMP split by type of prime.

There was a main effect of experimental condition $F(1, 148) = 5.43$, $p = .021$, $\eta p^2 = 0.035$. That is, participants rated the target as less pleasant when preceded by a GHW than in the control condition when preceded by a neutral IAPS image (Figure 1). The mean rating in the experimental condition was $M = 0.25$ ($SD = 0.83$), while in the control condition (neutral prime) it was $M = 0.54$ ($SD = 0.69$). This suggests that the GHWs had implicit effects on the judgments of the primes. Even when covariates (e.g., need to smoke) were included in general linear models, these results were consistent.

We did not find a significant effect for RTs, $F(1, 148) = 0.957$, $p = .33$, the mean RT was 2707 ms ($SD = 2779$) for GHWs and 2374 ms ($SD = 988$) for IAPS. These results indicate that the experimental manipulation did not affect the latencies required to rate target stimuli.

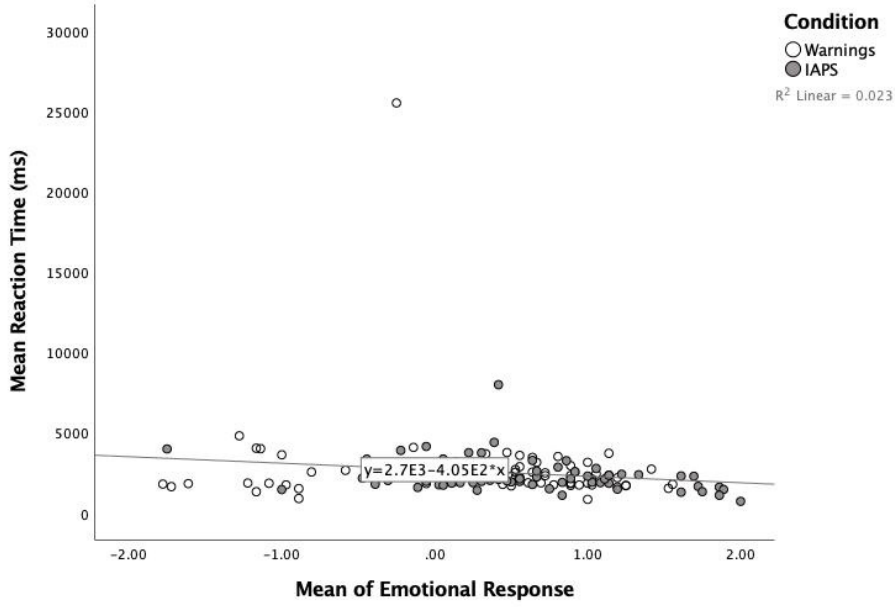
Figure 1. *Results by Condition in study 1*



Note. Mean of pleasantness judgments (left) and reaction times in milliseconds for target stimuli (kanjis) as a function of condition (graphic warning prime vs neutral prime). Error bars represent +/-1.5 S.E.

Additionally, correlations were performed between reaction times and the emotional response reported for the kanji. Figure 2. Scatterplot of kanjis' pleasantness evaluation and reaction times in study 1. This correlation was not significant (r (148) = -0.151, $p = .065$). Additionally, as can be seen in Figure 2, responses to graphic warnings were more negative than responses to neutral images. Although the correlation was not significant, reaction times for the experimental group tended to be lower than reaction times in the control group.

Figure 2. *Correlation between Reaction Time and Implicit Emotional Response.*



Discussion

Study 1 shows that GHWs have clear implicit effects. Participants exposed to GHWs as primes reported more negative perceptions of the targets. However, there were no significant differences in reaction times and no significant correlation between reaction times and implicit ratings of the targets. These results indicate that GHWs effectively influence the implicit ratings of the targets preceded by GHWs. In this procedure, participants are instructed to focus only on judging the target, but presumably, the negative affect triggered by the prime transfers to the evaluation of the target. However, this study does not indicate whether GHWs also induce explicit effects. This limitation emerges because the design specifically involves judging neutral target stimuli with short exposure times (75 ms for the prime and 100 ms for the target).

Experiment 2: Explicit Effects

To focus on explicit processing, Study 2 evaluates the explicit effects of GHWs using an exposure time of 500 ms for the prime and 100 ms for the target. In this case, participants are asked explicitly about the prime's pleasantness. This follows a variant of the AMP developed by Payne, Burkley, and Stokes (2008) to measure explicit influences within the AMP experimental paradigm. We expected that explicit judgments of pleasantness would be more negative in the experimental group compared to the control group, with values closer to -2.

Method

The method used in this study was identical to the one used in study 1 except for the stimulus presentation times, and instructions directed participants to judge the primes.

Participants

Participants were 151 undergraduates (63 women and 88 men) who participated for partial course credit. Similar to Experiment 1, the sample size and all other aspects of the study were preregistered in the aspredicted.org platform (https://aspredicted.org/8mf27.pdf). Participants were randomly assigned to either the experimental or control condition. The experimental group had 76

participants (48 female) with ages between 18 and 32 years (M = 22.5, SD = 2.8). The control group had 75 participants (40 female), with ages between 18 and 29 years (M = 21.6, SD = 2.2).

Results

Participants in this experiment had an average age of 22 years (SD = 2.5). The sample included 88 women (58.3%) and 63 men (41.7%), primarily middle-class individuals (average of 3 on the 1-6 scale used by the national government). Similar to Experiment 1, we performed ANOVAs for continuous variables (e.g., age) and Chi-Square tests for categorical variables (e.g., gender) to check the effectiveness of the random assignment. The results indicated no significant differences between conditions for any variables. Among the participants, 29 were smokers. For nicotine dependence (range 0-10), the mean score was 0.65 (SD = 0.23). The mean score on the need to smoke scale (range 0-70) was 6.7 (SD = 1.02). Only 4.1% of smokers reported needing to smoke within 6 to 30 minutes after waking, while the rest reported waiting more than 60 minutes. The average cigarette consumption was 0.39 (SD = 0.12) per day. Occasional smokers reported smoking 0.64 (SD = 0.13) days per week, with an average of 0.57 cigarettes (SD = 0.13) on smoking days. On average, this group smoked 1.87 cigarettes per week (SD = 0.64). Participants reported starting smoking at an average age of 15.86 years (SD = 2.08), and 86.1% of smokers had attempted to quit smoking.

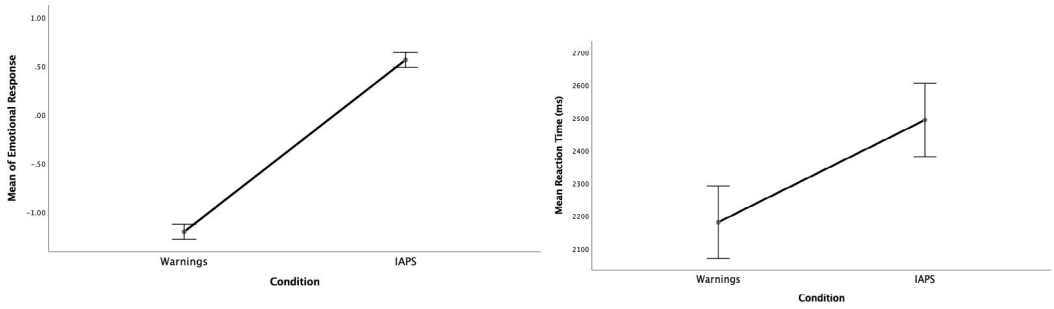
Main Results

A one-way ANOVA was conducted with condition (prime type) entered as a fixed effect. The experimental condition involved negative primes (GHWs), while the control condition involved neutral IAPS images. Analyses involved the mean explicit valence ratings and mean RTs.

For explicit ratings, the results showed a significant effect of condition, $F(1, 149) = 579$, $p < .001$, $\eta p^2 = .795$. Participants rated the pleasantness of the prime as more negative (less pleasant) in the experimental condition (GHWs) than in the control condition (neutral IAPS). Recall that explicit emotional responses were measured on a scale from -2 to +2, with negative values indicating unpleasantness and positive values indicating pleasantness. The mean emotional response was M = -1.2 (SD = 0.44) for the experimental condition and M = 0.56 (SD = 0.45) for the control condition. This result indicates that graphic warnings as primes have explicit effects. When we conducted general linear models including covariates (e.g., need to smoke), the results of the manipulation remained significant.

For RTs, the results were also significant, $F(1, 149) = 8.81$, $p < .003$, $\eta p^2 = .795$. Responses were faster in the experimental condition (GHWs: M = 2181 ms, SD = 567) than in the control condition (neutral IAPS: M = 2493 ms, SD = 717). These effects remained significant when we included covariates.

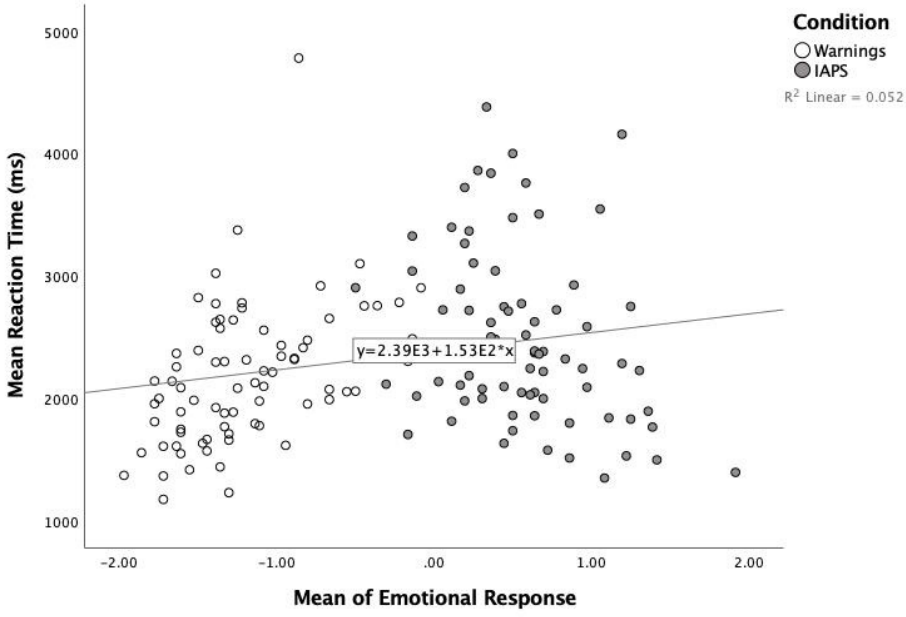
Figure 3. *Results by Condition in study 2*



Note. Mean of pleasantness judgments (left) and reaction times in milliseconds for target stimuli (prime) as a function of condition (graphic warning prime vs neutral prime). Error bars represent +/-1.5 S.E.

Additionally, we found a significant correlation between RTs and the valence ratings ($r(149) = .228$, $p < .01$), indicating that emotional implicit processing can lead to faster reactions. Figure 4 shows that reaction times in the graphic warning group are, on average, shorter when the emotional responses are more negative.

Figure 4. *Correlation between RTs and Explicit Valence Ratings in study 2*



Discussion

Study 2 demonstrates that GHWs have explicit effects when the prime images are presented for longer durations. Using the same paradigm as in Study 1, but with extended exposure times, GHWs resulted in faster and more negative pleasantness evaluations compared to neutral stimuli. This finding suggests that longer exposure times lead to a transition from implicit to explicit processing. This shift from automatic to deliberate processing has been explored in previous literature (e.g., Chartrand et al., 2006; Sánchez-Mora & Tamayo, 2021) and is instrumental in understanding the relationship between the automatic and educational functions of GHWs from a nudge perspective.

General Discussion

Taken together, our two studies show that GHWs can have implicit or explicit effects, depending on the time allowed to process the stimuli and the attention paid to them. The standard AMP in Experiment 1, with short presentation times for GHWs and instructions to direct participants' attention to the targets, showed implicit effects. This provides evidence that GHWs may behave as "type 1" nudges, harnessing implicit, automatic cognitive processes to discourage smoking.

The modified AMP procedure in Experiment 2, with longer presentation times for GHWs and instructions to direct participants' attention to the primes, showed explicit negative evaluations. These findings jointly suggest that the experimental conditions favored a transition from implicit to explicit affect, where automatic responses elicited by GHWs may influence more deliberate valence ratings. These results are consistent with previous literature showing that graphic warnings help prevent smoking initiation and relapse by appealing to negative emotions (Hammond, 2011; Macy et al., 2016).

Implicit vs. Explicit Effects

Most previous research on GHWs has focused on their explicit effects based on self-report measures (Pang et al., 2021). However, our use of the standard version of the AMP demonstrates the potential for a transition from initial automatic implicit processing of GHWs to more elaborated and deliberative evaluation of the messages conveyed by GHWs.

Interestingly, early implicit responses tend to be congruent with the valence of the primes, indicating that implicit processing consistently reflects the emotional direction of the targets. This suggests that implicit processing might be always present and aligned with the valence of the stimuli. In contrast, explicit processing occurs at a later stage and involves more deliberate and controlled cognitive processes. This later stage can lead to positive outcomes, as intentions to quit smoking or prevention of smoking initiation. However, it can also backfire resulting in defensiveness or reactance to GHWs (e.g., Bekalu et al., 2018).

The initial automatic implicit processing captures the immediate emotional responses to GHWs, while explicit processing allows for a more thoughtful and reflective evaluation of the warnings. In our view, this transition underscores the importance of considering both stages in the design of public health interventions.

Methodological Contributions

The AMP represents an original methodological contribution to the study of GHWs and their application in public policies. Our research demonstrates how easily the AMP can be adapted to capture both implicit and explicit affective responses to GHWs. For example, the entire procedure, including collection of demographic data and instructions, took no more than 10 minutes for each of our 300 participants.

In addition to collecting valence ratings, we measured the latencies required for participants to reach each decision. This approach yielded surprisingly interesting results. RTs correlated with explicit judgments in Experiment 2, but not with implicit effects in Experiment 1. This discrepancy provides information regarding the cognitive and emotional processing of GHW, suggesting that different cognitive processes are recruited at distinct stages of the evaluation process.

We suggest that current decision frameworks as the Linear Ballistic Accumulator (LBA) model (e.g., Berkovich & Meiran, 2024; Brown & Heathcote, 2008) can be applied to our data. From this perspective, the significant correlation between RTs and explicit judgments in Experiment 2 implies that longer presentation times and instructions that focus attention on GHWs facilitate explicit accumulation of information, leading to rapid explicit valence judgments. In contrast, the lack of correlation in Experiment 1 suggests that the predominantly implicit effects observed did not produce sufficient information accumulation for

controlled deliberative judgments within the short time manipulated. This interpretation fills a gap in understanding the transition from implicit to explicit processing, or, in terms of nudge theory, the transition from type 1 to type 2 nudges.

Implications for Nudge Theory

Our research also intersects with Nudge theory, as highlighted in our introduction. Nudges can be classified into two types. Type 1 nudges appeal to automatic and implicit processing, while type 2 nudges focus on controlled processing (Lin et al., 2017). Previous research classifies GHWs as type 1 nudges (e.g., Barton, 2013; Bogliacino et al., 2015). However, our data show that varying exposure times can modulate the effects of GHWs. This implies that the type of nudge alone does not determine whether the effect is implicit or explicit; rather, exposure times and instructions that control participants' attention play a critical role.

These results suggest the existence of a temporal activation pathway and transition processes between implicit and explicit effects, (e.g., Hollands et al., 2016; Parada et al., 2017; Sanchez-Mora & Tamayo 2021). This pathway implies that individuals progress from automatic, unconscious processing to controlled processing in an effort to consciously extract information from fuzzy signals arising from the initial phase. This idea is consistent with serial models of cognitive processing, as Evans and Stanovich's (2013) model. Their model suggests that System 1 is engaged first, followed by System 2, which monitors and, if necessary, corrects the output of System 1.

Recent approaches, like De Neys' hybrid model (2017), also support this view. In this model, System 1 operates in parallel with both heuristic and algorithmic intuitions, coupled with a conflict detection process that may or may not activate System 2. Although these models provide a framework, the exact pathways between implicit and explicit processing remain unclear.

Limitations

Correlational data guided our interpretation of the utility of RTs as supplementary indicators of explicit negative affective processing. Future studies should employ directly RT modeling frameworks to predict the formation of explicit judgments and long-term smoking attitudes. This approach could lead to stronger evidence and deeper understanding of this purported transition.

The sample in our study comprised only university students, which may limit the generalizability of the findings to a more diverse demographic. Future research should include a more diverse sample.

Recommendations

Future research should examine the relationship between implicit and explicit effects at different exposure times. Our results suggest that explicit effects are more pronounced than implicit effects, indicating that a well-designed strategy may encourage longer viewing times. Understanding the time course of these effects will help optimize the design of GHWs to evoke key attitudinal outcomes. In addition, examining how repeated presentation times influence familiarity and responses to GHWs may inform strategies for maintaining their long-term effectiveness. Additionally, further research could manipulate repeated vs. single presentation times of GHWs in order to assess how familiarity influences implicit ant explicit responses.

In addition, our research encourages the measure of RTs to model and predict the formation of explicit judgments and long-term attitudes related to smoking should be encouraged. RTs as a measure of evidence accumulation highlights the need to include the decision time in future models to develop accurate accounts of the transition from implicit to explicit processing.

Effective GHWs should consider both automatic responses and explicit judgments. Strategies that generate explicit effects through longer exposure times and engaging content can enhance

their impact, ensuring GHWs continue to play a critical role in deterring smoking. Additionally, future research should assess the implicit emotional valence of GHWs prior to their public release. This strategy could supplement usual GHWs validation methods, as questionnaires and explicit ratings, providing a more comprehensive evaluation of their potential success.

References

Bansal-Travers, M., Hammond, D., Smith, P., & Cummings, K. M. (2011). The impact of cigarette pack design, descriptors, and warning labels on risk perception in the U.S. *American journal of preventive medicine*, 40(6), 674–682. https://doi.org/10.1016/j.amepre.2011.01.021

Barton, A. (2013). How tobacco health warnings can foster autonomy. *Public Health Ethics*, *6*(2), 207-219. https://doi.org/10.1093/phe/pht011

Bekalu, M. A., Ramanadhan, S., Bigman, C. A., Nagler, R. H., & Viswanath, K. (2018). Graphic and arousing? Emotional and cognitive reactions to tobacco graphic health warnings and associated quit-related outcomes among low SEP population groups. *Health Communication*, *34*(7), 726-734. https://doi.org/10.1080/10410236.2018.1434733

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., ... & Galing, S. (2017). Should governments invest more in nudging? *Psychological science*, *28*(8), 1041-1055.

Berkovich, R., & Meiran, N. (2024). Both pleasant and unpleasant emotional feelings follow Weber's law but it depends how you ask. *Emotion*, *24*(5) 1180-1189. https://doi.org/10.1037/emo0001343

Bogliacino, F., Codagnone, C., Veltri, G. A., Chakravarti, A., Ortoleva, P., Gaskell, G., Ivchenko, A., Lupianez-Villanueva, F., Mureddu, F., & Rudisill, C. (2015). Pathos & ethos: Emotions and willingness to pay for tobacco products. *PLoS ONE*, *10*(10). https://doi.org/10.1371/journal.pone.0139542

Brown, S., & Heathcote, A. (2008). The simplest complete model of choice response time: Linear ballistic accumulation. *Cognitive Psychology*, 57, 153-178. https://doi.org/10.1016/j.cogpsych.2007.12.002

Chartrand, T. L., Van Baaren, R. B., & Bargh, J. A. (2006). Linking automatic evaluation to mood and information processing style: Consequences for experienced affect, impression formation, and stereotyping. *Journal of Experimental Psychology. General*, *135*(1), 70-77. https://doi.org/10.1037/0096-3445.135.1.70

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*(6), 1015–1026. https://doi.org/10.1037/0022-3514.58.6.1015

Coleman, S. (1996). The Minnesota income tax compliance experiment: State tax results.

Corneille, O., & Hütter, M. (2020). Implicit? What do you mean? A comprehensive review of the delusive implicitness construct in attitude research. *Personality and Social Psychology Review*, *24*(3), 212-232. https://doi.org/10.1177/1088868320911325

Cox, L. S., Tiffany, S. T., & Christen, A. G. (2001). Evaluation of the brief questionnaire of smoking urges (QSU-brief) in laboratory and clinical settings. *Nicotine & tobacco research: official journal of the Society for Research on Nicotine and Tobacco*, *3*(1), 7–16. https://doi.org/10.1080/14622200020032051

De Neys, W. (2017). Dual process theory 2.0. In Dual Process Theory 2.0. https://doi.org/10.4324/9781315204550 OK

Drovandi, A., Teague, P. A., Glass, B., & Malau-Aduli, B. (2019). Smoker perceptions of health warnings on cigarette packaging and cigarette sticks: A four-country study. *Tobacco induced diseases*, *17*, 23. https://doi.org/10.18332/tid/104753

Evans, A. T., Peters, E., Shoben, A. B., Meilleur, L. R., Klein, E. G., Tompkins, M. K., Romer, D., & Tusler, M. (2017). Cigarette graphic warning labels are not created equal: They can increase or decrease smokers' quit intentions relative to text-only warnings. *Nicotine & Tobacco Research*, *19*(10), 1155–1162. https://doi.org/10.1093/ntr/ntw389

Evans, J. S. B. T., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science, 8*(3), 223–241. https://doi.org/10.1177/1745691612460685

Erceg-Hurn, D. M., & Steed, L. G. (2011). Does exposure to cigarette health warnings elicit psychological reactance in smokers? *Journal of applied social psychology*, *41*(1). https://doi.org/10.1111/j.1559-1816.2010.00710.x

Fischer, S., Drosopoulos, S., Tsen, J., & Born, J. (2006). Implicit learning–explicit knowing: A role for sleep in memory system interaction. *Journal of Cognitive Neuroscience*, *18*(3), 311-319. https://doi.org/10.1162/jocn.2006.18.3.311

Fong, G. T., Hammond, D., Jiang, Y., Li, Q., Quah, A. C. K., Driezen, P., & Yan, M. (2010). Perceptions of tobacco health warnings in China compared with picture and text-only health warnings from other countries: An experimental study. *Tobacco Control*, *19*(Supplement 2), i69–i77. https://doi.org/10.1136/tc.2010.036483

Francis, D. B., Hall, M. G., Noar, S. M., Ribisl, K. M., & Brewer, N. T. (2017). Systematic review of measures used in pictorial cigarette pack warning experiments. *Nicotine & Tobacco Research*, *19*(10), 1127-1137. https://doi.org/10.1093/ntr/ntx082

Frensch, P. A., & Runger, D. (2003). Implicit learning. *Current Directions in Psychological Science*, *12*(1), 13–18. https://doi.org/10.1111/1467-8721.01213

Gantiva, C., Sotaquirá, M., Chaparro, V., Colorado, L., & Gómez, A. (2022). Emotional impact of graphic health warnings on tobacco packaging: Analysis of their content. *Europe's Journal of Psychology*, *18*(1), 40–52. https://doi.org/10.5964/ejop.2885

Graf, P., & Schacter, D. L. (1985). Implicit and explicit memory for new associations in normal and amnesic subjects. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *11*(3), 501. http://dx.doi.org/10.1037/0278-7393.11.3.501

Hall, M. G., Sheeran, P., Noar, S. M., Boynton, M. H., Ribisl, K. M., Parada, H., Jr, Johnson, T. O., & Brewer, N. T. (2018). Negative affect, message reactance and perceived risk: How do pictorial cigarette pack warnings change quit intentions? *Tobacco control*, *27*(e2), e136–e142. https://doi.org/10.1136/tobaccocontrol-2017-053972

Hammond, D. (2011). Health warning messages on tobacco products: A review. *In Tobacco Control*, *20*(5), 327–337. https://doi.org/10.1136/tc.2010.037630

Hammond, D., Fong, G. T., Borland, R., Cummings, K. M., McNeill, A., & Driezen, P. (2007). Text and Graphic Warnings on Cigarette Packages: Findings from the International Tobacco Control Four Country Study. American Journal of Preventive Medicine, 32(3), 202-209. https://doi.org/10.1016/j.amepre.2006.11.011

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom (1991). The Fagerström test for nicotine dependence: A revision of the Fagerstrom Tolerance Questionnaire. British *Journal of Addiction*, *86*(9), 1119-1127. https://doi.org/10.1111/j.1360-0443.1991.tb01879.x

Hoffman, S. J., & Tan, C. (2015). Overview of systematic reviews on the health-related effects of government tobacco control policies. *BMC Public Health*, *15*(1). https://doi.org/10.1186/s12889-015-2041-6

Hollands, G. J., Marteau, T. M., & Fletcher, P. C. (2016). Non-conscious processes in changing health-related behaviour: A conceptual analysis and framework. *Health Psychology Review*, *10*(4), 381-394. https://doi.org/10.1080/17437199.2015.1138093

Jansen, C., van den Berg, M., & Buurman, C. (2006). Effects of adding images to verbal warnings on cigarette packages. Information and document design: Varieties on recent research, *7*, 129. In Carliner, S.; Waele, C. de; Verckens, J.P. (ed.), Information and Document Design: Varieties on Recent Research, pp. 129-147

Kahneman, D. (2003a). A psychological perspective on economics. *American economic review*, *93*(2), 162-168. http://www.jstor.org/stable/3132218

Kahneman, D. (2003b). Maps of bounded rationality: Psychology for behavioral economics. *American Economic Review*, *93*(5), 1449-1475. http://www.jstor.org/stable/3132137

Kolodko, J., Read, D., & Taj, U. (2016). Using Behavioural Insights to Reduce Littering in the UK. Nudgeathon, sl.

Kovács, R. (2021). Public health policy: Nudge theory in a discourse of behavioural economics. *Socio-Economic and Humanities Studies*, *14*(2), 57–86. https://doi.org/10.61357/sehs.v14i2.32

Lin, Y., Osman, M., & Ashcroft, R. (2017). Nudge: Concept, effectiveness, and ethics. *Basic and Applied Social Psychology, 39*(6), 293–306. https://doi.org/10.1080/01973533.2017.1356304

Madera-Carrillo, H., Zarabozo, D., Ruiz-Díaz, M., & Berriel-Saez, P. (2015). El Sistema Internacional de Imágenes Afectivas (IAPS) en población mexicana. Guadalajara, México: Universidad de Guadalajara.

Macy, J. T., Chassin, L., Presson, C. C., & Yeung, E. (2016). Exposure to graphic warning labels on cigarette packages: Effects on implicit and explicit attitudes towards smoking among young adults. *Psychology & Health*, *31*(3), 349-363. https://doi.org/10.1080/08870446.2015.1104309

Noar, S. M., Hall, M. G., Francis, D. B., Ribisl, K. M., Pepper, J. K., & Brewer, N. T. (2016). Pictorial cigarette pack warnings: A meta-analysis of experimental studies. *Tobacco control*, *25*(3), 341-354. http://dx.doi.org/10.1136/tobaccocontrol-2014-051978

Pang, B., Saleme, P., Seydel, T., Kim, J., Knox, K., & Rundle-Thiele, S. (2021). The effectiveness of graphic health warnings on tobacco products: A systematic review on perceived harm and quit intentions. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-10810-z

Parada, H., Hall, M. G., Boynton, M. H., & Brewer, N. T. (2017). Trajectories of responses to pictorial cigarette pack warnings. *Nicotine & Tobacco Research*, *20*(7), 876-881. https://doi.org/10.1093/ntr/ntx182

Payne, B. K., Burkley, M. A., & Stokes, M. B. (2008). Why do implicit and explicit attitude tests diverge? The role of structural fit. *Journal of Personality and Social Psychology*, *94*(1), 16–31. https://doi.org/10.1037/0022-3514.94.1.16

Payne, B. K., Cheng, C. M., Govorun, O., & Stewart, B. D. (2005). An inkblot for attitudes: Affect misattribution as implicit measurement. Journal of Personality and Social Psychology, 89(3), 277–293. https://doi.org/10.1037/0022-3514.89.3.277

Perkins, H. W. (Ed.). (2003). The social norms approach to preventing school and college age substance abuse: A handbook for educators, counselors, and clinicians. Jossey-Bass/Wiley.

Peters, E., Romer, D., Slovic, P., Jamieson, K. H., Wharfield, L., Mertz, C. K., & Carpenter, S. M. (2007). The impact and acceptability of Canadian-style cigarette warning labels among US smokers and nonsmokers. *Nicotine & Tobacco Research*, *9*(4), 473-481. https://doi.org/10.1080/14622200701239639

Sánchez-Mora, J., & Tamayo, R. M. (2021). From incidental learning to explicit memory: The role of sleep after exposure to a serial reaction time task. *Acta Psychologica*, 217, 103325. https://doi.org/https://doi.org/10.1016/j.actpsy.2021.103325

Schacter, D. L., & Graf, P. (1986). Effects of elaborative processing on implicit and explicit memory for new associations. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 12(3), 432. http://dx.doi.org/10.1037/0278-7393.12.3.432

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science*, *18*(5), 429-434. https://doi.org/10.1111/j.1467-9280.2007.01917.x

Simon, H. A. (2000). Bounded rationality in social science: Today and tomorrow. In *Mind & Society* (Vol. 1). www.irpublicpolicy.ir

Smith, C. T., & De Houwer, J. (2015). Hooked on a feeling: Affective anti-smoking messages are more effective than cognitive messages at changing implicit evaluations of smoking. *Frontiers in psychology*, 6, 1488. https://doi.org/10.3389/fpsyg.2015.01488

Slovic, P. (2001). Cigarette smokers: Rational actors or rational fools? In P. Slovic (Ed.), *Smoking: Risk, perception, & policy* (p. 97–124). Sage Publications, Inc. https://doi.org/10.4135/9781452232652.n6

Slovic, P. (2003). Affect, analysis, adolescence, and risk. In D. Romer (Ed.), *Reducing adolescent risk: Toward an integrated approach* (pp. 44-48). Thousand Oaks, CA: Sage.

Tiffany, S. T., & Drobes, D. J. (1991). The development and initial validation of a questionnaire on smoking urges. *British journal of addiction*, *86*(11), 1467–1476. https://doi.org/10.1111/j.1360-0443.1991.tb01732.x

Thaler, R. H., & Ganser, L. J. (2015). Misbehaving: The making of behavioral economics. New York: WW Norton.

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin.

Wang, A. L., Lowen, S. B., Romer, D., Giorno, M., & Langleben, D. D. (2015). Emotional reaction facilitates

the brain and behavioural impact of graphic cigarette warning labels in smokers. Tobacco control, 24(3), 225-232. http://dx.doi.org/10.1136/tobaccocontrol-2014-051993

Warrington, E. K., Weiskrantz, L. (1968). New method of testing long-term retention with special reference to amnesic patients. *Nature Publishing Group*, *217*, 972–974.

Wiers, R. W., & Stacy, A. W. (Eds.). (2006). *Handbook of implicit cognition and addiction*. Sage

Weiskrantz, L., & Warrington, E. K. (1979). Conditioning in amnesic patients. *Neuropsychologia*, *17*(2), 187–194. https://doi.org/10.1016/0028-3932(79)90009-5

Willingham, D. B., & Goedert-Eschmann, K. (1999). The relation between implicit and explicit learning: Evidence for parallel development. *Psychological Science*, *10*(6), 531–534. https://doi.org/10.1111/1467-9280.00201

Normas para Autores

La Revista Colombiana de Psicología (RCP) es una publicación semestral del Departamento de Psicología de la Universidad Nacional de Colombia; está dirigida a instituciones educativas y culturales, psicólogos y estudiantes de Psicología o disciplinas afines. Su objetivo principal es la divulgación de trabajos originales y arbitrados que se enmarquen en cualquiera de las áreas de investigación básica o aplicada propias de la psicología y que contribuyan al avance de esta.

Se aceptan reportes de investigaciones empíricas, contribuciones teóricas en formato de ensayo, trabajos de meta-análisis, revisiones críticas de literatura, y, en general, trabajos que sigan alguna de las variedades metodológicas de tipo científico en psicología.

Proceso de Envío, Arbitraje y Aceptación de Artículos

Los artículos que se sometan a revisión para publicación deben dirigirse y enviarse a la RCP, en medio electromagnético, versión MS Word, a través del sistema de gestión de revistas Open Journal System. Para enviar el manuscrito, ingrese a la página http://www.revistas.unal.edu.co/index.php/psicologia/index/, donde podrá inscribirse como autor y seguir las instrucciones para el envío de artículos. De esta forma podrá hacer seguimiento del proceso de su artículo.

Los artículos enviados deben ser inéditos y no pueden ser evaluados simultáneamente por otras revistas, razón por la cual es indispensable que los autores firmen una carta, suministrada por la revista, en la que certifiquen la originalidad del texto.

Para garantizar que no exista conflicto de intereses en el proceso de arbitraje, el autor enviará con el artículo, dos nombres de pares académicos que considere idóneos para evaluar su trabajo, con una justificación de la sugerencia. El editor se reserva el derecho de aceptar la sugerencia o escoger dos árbitros diferentes. Los autores no conocerán la identidad de los evaluadores.

Una vez revisados los criterios mínimos de presentación según las normas APA, y demás requerimientos formales, se enviará el manuscrito a pares académicos expertos en el área temática, quienes tampoco conocerán el nombre del autor. En un plazo de 6 a 12 meses para realizar la evaluación, los jurados elaborarán sendos conceptos académicos a partir de su conocimiento y experiencia en el área temática del artículo, con base en los cuales, el editor de la revista emitirá la decisión editorial en la que se le comunica formalmente al autor las posibilidades de publicación del artículo. Esto es: aceptado, rechazado o aceptado cuando realice los cambios solicitados por los evaluadores. En cualquiera de los casos, los autores recibirán un concepto general que integra las evaluaciones de cada uno de los árbitros, en el que se detallan las fortalezas del artículo y los aspectos que se deben modificar. En ocasiones, recibirán, el manuscrito con los comentarios que los evaluadores hicieron en el texto.

Cuando un artículo es aceptado, los derechos de publicación y reproducción en medios impresos y digitales que permitan el acceso público son de la RCP, bajo licencia de Creative Commons. Sin embargo, se evaluará cualquier petición por parte del autor para obtener el permiso de su reproducción.

Una vez publicado el artículo, se enviará en formato .pdf a los autores. Para retirar un artículo antes de su publicación, el autor deberá dirigir una solicitud por escrito (impreso) al editor, asimismo esta se hará efectiva únicamente con la respuesta del editor.

Características Formales y Presentación de los Artículos

Los artículos no deben superar las 25 páginas más la sección de referencias y deben cumplir con las normas de presentación del estilo internacional de publicaciones científicas en psicología, recomendadas por la APA, 6.ª edición (2010). Las tablas o figuras se deben incluir en el archivo Word y, además, se debe adjuntar aparte el archivo original (e.g., .xls, .jpg, .tiff).

Se recomienda usar un lenguaje estándar para publicaciones científicas y evitar el uso de modismos propios de una región geográfica particular. Todo artículo que sea el informe de una investigación empírica (donde haya recolección de datos) debe estar adecuadamente dividido en las secciones recomendadas por la APA y contener la siguiente información:

Título: que corresponda a la información y al propósito del manuscrito.

Resumen: breve texto de máximo 160 palabras, en el que se condensen los aspectos más relevantes en cuanto a la metodología, los resultados y las conclusiones. Se deben incluir cinco palabras clave referentes al contenido y al área de la psicología a la que pertenece el trabajo, así como una versión en inglés del resumen y de las palabras clave.

Introducción: texto en el que se exponen tanto los antecedentes en el área de investigación como la descripción del problema de investigación o pregunta, cuya justificación debe ser clara, coherente y basada en la literatura consultada.

Sujetos o Participantes: el artículo debe explicitar las características principales de los participantes, así como el proceso de selección y asignación a grupos cuando sea pertinente. La APA recomienda el uso del término *participantes* cuando se trata de investigaciones con humanos, y el término *sujetos*, cuando es con animales.

Instrumentos: es indispensable que se identifiquen y describan claramente los instrumentos utilizados para la recolección de la información; si se trata de pruebas psicológicas, se deben mencionar sus propiedades psicométricas.

Procedimiento: es necesario describir las acciones relevantes durante la recolección de la información y el análisis de los datos.

Resultados: los resultados (expresados en datos) relevantes para los objetivos del estudio deben ser explícitos y claros. Cuando se requieran elementos complementarios, como tablas o figuras, los datos deben estar ordenados debidamente como lo indica la APA. Se recomienda evitar repeticiones de los datos en el cuerpo del texto y en las tablas.

Discusión y Conclusiones: toda discusión respecto a los resultados debe responder a las preguntas de investigación y hacerse a la luz de la literatura relevante. Asimismo, se deben presentar las conclusiones del estudio.

Citas y Referencias: todo artículo debe contener solo el listado de referencias citadas en él (máximo 60 referencias). Así mismo, todas las citas que aparezcan en el texto deben tener una referencia correspondiente. Tanto las citas como las referencias deben presentarse estrictamente como lo indica la APA. Recuerde que siempre que sea posible, se debe indicar el doi de cada uno de los artículos referenciados.

Apéndices: el texto puede incluir apéndices (páginas anexas) siempre y cuando sean importantes y estrictamente necesarios para la comprensión del texto.

Los artículos que no sean un informe de investigación como tal y que no contengan la información anteriormente desglosada pueden figurar como revisiones de una temática, crítica de una teoría o de un estudio empírico, o desarrollo de una propuesta teórica. Estos artículos deben ser presentados teniendo en cuenta los criterios generales de las normas APA en relación con títulos y subtítulos, resumen, estilo de redacción y citación de referencias. Adicionalmente, estos textos deben tener las siguientes características:

1. Problema claramente establecido que se desarrolle a lo largo de todo el texto.
2. Presentar de manera clara la importancia del tema o de la problemática analizada.
3. Argumentación y conclusiones claras y coherentes con el desarrollo del tema.
4. Referencias bibliográficas correspondientes a la temática estudiada y al tipo de estudio (para un artículo de revisión se esperan mínimo 50 referencias).

Ética y Buenas Prácticas en Publicación

La RCP se acoge a los lineamientos del Código Deontológico y Bioético del Ejercicio de la Psicología en Colombia (http://www.tribunales.colpsic.org.co) y de la APA (http://www.apa.org/ethics/code) en relación con los estándares éticos de investigación y publicación. Para la publicación de manuscritos en esta revista es necesario que el(los) autor(es) garantice(n) el cumplimiento de los principios éticos mencionados en la "Declaración de cumplimiento de los principios éticos", disponible en la página web de la revista (http://www.revistas.unal.edu.co/index.php/psicologia).

Adicionalmente, en la "Declaración de conflictos de intereses", disponible en la misma página web, se requiere que el(los) autor(es) revele(n) cualquier conflicto potencial de intereses, así como las instituciones de afiliación o acuerdos financieros relacionados con los productos o servicios empleados en el estudio presentado en el manuscrito.

Cómo Solicitar Copias y Acceder a Documentos

La RCP es publicada bajo las licencias de Creative Commons (http://creativecommons.org/licenses/by-nc-nd/2.5). Los artículos de esta revista están disponibles

online en la siguiente dirección electrónica: http://www.revistas.unal.edu.co/index.php/psicologia/issue/archive, y pueden ser reproducidos y copiados de acuerdo a las condiciones de esta licencia. Si usted desea suscribirse como lector en la revista, por favor diríjase a la sección de información para lectores en http://www.revistas.unal.edu.co/index.php/psicologia/information/readers, y siga los pasos que allí le indican. Adicionalmente, existe un número limitado de copias físicas disponibles para requerimientos especiales. Para solicitar copias físicas, por favor escriba a **revpsico_fchbog@unal.edu.co.**

¿Cómo Citar la RCP?

Al citar las revistas normalmente se utiliza el nombre completo de estas (e.g., formato APA). Sin embargo, dada la extensión del título (e.g., *Journal of Science Education and Technology*), algunas publicaciones utilizan sistemas de citación que requieren la forma abreviada. Se solicita a los autores que, cuando otras publicaciones les soliciten dicha forma, se refieran a la *Revista Colombiana de Psicología* con su abreviatura *Rev. colomb. psicol.* Adicionalmente, solicitamos a los autores citar cada artículo de la revista con su respectivo doi, el cual aparece en la portada del artículo.

Authors Guidelines

The Revista Colombiana de Psicología (RCP) is a biannual publication from the Department of Psychology at the Universidad Nacional de Colombia; it is aimed at educational and cultural institutions, psychologists and students of psychology or related disciplines. Its main objective is the dissemination of original works and refereed that fall within any of the areas of basic or applied research of psychology and contribute to its advancement.

We accept reports of empirical research, theoretical contributions in the form of essays, meta-analysis, critical reviews of literature, and in general, those works that follow any of the varieties of a scientific methodology in psychology.

Submission Process, Arbitration and Acceptance of the Article

Articles submitted for publication should be addressed and sent to the RCP, as MS Word file texts, through the Open Journal System. To send the article, go to page http://www.revistas.unal.edu.co/index.php/psicologia/index/, where you can register as author and follow the instructions for sending articles. This allows you to monitor the process of your article.

Articles submitted must be unpublished and may not be assessed simultaneously by other journals, which is why it is essential that authors sign a letter provided by the journal certifying the originality of these text.

To ensure no conflict of interest in the arbitration process, the author will send, along with the article, the names of two academic peers he/she considers qualified to evaluate his/her work, with the rationale for the suggestion. The editor reserves the right to accept the suggestion or choose two different referees. The authors will not know the identity of the reviewers.

After reviewing the minimum standards of presentation according to APA standards, and other formal requirements, the manuscript is evaluated by academic peers, to whom the name of the author will not be revealed. Within a period of 6 to 12 months for evaluation, reviewers will produce an academic concept drawn from their knowledge and experience in the theme area of the article.

Finally, based on the concepts of the referee, the editor of the journal will issue a decision in which he formally communicates to the author the possibility of publishing the article. That is, accepted, rejected, or accepted once the changes requested by the reviewers are made. In either case, authors will receive a general concept that integrates the evaluations of each of the referees, detailing the strengths of the article and the issues that must be modified. In many cases they will also receive the manuscript with the comments that different evaluators made to the text.

Whenever an article is accepted, the rights to publish and reproduce it either in print or online belong to the Revista Colombiana de Psicología, under Creative Commons license. However, any request from the author for reproduction permission will be assessed.

Once posted, the article will be sent to the authors in .pdf format. To remove an article before its publication, the author must send a written request to the editor, which will be effective only with the editor's response.

Formal Characteristics and Presentation of Articles

Articles should not exceed 25 pages (not taking into account references section) and must meet the standards of international style of presentation of scientific literature in psychology, recommended by the APA, 6th edition (2010). Tables and figures should be included in the Word document and, in addition, enclose the original file (e.g., .xls, .jpg, .tiff).

We recommend using a standard language for scientific publications and avoid using idioms characteristic of a particular geographic region. Any article that is the report of empirical research (which has data collection) should be properly divided into the sections recommended by the APA and contain the following information:

Title: Corresponding with the information and purpose of the manuscript.

Abstract: A brief text (160 words maximum) to condense the most relevant aspects concerning the methodology, results and conclusions. It should include 5 keywords on the content and the area of psychology that matches the work, and also a Spanish version of the abstract and keywords.

Introduction: A text setting out both the background in the research area and the description of the research problem or question; the justification must be clear, coherent and based on the reviewed literature.

Subjects or Participants: The article should explain the main characteristics of the participants and the selection and assignment to groups when appropriate. The APA recommends the use of the term *participants* when it comes to research with humans, and *subjects*, when animals.

Instruments: It is essential to clearly identify and describe the instruments used to collect information; when it comes to psychological tests, the psychometric properties should be mentioned.

Procedure: You must describe the relevant actions that were undertaken to collect information and analyze data.

Results: The results (shown as data) relevant to the objectives of the study should be explicit and clear. Whenever you require additional elements such as tables or figures, the data must be sorted properly as indicated by the APA. Avoid repeating the same data in the body of the text and in the tables.

Discussion and Conclusions: Any discussion about the results should be made in light of the relevant literature and answer the research questions. Likewise, the conclusions of the study must be presented.

Citations and References: Any article should contain only the list of references cited in the article (maximum 60 references.) Conversely, all the cited documents in the text must have a reference. Both, the cited documents and the list of references, must be submitted strictly as indicated by the APA. When available, the doi number must be included in the list of references.

Appendices: The text may include appendices (attached pages) provided they are considered important and strictly necessary to clarify the understanding of the text. Otherwise, it is not recommended to include them.

Articles that are not a research report as such and do not contain the above information can be submitted as itemized revisions of a thematic, as review of a theory or empirical research, or as development of a theoretical proposition. These articles should be presented taking into account those general criteria of the APA regarding titles and subtitles, abstracts, writing style and citation of references. Additionally, these texts should have the following characteristics:

1. Problem clearly stated and developed throughout the text.
2. Importance of the issue or analyzed problematic clearly presented.
3. Arguments and conclusions clear and consistent with the development of the subject.
4. References for the topic being studied and the type of study (for a review article at least 50 references are expected.)

Ethics and Publication Malpractice

The RCP accepts the bio-ethical and deontological code for the practice of psychology in Colombia (http://www.tribunales.colpsic.org.co) and the APA ethics code as ethical standards (http://www.apa.org/ethics/code/) for research and publication. As a policy of RCP, accepted authors must warrant compliance with the principles mentioned in the document "Ethical principles for publication" available at the webpage of the journal (http://www.revistas.unal.edu.co/index.php/psicologia).

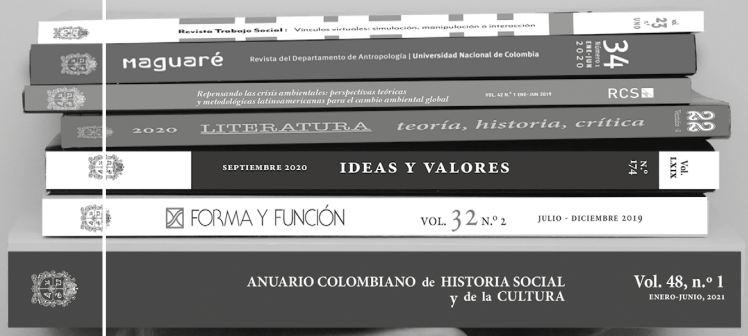
Additionally, accepted authors must read and sign a document certifying that they not have a conflict of interests in relation with the research being published. This document is available in the webpage of the journal. In this document, accepted authors must declare any potential conflict of interest, as well as the institutions of affiliation and the financial sources related to the research that is being published in the journal.

Copies and Documents Request

The RCP is published under the Creative Commons license and can be copied and reproduced according to the conditions of this license (http://creativecommons.org/licenses/by-nc-nd/2.5). RCP articles are available online at http://www.revistas.unal.edu.co/index.php/psicologia/issue/archive. If you would like to subscribe to the RCP as reader, please go to http://www.revistas.unal.edu.co/index.php/psicologia/information/readers and follow the instructions mentioned in the webpage. Additionally, a limited number of print journals are available upon request. To request print copies, please email **revpsico_fchbog@unal.edu.co**.

How to Cite the RCP When Using the Abbreviated Form?

When citing a journal, most citation formats require using the complete journal title (e.g., APA format). However, given the length of the title, some journals (e.g., *Journal of Science Education and Technology*) use citation formats that include the abbreviated citation form. RCP asks authors referring to *Revista Colombiana de Psicología* as *Rev. colomb. psicol.*, when the abbreviated form is required by other publications. Additionally, we ask authors to cite articles from our journal with the respective doi numbers, when possible. Doi numbers are indicated in the title page of each article.



NUESTRAS REVISTAS

Facultad de Ciencias Humanas
Portal de revistas Universidad Nacional de Colombia
www.revistas.unal.edu.co

PROFILE Issues in Teachers' Professional Development
Vol. 24, N.º 21 • January-June 2022
Departamento de Lenguas Extranjeras
www.profile.unal.edu.co
rprofile_fchbog@unal.edu.co

Revista Colombiana de Psicología
Vol. 30, N.º 2 • julio-diciembre 2021
Departamento de Psicología
www.revistacolombiana
psicologia.unal.edu.co
revpsico_fchbog@unal.edu.co

Forma y Función
Vol. 31, N.º 1 • enero-junio 2022
Departamento de Lingüística
www.formayfuncion.unal.edu.co
fyf_fchbog@unal.edu.co

Cuadernos de Geografía: Revista Colombiana de Geografía
Vol. 30, N.º 2 • julio-diciembre 2021
Departamento de Geografía
www.cuadernosdegeografia.unal.edu.co
rcgeogra_fchbog@unal.edu.co

Anuario Colombiano de Historia Social y de la Cultura
Vol. 49, N.º 1 • enero-junio 2022
Departamento de Historia
www.anuariodehistoria.
unal.edu.co
anuhisto_fchbog@unal.edu.co

Literatura: Teoría, Historia, Crítica
Vol. 23, N.º 2 • julio-diciembre 2021
Departamento de Literatura
www.literaturathc.unal.edu.co
revliter_fchbog@unal.edu.co

Ideas y Valores
Vol. LXX, SUPL 7 • diciembre 2021
Departamento de Filosofía
www.ideasyvalores.unal.edu.co
revideva_fchbog@unal.edu.co

Revista Maguaré
Vol. 35, N.º 1 •enero-junio 2021
Departamento de Antropología
www.revistamaguare.unal.edu.co
revmag_fchbog@unal.edu.co

Revista Colombiana de Sociología
Vol. 45, N.º 1 • enero-junio 2022
Departamento de Sociología
www.revistacolombianasociologia.
unal.edu.co
revcolso_fchbog@unal.edu.co

Trabajo Social
Vol. 23, N.º 2 • julio-diciembre 2021
Departamento de Trabajo Social
www.revtrabajosocial.unal.edu.co
revtrasoc_bog@unal.edu.co

Desde el Jardín de Freud
N.º 20 • enero-diciembre 2020
Escuela de Estudios en Psicoanálisis y Cultura
www.jardindefreud.unal.edu.co
rpsifreud_bog@unal.edu.co

Matices en Lenguas Extranjeras
N.º 13 • enero-diciembre 2019
Departamento de Lenguas Extranjeras
www.revistas.unal.edu.co/index.
php/male
revlenex_fchbog@unal.edu.co

PUNTOS DE VENTA

UN la librería, Bogotá Plazoleta de Las Nieves • Calle 20 N.º 7-15 • Tel. 3165000 ext. 29494 | **Campus Ciudad Universitaria** Edificio Orlando Fals Borda (205) • Edificio de Posgrados de Ciencias • Humanas Rogelio Salmona (225) • Auditorio León de Greiff, piso 1 • Tel.: 316 5000, ext. 20040
www.unlalibreria.unal.edu.co | libreriaun_bog@unal.edu.co

Todas nuestras revistas académicas se pueden consultar *on-line* bajo la modalidad de acceso abierto.

CENTRO EDITORIAL
Edificio de Posgrados de la Facultad de Ciencias Humanas (225), sótano • Tel: 3165000 ext. 16139, 16141
editorial_fch@unal.edu.co | www.humanas.unal.edu.co

Revista Colombiana de Psicología, vol. 34, n.º 1

Texto compuesto en caracteres Minion, Syntax y Serifa. En las páginas interiores se utilizó papel Book cream de 60 gramos y, en la carátula, papel Propalcote de 240 gramos. Impresa en Bogotá, Colombia, en febrero de 2025