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CONCIENCIA CORPORAL COMO FACTOR PROTECTOR DE LAS ORIENTACIONES SUICIDAS EN ESTUDIANTES UNIVERSITARIOS

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Dr. JOSÉ MARÍA CRIADO GUTIÉRREZ, Profesor Titular de Fisiología en el Departamento de Fisiología y Farmacología de la Universidad de Salamanca, y el Dr. RAÚL JUÁREZ VELA, Profesor Titular de Universidad en la Unidad Predepartamental de Enfermería de la Universidad de la Rioja,

CERTIFICAN:

Que el presente trabajo de investigación: "*Conciencia corporal como factor protector del comportamiento suicida en estudiantes universitarios*" constituye el trabajo de investigación que presenta Dña. **Olga Lucia Montoya Hurtado** para optar al Grado de Doctor en la modalidad de compendio de artículos.

El trabajo realizado bajo nuestra dirección reúne los requisitos de calidad, originalidad y presentación exigibles a una investigación científica y está en condiciones de ser sometido a la valoración del Tribunal encargado de juzgarlo para optar al Grado de Doctor por la Universidad de Salamanca.

Y para que conste, firmamos el presente, en Salamanca a 30 de mayo de 2024.

Fdo.: José María Criado Gutiérrez

Fdo.: Raúl Juárez Vela

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ÍNDICE

RESUMEN

Esta tesis doctoral se presenta en formato por compendio de 3 artículos publicados. Se tuvo como hipótesis "La conciencia corporal interoceptiva actúa como factor protector de las orientaciones suicidas en estudiantes universitarios". Esta hipótesis sugiere que un mayor nivel de conciencia corporal, entendida como la capacidad de una persona para percibir y responder a las señales internas de su cuerpo, está asociado a menores orientaciones suicidas en la población de estudiantes universitarios. Se tomó como variables de estudio “Conciencia corporal interoceptiva” y “Orientaciones suicidas”.

En la primera fase, se verificaron los instrumentos adecuados para la evaluación de las variables. Se determinó que era necesario examinar las propiedades psicométricas del cuestionario seleccionado para medir la conciencia corporal interoceptiva debido a que el instrumento elegido Evaluación Multidimensional de la Conciencia Interoceptiva (MAIA) no estaba validado en la población objetivo. Los resultados obtenidos se respaldaron con la publicación "Psychometric Properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire in Colombian University Students", publicado en la revista Journal of Clinical Medicine, https://doi.org/10.3390/jcm12082937

JCR YEAR 2022, JIF RANK 58/169, JIF QUARTILE Q2, JIF PERCENTILE 66.0, SJR 2023 Q1.

En la segunda fase, se exploró la relación entre la conciencia corporal interoceptiva y las orientaciones suicidas en estudiantes universitarios. Los resultados se respaldaron con la publicación "Exploring the Link between Interoceptive Body Awareness and Suicidal Orientation in University Students: A Cross-Sectional Study", publicado en la revista Behavioral Sciences, https://doi.org/10.3390/bs13110945

JCR YEAR 2022, JCI RANK 86/215, JCI QUARTILE Q2, JCI PERCENTILE 60.23, SJR 2023 Q2.

Finalmente, en la tercera fase, se analizó a profundidad la conciencia corporal como factor protector de las orientaciones suicidas en estudiantes universitarios. Los resultados se publicaron en el artículo "Body Awareness as a Protective Factor against Suicidal Orientations in College Students", en la revista Behavioral Sciences, https://doi.org/10.3390/bs14050358

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ABSTRACT

This thesis is presented as a compendium of 3 published articles. The hypothesis was "Interoceptive body awareness acts as a protective factor for suicidal orientations in college students". This hypothesis suggests that higher levels of interoceptive body awareness, understood as an individual's ability to perceive and respond to internal bodily signals, are associated with lower levels of suicidal ideation in the college student population. Interoceptive body awareness" and "suicidal orientations" were used as study variables.

In the first phase, the proper instruments for the assessment of the variables were verified. It was decided that it was necessary to study the psychometric properties of the questionnaire selected to measure interoceptive body awareness, since the chosen instrument, the Multidimensional Assessment of Interoceptive Awareness (MAIA), had not been validated in the target population. The results obtained were supported by the publication "Psychometric Properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire in Colombian University Students", published in the Journal of Clinical Medicine, https://doi.org/10.3390/jcm12082937

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The second phase explored the relationship between interoceptive body awareness and suicidal orientation in university students. The results were supported by the publication "Exploring the Link between Interoceptive Body Awareness and Suicidal Orientation in University Students: A Cross-Sectional Study," published in the journal Behavioral Sciences, https://doi.org/10.3390/bs13110945

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Finally, in the third phase, body image as a protective factor against suicidal orientations in college students was analyzed in depth. The results were published in the article "Body Awareness as a Protective Factor against Suicidal Orientations in College Students" in the journal Behavioral Sciences, https://doi.org/10.3390/bs14050358

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INTRODUCCIÓN

Las orientaciones suicidas, que incluyen la ideación suicida, la planificación y el intento de suicidio, representan un problema de salud pública entre los estudiantes universitarios. Como señalan Mortier et al. (2018), el suicidio es una de las principales causas de muerte en este grupo demográfico en muchos países, incluido Colombia, donde se ha observado un aumento en los casos de intento de suicidio entre los jóvenes.

La transición a la vida universitaria puede ser un período estresante para muchos estudiantes, lo que aumenta su vulnerabilidad a problemas de salud mental, incluidas las orientaciones suicidas (Drum, Brownson, Denmark, & Smith, 2009). Según Eisenberg et al. (2007), esta etapa de la vida está marcada por nuevas responsabilidades académicas, cambios en el entorno social y presiones para adaptarse a un entorno desconocido, lo que puede afectar la salud mental de los estudiantes.

El suicidio representa un desafío complejo para la salud pública y está influenciado por diversos factores biológicos, psicológicos, sociales y ambientales. Según la Organización Mundial de la Salud, el suicidio es la cuarta causa principal de muerte en personas de 15 a 19 años en las Américas. En Colombia, los adultos jóvenes entre 20 y 24 años, especialmente aquellos de 18 y 19 años, presentan una alta tasa de suicidio (World Health Organization, 2021a, 2021b; Medicina Legal, 2021).

La salud mental no solo implica la ausencia de problemas o trastornos, sino también el bienestar general y las relaciones positivas. Los problemas mentales pueden ser temporales como por ejemplo sentir angustia o miedo por alguna situación cotidiana mientras que los trastornos requieren intervención profesional al presentarse como condiciones de salud que alteran de manera sistémica las funciones de la persona (Ministerio de Educación Nacional, 2023). En Colombia, fortalecer la atención primaria en salud en universidades es una prioridad, esta atención se enfoca en la prevención, detección temprana y tratamiento de problemas mentales (Ministerio de Educación Nacional, 2023).

En este contexto, las intervenciones centradas en la conciencia corporal pueden servir en la prevención de las orientaciones suicidas. Según la investigación de Price y Hooven (2018), prácticas como la meditación, el yoga y el mindfulness han demostrado beneficios para

mejorar la conciencia corporal y reducir los síntomas de ansiedad y depresión en los jóvenes adultos.

La conciencia corporal interoceptiva, es la capacidad de percibir y comprender las señales internas del cuerpo y al gestionarla de manera adecuada influye en la regulación emocional, la toma de decisiones y la adaptación al estrés (Mehling et al., 2018). Lee, Lee, Kim y Huh (2024) encontraron que la conciencia interoceptiva está estrechamente relacionada con la regulación emocional y la severidad de los síntomas clínicos de depresión, ansiedad y somatización. Los cuestionarios de autoevaluación de la conciencia corporal interoceptiva son sencillos y rentables, pueden ofrecer información sobre la percepción de las sensaciones corporales, ayudando a identificar problemas de salud y a seguir cambios a lo largo del tiempo (Mehling et al., 2018).

Según Mehling et al. (2018), la conciencia interoceptiva ayuda a las personas a manejar el estrés y las emociones. Existen estrategias de atención en salud mental que promueven la conexión con las señales internas del cuerpo, lo cual puede contribuir a mejorar el bienestar mental, gestionar las emociones y reducir el riesgo de presentar orientaciones suicidas.

Auerbach et al., (2018) hace un llamado para abordar la salud mental de los estudiantes universitarios, destacando la necesidad de mejorar la identificación temprana y el tratamiento de trastornos mentales en este grupo demográfico. Menciona la inestabilidad característica de la vida universitaria, que puede contribuir al estrés y la falta de apoyo social, factores conocidos por su influencia en los trastornos mentales, también hace referencia al proyecto World Mental Health Surveys International College Student.

La implementación de programas que trabajen la conciencia corporal interoceptiva, como el entrenamiento en atención plena, puede ofrecer varios beneficios preventivos para estudiantes universitarios. Estos incluyen la mejora del bienestar emocional al reducir el estrés, la ansiedad y la depresión; la disminución de la angustia emocional, ayudando a manejar desafíos académicos y personales; el fortalecimiento de la capacidad para regular las emociones, permitiendo respuestas más efectivas a situaciones estresantes; la mejora de la concentración, atención y claridad mental, lo cual beneficia el rendimiento académico; y el fomento de la resiliencia emocional y la capacidad de recuperación frente a la adversidad, especialmente útil en períodos de estrés académico (Conley et al., 2013). Esto incluye

fortalecer los servicios de salud mental en los campus, estableciendo programas de alertas tempranas como programas de promoción y prevención, talleres, actividades extracurriculares y asesoramiento (Eisenberg et al., 2016; Drum et al., 2009).

Capacitar al personal universitario para identificar señales de problemas de salud mental y derivar a los estudiantes a los servicios correspondientes también es clave (Lipson y Eisenberg, 2018). Además, es importante contar con políticas y protocolos institucionales claros sobre salud mental y bienestar estudiantil (Ketchen Lipson et al., 2019).

La colaboración interinstitucional y los programas de acompañamiento y mentorías pueden complementar estas estrategias (Salzer, 2012; Storrie et al., 2010). La combinación de estos enfoques integrales puede contribuir para abordar los problemas de salud mental de los estudiantes universitarios.

Farb et al., (2015) estudió la relación entre la interocepción (capacidad de percibir las señales internas del cuerpo) y la salud mental. Destaca cómo las prácticas contemplativas, como la atención plena, pueden potenciar la conciencia interoceptiva, generando beneficios para el bienestar psicológico; plantea que, al atender las sensaciones corporales y su integración adecuada en la experiencia personal, las personas pueden experimentar una sensación de seguridad en su entorno, mejorar su capacidad para enfrentar situaciones estresantes y sentirse más plenas y empoderadas.

Un estudio longitudinal encontró que la práctica de yoga durante 8 semanas incrementó la conciencia de las señales corporales internas en adultos jóvenes, tanto en hombres como en mujeres. Además, se observó que una práctica más frecuente de yoga se asociaba con una mayor conciencia corporal, mayor afecto positivo y satisfacción con la vida, y una reducción del afecto negativo (Impett et al., 2006). Además, investigaciones con neuroimágenes han encontrado que la meditación se asocia con una mayor activación de las regiones cerebrales implicadas en la percepción interoceptiva (Farb et al., 2007). La terapia de biofeedback también ha mostrado resultados positivos. Un metaanálisis de 27 estudios concluyó que el biofeedback es eficaz para mejorar la conciencia de las señales fisiológicas internas, como la frecuencia cardíaca y la respiración (Schoenberg & David, 2014). Un estudio en estudiantes universitarios demostró que el biofeedback de la frecuencia cardíaca aumentó la conciencia interoceptiva y redujo los síntomas de ansiedad (Prinsloo et al., 2013).

Se ha explorado cómo las dificultades en la percepción corporal pueden vincularse con la autolesión no suicida (NSSI), sugiriendo posibles áreas de intervención clínica. Forrest y Smith (2021) llevaron a cabo un examen de múltiples medidas de la interocepción en personas con autolesiones no suicidas recientes. Hagan, Rogers, Brausch, Muehlenkamp y Joiner (2019) investigaron los déficits interoceptivos, la autolesión no suicida y el riesgo de suicidio en un estudio multisitio sobre efectos indirectos. Dodd, Smith, Forrest, Witte, Bodell, Bartlett, Siegfried y Goodwin (2018) encontraron una relación entre los déficits interoceptivos, la autolesión no suicida y los intentos de suicidio en mujeres con trastornos alimentarios.

En un estudio transversal se reclutaron 537 personas a través de Mechanical Turk de Amazon, con edades entre 18 y 71 años, sugieren que los déficits en la interocepción podrían desempeñar un papel importante en la predicción y tratamiento del riesgo suicida. Quienes han tenido pensamientos suicidas muestran mayor preocupación hacia sensaciones corporales negativas y aquellos con historial de suicidio muestran menos confianza en sus sensaciones corporales, lo que podría facilitar comportamientos autodestructivos (Rogers, Hagan, & Joiner, 2018).

Aunque se encuentran soportes teóricos sobre los beneficios de la conciencia corporal interoceptiva en el cuidado de la salud mental, no se encuentra soportes estadísticos sobre sus relaciones y predicciones. Es por esto por lo que, en esta tesis, se tomaron como variables centrales de estudio la "conciencia corporal interoceptiva" y las "orientaciones suicidas", utilizando instrumentos de evaluación para analizar correlaciones que permitieran comprender mejor la relación entre ellas. El objetivo se centró en determinar si la conciencia corporal interoceptiva actúa como un factor protector contra las orientaciones suicidas en estudiantes universitarios. Cada una de las fases desarrolladas en la investigación está respaldada por antecedentes y justificaciones que sustentan la necesidad de desarrollar cada fase.

OBJETIVOS

Los objetivos propuestos se plantearon con el propósito de dar respuesta a la hipótesis "la conciencia corporal interoceptiva actúa como un factor protector de las orientaciones suicidas en estudiantes universitarios". Se tuvo como variables de estudio "conciencia corporal interoceptiva" y "orientaciones suicidas". Cada objetivo específico fue sustentado con un artículo publicado.

Objetivo principal

1. Determinar si la conciencia corporal interoceptiva actúa como un factor protector contra las orientaciones suicidas en estudiantes universitarios

Objetivos específicos

1. Verificar y validar las propiedades psicométricas del cuestionario de Evaluación Multidimensional de la Conciencia Interna (MAIA) en estudiantes universitarios colombianos, asegurando su adecuación para medir la conciencia corporal interoceptiva en esta población.
2. Explorar la relación entre la conciencia corporal interoceptiva y las orientaciones suicidas en estudiantes universitarios, determinando si existe una correlación significativa entre ambas variables.
3. Probar la hipótesis de que un mayor nivel de conciencia corporal interoceptiva está asociado con una reducción en las orientaciones suicidas en la población de estudiantes universitarios, evaluando si la conciencia corporal interoceptiva actúa como un factor protector.

JUSTIFICACIÓN

Explorar la hipótesis "la conciencia corporal interoceptiva actúa como un factor protector de las orientaciones suicidas en estudiantes universitarios" ofrece una oportunidad para incorporar estrategias de atención primaria en salud mental en contextos universitarios. Comprender mejor la relación entre estas variables proporciona nuevas perspectivas para desarrollar e implementar intervenciones preventivas dirigidas a la población estudiantil.

La verificación y validación de instrumentos específicos, como el cuestionario de Evaluación Multidimensional de la Conciencia Interna (MAIA), brinda un soporte para los profesionales que trabajan por la salud mental en contextos universitarios.

Este estudio aborda una problemática en una población vulnerable e introduce una perspectiva sobre la prevención del suicidio. Los hallazgos de esta investigación pueden tener implicaciones para la salud pública, contribuyendo al desarrollo de programas de intervención y apoyo que mejoren la salud mental y el bienestar de los estudiantes universitarios.

ARTÍCULOS APORTADOS

Artículo 1: Psychometric Properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire in Colombian University Students

Los estudiantes universitarios enfrentan desafíos en su bienestar mental debido a varios factores. Esta preocupación ha motivado a los investigadores a indagar más sobre los determinantes que afectan la salud mental en contextos universitarios para impulsar iniciativas de salud preventiva y cultivar un entorno de cuidado y autocuidado (Chau & Vilela, 2017).

Algunas investigaciones resaltan la importancia de factores protectores para la salud, como el ejercicio físico, y señalan que la autoestima es fundamental entre ellos. Una premisa clave de este enfoque es asegurar una adecuada conciencia corporal, que implica una conexión consciente entre la mente y el cuerpo, relacionada con procesos internos de autoconocimiento y autorregulación. Esto incluye confiar en el cuerpo y reconocer sensaciones físicas básicas, como cambios posturales, ritmo respiratorio y cardíaco, así como identificar el dolor y los momentos de relajación (Idrugo Jave & Sanchez Cabrejos, 2020).

La conciencia interoceptiva, influida por factores socioeconómicos y culturales, es clave para programas de autocuidado en estudiantes. Las unidades de bienestar buscan identificar riesgos de salud y aplicar medidas preventivas (Idrugo Jave & Sanchez Cabrejos, 2020).

Aunque su evaluación generalmente requiere técnicas avanzadas realizadas por profesionales especializados, los cuestionarios de autoinforme ofrecen una alternativa práctica y económica. Estos cuestionarios permiten a las personas compartir cómo perciben sus sensaciones corporales, identificar problemas de salud y seguir cambios a lo largo del tiempo (Herbert & Pollatos, 2014; Mehling et al., 2012).

Para la primera fase de la tesis, se verificaron los instrumentos con los cuales se podían evaluar las dos variables de estudio “Conciencia corporal interoceptiva” y “Orientaciones suicidas”.

Para las orientaciones suicidas se utilizó el cuestionario ISO-30, el cual consta de 30 preguntas. Se administra de forma autónoma con respuestas en una escala Likert de cuatro posiciones. Su objetivo es evaluar la presencia e intensidad de la orientación suicida durante

30 días para identificar riesgos y guiar la intervención. Se ha utilizado previamente en estudiantes universitarios colombianos con buena fiabilidad (coeficiente alfa de Cronbach de 0.89) (Castaño Castrillón et al., 2022).

Sin embargo, para evaluar la conciencia corporal no se encuentran disponibles instrumentos validados para población estudiantil universitaria, por lo cual se seleccionó el cuestionario de MAIA el cual permite una evaluación completa y objetiva. Se evaluaron sus propiedades psicométricas en estudiantes universitarios colombianos, encontrando que la versión en español del MAIA de 32 ítems tiene buenas propiedades psicométricas en términos de validez y confiabilidad.

El cuestionario Evaluación Multidimensional de la Conciencia Interoceptiva (MAIA) está diseñado para evaluar varios aspectos de la conciencia corporal, incluyendo la percepción de sensaciones corporales, la regulación de la atención, la conciencia emocional y la autorregulación, entre otros. El cuestionario utiliza una escala de medición tipo Likert que va de 0 (nunca) a 5 (siempre) y proporciona un puntaje total para el nivel de conciencia corporal, así como una evaluación dimensional. Es importante señalar que algunas preguntas están invertidas en su puntuación (Mehling et al., 2012). El cuestionario MAIA ha sido utilizado en varios países y poblaciones, y actualmente está disponible en múltiples traducciones. La herramienta proporciona una evaluación completa de la conciencia corporal interoceptiva y puede ser valiosa para fines de investigación y clínicos relacionados con la conciencia corporal y el manejo emocional (Osher Center for Integrative Health, 2012).

El objetivo de esta fase fue presentar las propiedades psicométricas de la Evaluación Multidimensional de la Conciencia Interoceptiva (MAIA) en la población de estudiantes universitarios en Colombia. Se realizó un estudio descriptivo transversal con 202 estudiantes que cumplieron con el criterio de inclusión de ser estudiantes universitarios de pregrado. Los datos se recopilaron en mayo de 2022.

Artículo 2: Exploring the Link between Interoceptive Body Awareness and Suicidal Orientation in University Students: A Cross-Sectional Study

Una vez se dispuso de los instrumentos apropiados para evaluar ambas variables, se procedió a analizar sus relaciones.

La transición a la vida universitaria implica enfrentar nuevos retos y asumir mayores responsabilidades, así como adaptarse a diferentes contextos sociales y culturales (Cotonieto-Martínez et al., 2020). La prevención del suicidio ha adquirido un papel destacado a nivel mundial en términos de salud pública (World Health Organization, 2014).

La conciencia corporal, que incluye la capacidad de percibir y comprender las señales internas del cuerpo, como las sensaciones viscerales, el latido del corazón y la respiración puede influir en el manejo del estrés, la ansiedad y otros problemas emocionales que pueden aumentar el riesgo de suicidio (Bindu & Vargas, 2014).

El propósito de esta fase fue examinar dicha relación específicamente en estudiantes universitarios de Colombia a través de un estudio observacional y transversal realizado entre febrero y abril de 2023, utilizando un muestreo por conveniencia con estudiantes de Ciencias de la Rehabilitación de una universidad colombiana. Los cuestionarios se administraron a través de Google Forms en tres sesiones, con la presencia de un investigador para resolver dudas. Este estudio contó con la aprobación del comité de bioética de la Escuela Colombiana de Rehabilitación (ECR-CI-INV-121-2021) y se enmarcó en el programa de alerta temprana para condiciones de salud mental, respaldado por la unidad de investigación y la unidad de bienestar universitario.

Artículo 3: Body Awareness as a Protective Factor against Suicidal Orientations in College Students

El suicidio constituye un desafío complejo para la salud pública, siendo influenciado por una variedad de factores biológicos, psicológicos, sociales y ambientales. De acuerdo con la teoría de las tres etapas, que abarca la ideación suicida, la planificación y la ejecución, es crucial identificar signos de alerta en cada fase para la prevención e intervención efectivas (Ropaj, 2023). La Organización Mundial de la Salud (OMS) reconoce al suicidio como la cuarta causa de muerte más común entre individuos de 15 a 19 años en las Américas (World Health Organization, 2021ª). Por ende, comprender los factores protectores resulta fundamental, particularmente entre los estudiantes universitarios.

La interocepción, que implica la capacidad de percibir y reconocer señales internas del cuerpo como dolor, temperatura, hambre y sed, juega un papel fundamental en el bienestar físico y emocional. Esta habilidad es esencial para comprender el estado fisiológico interno y adaptarse a cambios, lo que garantiza el bienestar y la supervivencia (Craig, 2002). Asimismo, la interocepción influye en la generación de emociones y en el desarrollo de la conciencia corporal. Alteraciones en esta capacidad están vinculadas a trastornos psicológicos como ansiedad y trastornos del estado de ánimo. Las personas con orientaciones suicidas pueden presentar una sensibilidad interoceptiva reducida, lo que podría constituir un factor de riesgo para la ideación y el comportamiento suicidas (Khalsa et al., 2018; Smith, Duffy, & Joiner, 2021). En Colombia, la atención a la salud mental en contextos universitarios es de suma importancia, subrayando la necesidad de establecer políticas y medidas que fomenten el apoyo emocional (Ministerio de Educación Nacional, 2023).

A pesar del creciente interés en la salud mental, hay una notable ausencia de investigaciones sobre la conciencia corporal y su vínculo con el bienestar físico y emocional. Es por esto por lo que, en esta fase, una vez analizadas las relaciones entre las variables, se procedió a corroborar la hipótesis planteada a través de análisis de regresión logística binaria y regresión lineal para examinar la relación entre la conciencia corporal interoceptiva y la orientación suicida entre estudiantes universitarios colombianos. Se empleó la técnica de bootstrap para remuestrear y estimar la distribución de los datos.

Otros soportes para la tesis

Como apoyo en el desarrollo de la temática de la tesis, se profundizo en la variable de conciencia corporal en población víctimas del conflicto armado y en determinantes sociales que pueden afectar la salud mental de los estudiantes universitarios. Como soporte de estos trabajos realizados se tienen las siguientes publicaciones:

Tabla 1.

Otros soportes

Temática de profundización	Título	Tipo	Año	Enlace
Salud mental en estudiantes universitarios	Predictive model of suicide risk in Colombian university students: quantitative analysis of associated factors.	Artículo	2024	10.3389/fpsyt.2024.1291299
	Niveles de actividad física y sedentarismo en estudiantes universitarios colombianos y mexicanos: Un estudio descriptivo transversal	Artículo	2024	https://doi.org/10.47197/retos.v54.100234
	Caracterización de las condiciones en salud mental de estudiantes de la Universidad de Manizales, Caldas, Colombia	Artículo	2022	https://doi.org/10.37511/tesis.v17n2a1
	Diseño de un Sistema de Alertas Tempranas para Riesgo Suicida en Estudiantes Universitarios, basado en Determinantes Sociales, mediante Herramientas SIG.	Capítulo de libro	2023	https://editorial.tirant.com/mex/ebook/caminar-juntas-en-la-ciencia-tania-hogla-rodriguez-9788419588104
Conciencia corporal	Dolor y conciencia corporal antes y después de un programa de abordajes corporales en víctimas del conflicto armado, Colombia	Capítulo de libro	2023	https://editorial.tirant.com/mex/libro/las-cientificas-y-su-incidencia-social-maria-lilia-cedillo-ramirez-9788419588128
	Diseño de una guía para la evaluación del aprendizaje motor	Artículo	2023	https://drive.google.com/file/d/1mmnp3YSuW0Z9vLDVlyFkYQLH_b4tcaF8/view

Estas publicaciones sirvieron de soporte para la comprensión de las estrategias de cuidado desde la atención primaria en salud mental de los estudiantes universitarios y en la profundización de los aspectos neurofisiológicos de la conciencia corporal.

Además de estas publicaciones, se tuvo como soporte la presentación de la tesis en eventos académicos que sirvieron para socializar y retroalimentar el trabajo desarrollado. También se realizó una estancia corta en la Universidad de Montes Claros de Brasil donde se obtuvo apoyo del investigador Renato Sobral Monteiro para la última fase de análisis regresión logística binaria y regresión lineal para examinar la relación entre la conciencia corporal interoceptiva y la orientación suicida y la utilización de la técnica de Bootstrap.

RESUMEN DE LOS RESULTADOS

Artículo 1: Psychometric Properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire in Colombian University Students

En esta primera fase se analizaron las propiedades psicométricas del cuestionario MAIA, a través de un análisis factorial exploratorio y comprobatorio. Se realizó un estudio transversal con estudiantes universitarios de pregrado. Se empleó un muestreo por conveniencia y se incluyeron 202 estudiantes que cumplían con el requisito de ser estudiantes universitarios de pregrado. Los estudiantes de posgrado fueron excluidos debido a su corta estadía en las instituciones.

En términos de características sociodemográficas, se observó que la mayoría de los estudiantes que participaron en el estudio fueron mujeres (64%), matriculadas en disciplinas BHASE (Negocios, humanidades, salud, artes, ciencias sociales y educación) (91%) y con edades comprendidas entre los 18 y los 49 años, con un 55% menor de 21 años y una edad promedio de 21 años, con una desviación estándar de ±3.48. La mayoría solteros (65%) y residían en la ciudad de Bogotá. Respecto a la salud, el 16% de los participantes informaron tener antecedentes de enfermedades crónicas, como diabetes o enfermedades respiratorias. Estos datos se tomaron en cuenta al describir a los estudiantes con el fin de obtener un perfil general de salud. Cabe destacar que estos antecedentes médicos no se utilizaron como criterios de exclusión para la aplicación del cuestionario, ya que el MAIA, al ser de autoevaluación, busca evaluar la percepción de la conciencia interoceptiva.

Para comprender los resultados del estudio se debe tener en cuenta las dimensiones de MAIA.

Tabla 2.

Dimensiones de MAIA

Dimensión	Definición
Percepción	Mide la capacidad de mantener la atención en las señales interoceptivas sin distraerse por factores externos
No distraerse	Se refiere a la capacidad de mantener el enfoque en las señales interoceptivas sin distraerse por factores externos
No preocuparse	Evalúa la capacidad de no sentirse incómodo o ansioso al experimentar sensaciones corporales internas.
Regulación de la atención	Se refiere a la habilidad de regular y prestar atención directa a las señales corporales internas
Conciencia emocional	Mide la capacidad de reconocer y comprender emociones y sensaciones corporales asociadas
Autorregulación	Evalúa la capacidad de regular y responder de manera adaptativa a las señales corporales internas
Escuchar el cuerpo	Se refiere a la capacidad de atender y escuchar las necesidades y señales del cuerpo
Confiar	Mide la confianza en la capacidad de interpretar y comprender las señales corporales internas
Total, MAIA	Suma de todas las puntuaciones

El análisis factorial exploratorio detectó ocho factores con valores propios mayores a 1.0. Sin embargo, no se encontró una clara agrupación de preguntas con altos valores en un único factor en las dimensiones de Percepción, No Distraerse, No Preocuparse y Regulación de la Atención. Posteriormente, se llevó a cabo un análisis factorial confirmatorio basado en el modelo de factores propuesto en el MAIA original, lo que arrojó un valor p significativo. Durante la evaluación de la carga factorial, se observó un valor p bajo para el ítem 6 del factor No Distraerse, así como para todo el factor No Preocuparse, indicando que estos elementos podrían no ajustarse adecuadamente al modelo propuesto, por lo que se recomienda cautela al interpretar los resultados asociados con estos elementos.

Se obtuvo un alfa de Cronbach global de 0.90 y un coeficiente omega ($\Omega = 0.96$). Estos resultados indican que la versión del MAIA empleada es una herramienta confiable y efectiva

para evaluar la conciencia interoceptiva en el grupo estudiado. No obstante, se requieren investigaciones adicionales para validar y asegurar la confiabilidad del MAIA en diversos contextos transculturales y poblaciones, así como para explorar posibles adaptaciones al modelo propuesto.

Artículo 2: Exploring the Link between Interoceptive Body Awareness and Suicidal Orientation in University Students: A Cross-Sectional Study

Teniendo las características de las propiedades del cuestionario MAIA, se definió para el estudio de las relaciones de las variables utilizar este para la evaluación de la conciencia corporal y el ISO-30 para las orientaciones suicidas dado que los dos cuestionarios ya contaban con aplicaciones fiables en población de estudiantes universitarios colombianos.

En esta fase, se analizó la relación entre las variables, encontrando una correlación negativa entre la conciencia corporal y las orientaciones suicidas en estudiantes universitarios colombianos. Se administraron los cuestionarios a 187 estudiantes, de los cuales 3 optaron por no participar. De los 184 restantes, 15 decidieron no completar el cuestionario ISO-30. La muestra final consistió en 169 estudiantes que respondieron ambos cuestionarios. Entre los participantes que completaron las encuestas en línea, el 80% eran mujeres, el 93% estaban solteros y el 86% residían en Bogotá. La edad de los participantes oscilaba entre los 16 y 42 años, con una edad media de 20 años.

Es importante recordar las dimensiones que evalúan los dos instrumentos, ya se mencionaron las de MAIA y se presentan a continuación las del ISO-30:

Tabla 3.

Dimensiones del ISO-30

Dimensión	Definición
Baja autoestima	Percepción negativa y poco saludable que una persona tiene de sí misma. Se refiere a la falta de confianza en las propias habilidades, valor e imagen.
Desesperanza	Se refiere a un estado emocional en el que una persona siente que no hay esperanza o posibilidad de mejora en su situación actual o en el futuro.
Incapacidad para controlar emociones	Significa que una persona tiene dificultades para gestionar y modular sus emociones de manera efectiva.
Aislamiento social	Se refiere a un estado en el que un individuo tiene contacto o interacción limitados con otros. A menudo implica separación física de las redes sociales, como amigos, familiares o la comunidad en general. El aislamiento social puede ser voluntario, como cuando alguien elige vivir solo en un área remota, o puede ser involuntario.
Ideación suicida	Pensamientos persistentes de querer morir
Total	Suma de todas las puntuaciones
Factores críticos	Verdadero si la persona puntúa dos o más ítems (5, 10, 15, 20, 25 y 30) con una puntuación mayor que 2; falso en caso contrario.

Se observó que las dimensiones "no distraído" y "regulación de la atención" mostraron una mayor variabilidad, mientras que "percepción" y "conciencia emocional" obtuvieron respuestas más uniformes. Los puntajes totales del ISO-30 indicaron un amplio espectro de orientación suicida en la muestra, con una desviación estándar de 17.00 y una puntuación promedio de 34.00. Además, las respuestas a dimensiones específicas del ISO-30 variaron significativamente.

Se identificó una correlación negativa moderada y significativa entre la puntuación total del MAIA y la del ISO-30. Al examinar la relación entre el ISO-30 y los componentes del MAIA, se encontraron correlaciones significativas entre la puntuación total del ISO-30 y aspectos como "no distraído", "regulación de la atención", "autorregulación", "escuchar el cuerpo" y "confiar".

El 15% de la población obtuvo factores críticos, y se hallaron correlaciones significativas entre estos factores y varias dimensiones del MAIA. Las relaciones más relevantes se observaron entre los factores de "confiar" y "autorregulación" del MAIA.

Se evidenció que la puntuación total del Cuestionario de Evaluación Multidimensional de la Conciencia Interna (MAIA) guardaba una correlación moderada con la puntuación total del Inventario de Orientación Suicida (ISO-30) ($r = -0.54$, $p < 0.001$). Se identificó que la confianza y la autorregulación fueron los factores más influyentes en esta relación entre la MAIA y el ISO-30. Estos resultados sugieren la existencia de una correlación negativa entre la conciencia interoceptiva del cuerpo y las orientaciones suicidas, subrayando la importancia de profundizar en esta relación y desarrollar intervenciones específicas basadas en la conciencia corporal para prevenir las orientaciones suicidas.

Artículo 3: Body Awareness as a Protective Factor against Suicidal Orientations in College Students

Para corroborar la hipótesis planteada en esta tesis, se procedió a realizar un análisis estadístico de la puntuación del MAIA y del ISO-30, comparaciones de frecuencia entre géneros, pruebas de chi-cuadrado, regresión logística binaria y evaluaciones de la curva ROC para determinar la precisión de los modelos estadísticos en la predicción de las orientaciones suicidas basada en la conciencia corporal. Además, se aplicó la regresión lineal para investigar cómo el puntaje total del MAIA explica la variación en el puntaje total del ISO-30, lo que contribuyó a una comprensión cuantitativa de la relación entre la conciencia corporal y la orientación suicida. Se empleó la técnica de Bootstrap para remuestrear y estimar la distribución de los datos.

Se observó que un mayor porcentaje (51.8%) de estudiantes se ubicaba por debajo de la mediana en el percentil de MAIA, lo que indica una menor conciencia interoceptiva en este grupo. Esta aproximación de categorización permitió identificar a individuos con una menor conciencia corporal interoceptiva. Además, aquellos que obtuvieron puntajes por encima de la mediana en el ISO-30 fueron categorizados como con una mayor conciencia interoceptiva.

Los resultados de los análisis de regresión logística indicaron que entre el 16% y el 21% de la variabilidad en el percentil de ISO-30 se explicaba por el percentil de MAIA (Cox y Snell $R^2 = 0.16$; Nagelkerke $R^2 = 0.21$; $p < 0.01$). La edad no mostró una influencia estadísticamente significativa en este modelo (considerada como una variable de confusión; $p = 0.46$). Además, los individuos con una puntuación de MAIA de 2.9 o más demostraron una probabilidad significativamente reducida de ideación suicida, con un odds ratio de 0.17 ($p = 2.41 \times 10{-}7$), lo que representa un factor de protección del 83%.

La evaluación del modelo mostró que puede predecir las orientaciones suicidas basadas en el ISO-30 de manera bastante efectiva. El AUC, que es un indicador de que tan bien puede distinguir el modelo entre personas con y sin orientaciones suicidas, fue de 0.69, lo que sugiere una capacidad moderada para hacer estas distinciones. La sensibilidad del modelo, que mide cuántas personas con orientaciones suicidas puede identificar correctamente, fue del 71%, lo que indica una buena capacidad para detectar estos casos. La especificidad, que es cuántas personas sin orientaciones suicidas puede identificar correctamente, fue del 70%, lo que también es bastante bueno. El modelo tiene una precisión del 71%, lo que significa

que el 71% de las veces, las predicciones positivas del modelo resultan ser correctas. En general, estos resultados sugieren que el modelo tiene un rendimiento moderadamente bueno en la predicción de las orientaciones suicidas.

En este análisis, se evidencia una relación inversa entre los puntajes de MAIA e ISO-30, indicando que conforme el puntaje de MAIA aumenta, el de ISO-30 tiende a disminuir. Además, se ha confirmado que no hay multicolinealidad entre estas variables. Estos resultados subrayan la consistencia y la robustez de la relación entre los puntajes de MAIA e ISO-30. La ausencia de multicolinealidad es importante ya que cuando se dice que "no existe multicolinealidad entre estas variables", significa que no hay una alta correlación problemática entre las variables independientes en el modelo. Esto es positivo porque permite una interpretación más clara y precisa de los efectos individuales de cada variable.

DISCUSIÓN

Artículo 1: Psychometric Properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire in Colombian University Students

El objetivo de este estudio fue describir las propiedades psicométricas de la versión en español de la Evaluación Multidimensional de Conciencia Interoceptiva (MAIA) para observar en qué medida el modelo original del cuestionario se ajusta a la población de estudiantes universitarios en Colombia. El cuestionario se aplicó a una muestra de 202 estudiantes, encontrando un alfa de Cronbach global de 0.90. Otros estudios reportan un alfa de Cronbach de 0.90 en 202 estudiantes de entre 18 y 32 años, similar a otras versiones del MAIA en alemán, español e italiano (Calì et al., 2015; Bornemann et al., 2015; Valenzuela-Moguillansky & Reyes-Reyes, 2015).

En nuestro estudio en el análisis factorial confirmatorio basado en el modelo de factores propuesto del MAIA original se obtuvo un valor de p significativo y un intervalo de confianza del 95%. Sin embargo, el análisis de carga factorial encontró un valor de p bajo para el ítem 6 del factor de No Distraer y para todo el factor de No Preocupación. Un estudio de traducción y validación en Malasia sugirió una estructura de tres factores con 19 ítems, mientras que en Japón se propuso un modelo de seis factores (Hasegawa et al., 2020; Todd et al., 2020). Los resultados sugieren la necesidad de hacer modificaciones menores, como la eliminación o adición de ítems, para validar la escala MAIA en contextos transculturales.

Artículo 2: Exploring the Link between Interoceptive Body Awareness and Suicidal Orientation in University Students: A Cross-Sectional Study

Las dimensiones de la MAIA vinculadas a la autorregulación y la confianza en las sensaciones corporales muestran una asociación significativa con los factores críticos del cuestionario ISO-30. La presencia de niveles más bajos de autorregulación y confianza en las sensaciones corporales se relaciona con una mayor tendencia suicida y con factores como la baja autoestima, la desesperanza, la dificultad para manejar las emociones y el aislamiento social.

Esto se respalda con un estudio de seis meses con 43 adultos con ideación suicida reciente y autolesiones no suicidas (NSSI). Se realizaron evaluaciones interoceptivas al inicio y quincenalmente durante seis meses, reportando la presencia y gravedad/frecuencia de la ideación suicida y las NSSI. Los resultados mostraron que una menor confianza en el cuerpo predijo la presencia y gravedad de la ideación suicida y las NSSI, sugiriendo que la confianza y seguridad en el propio cuerpo son esenciales, y su falta puede reflejarse en una actitud negativa hacia el cuerpo (Gioia, Forrest, & Smith, 2022).

Nuestra investigación muestra que la conciencia interoceptiva, especialmente en no distraerse, regulación de la atención, autorregulación, escucha corporal y confianza en las sensaciones corporales, está vinculada con orientaciones suicidas. Las personas con mayor inclinación suicida tienden a tener niveles más bajos de conciencia interoceptiva en estas áreas. Sin embargo, estas correlaciones no implican causalidad, y se necesita más investigación para comprender los mecanismos subyacentes.

Un estudio examinó si el procesamiento interoceptivo atenuado está asociado con intentos de suicidio auto informados en personas con diversos trastornos psiquiátricos. Los resultados indicaron que las personas que intentaron suicidarse mostraron respuestas reducidas a las amenazas homeostáticas del cuerpo y una menor precisión en la percepción de los latidos del corazón (DeVille et al., 2020).

La autoconfianza y la confianza en los demás están estrechamente relacionadas con un mayor bienestar psicológico y una mejor calidad de vida. Investigaciones han demostrado que la confianza en las relaciones interpersonales y la autoconfianza están asociadas con una menor probabilidad de experimentar síntomas depresivos y una mayor resiliencia psicológica. Esto puede explicar la correlación inversa significativa entre el factor de confianza del MAIA y los factores del ISO-30 (DeVille et al., 2020).

En nuestro estudio, el 15% de los estudiantes mostró factores críticos asociados con la orientación suicida, según el ISO-30. Estos hallazgos coinciden con una revisión sistemática que sugiere una relación entre la disfunción interoceptiva y el riesgo de suicidio, subrayando la importancia de realizar más investigaciones sobre estas relaciones (Hielscher & Zopf, 2021).

El estudio de la relación entre la conciencia corporal interoceptiva y la orientación suicida está ganando atención, como lo demuestran estudios que sugieren la necesidad de más investigaciones para generar evidencia científica sobre el tema.

Artículo 3: Body Awareness as a Protective Factor against Suicidal Orientations in College Students

Nuestro estudio encontró que entre el 16% y el 21% de la variabilidad en el percentil del ISO-30 puede ser explicada por el percentil del MAIA, lo que sugiere que la conciencia interoceptiva podría predecir orientaciones suicidas. Además, se observó una asociación negativa significativa entre las puntuaciones del MAIA y del ISO-30, indicando que una mayor conciencia interoceptiva se relaciona con menores niveles de ideación suicida. Esta relación se mantuvo constante en varias muestras, demostrando una capacidad moderada para predecir orientaciones suicidas.

Investigaciones similares subrayan la importancia de la conciencia interoceptiva, encontrando que una baja confianza corporal se asocia con una mayor severidad de la ideación suicida y que las dificultades en la percepción corporal podrían estar relacionadas con la autolesión no suicida (Hagan et al., 2019; Forrest & Smith, 2021).

Este estudio respalda el uso de estrategias que promuevan la conciencia corporal interoceptiva como complemento a otras intervenciones en la atención primaria de salud. Aalsma et al. (2020) llevaron a cabo un estudio piloto sobre Grupos de Habilidades Mente-Cuerpo para adolescentes con depresión en atención primaria. Se emplearon medidas de autoinforme, incluyendo el Inventario de Depresión Infantil-2, el Cuestionario de Ideación Suicida, la Escala de Atención Plena, la Autoeficacia para Adolescentes Deprimidos, la subescala de rumiación del Cuestionario de Estilos de Respuesta Infantil, y un cuestionario de aceptabilidad. El estudio implementó un programa de Grupo de Habilidades Mente-Cuerpo de 10 semanas. Se observó una mejora significativa en los puntajes totales de depresión después de la intervención, así como mejoras en la atención plena, la autoeficacia, la rumiación y la ideación suicida.

Dos estudios compararon la interocepción entre personas con diferentes grados de orientaciones suicidas y encontraron que aquellos con orientaciones suicidas tenían una interocepción más pobre que los controles. Además, aquellos que habían intentado suicidarse recientemente tenían mayores déficits interoceptivos que aquellos que no lo habían hecho (Forrest & Smith, 2021). Estos hallazgos sugieren que la interocepción deteriorada puede ser

significativa para participar en autolesiones graves y que mejorar la conexión con el cuerpo podría ayudar a prevenir el comportamiento suicida.

La atención primaria de salud puede detectar signos tempranos de trastornos mentales y referir a servicios especializados cuando sea necesario. La colaboración entre el personal de atención primaria y los profesionales de la salud mental mejora la calidad de los servicios en entornos universitarios (Duffy, Rogers, & Joiner, 2018).

CONCLUSIONES

1. Se validaron las propiedades psicométricas del cuestionario MAIA en estudiantes universitarios colombianos, confirmando que la versión en español del MAIA de 32 ítems es un instrumento válido y confiable para medir la conciencia corporal interoceptiva en esta población.
2. Se encontró una correlación negativa moderada entre la conciencia corporal interoceptiva y las orientaciones suicidas en estudiantes universitarios colombianos, lo que significa que, a mayor nivel de conciencia corporal interoceptiva, menor tendencia a presentar orientaciones suicidas.
3. Las dimensiones de la MAIA vinculadas a la autorregulación y la confianza en las sensaciones corporales muestran una asociación significativa con los factores críticos del cuestionario ISO-30.
4. La capacidad de percibir y comprender las señales internas del cuerpo podría actuar como un factor protector contra las orientaciones suicidas, ayudando a regular las emociones, lidiar con el estrés y afrontar situaciones difíciles.
5. Se requiere implementar diseños longitudinales y considerar poblaciones más diversas para aumentar la generalización de los resultados.
6. Los hallazgos pueden contribuir al diseño de estrategias para promover la salud mental y el bienestar emocional en contextos universitarios.

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ANEXOS

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Psychometric Properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire in Colombian University Students

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Abstract: Introduction: The university student population is influenced by multiple factors that affect body awareness. Identifying the body awareness status of students is crucial in creating self-care and emotion management programs to prevent diseases and promote health. The Multidimensional Assessment of Interoceptive Awareness (MAIA) questionnaire evaluates interoceptive body awareness in eight dimensions through 32 questions. It is one of the few tools that enable a comprehensive assessment of interoceptive body awareness by involving eight dimensions of analysis. Method: The objective of this study is to present the psychometric properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) to observe to what extent the hypothesized model fits the population of university students in Colombia. A descriptive cross-sectional study was conducted with 202 students who met the inclusion criterion of being undergraduate university students. Data were collected in May 2022. Results: A descriptive analysis of the sociodemographic variables of age, gender, city, marital status, discipline, and history of chronic diseases was performed. JASP 0.16.4.0 statistical software was used to conduct confirmatory factor analysis. A confirmatory factor analysis was performed based on the proposed eight-factor model of the original MAIA, giving a significant *p*-value and 95% confidence interval. However, when performing loading factor analysis, a low *p*-value was found for item 6 of the Not Distracting factor, and for the entire Not Worrying factor. Discussion: A seven-factor model with modifications is proposed. Conclusions: The results of this study confirmed the validity and reliability of the MAIA in the Colombian university student population.

Keywords: awareness; interoception; evaluation study; students; psychometry

1. Introduction

The mental health of university students has been affected by various social determinants such as high academic load, a sedentary lifestyle, suicidal ideation, depression,

early pregnancy, domestic violence, dysfunctional families, poverty, and eating disorders, among others [1]. This has generated interest by researchers in investigating these social determinants in greater depth to promote primary health care programs and generate a culture of care in universities [2].

Some prior studies promote health protective factors such as physical exercise and note that self-esteem is among the switch projective factors for protective factors. One of the pillars of this approach is to ensure adequate body awareness, which implies a conscious mind–body connection linked to internal processes of self-knowledge and self-regulation, confidence in the body, and identification of basic physical sensations such as postural alterations, respiratory and cardiac rhythm, in addition to identifying pain and states of relaxation [3].

Among the theoretical references to the body is corporeality, which refers to the understanding of the body beyond the physical, where an emotional memory produced by the interactions and intersections of the individual with a social context is registered throughout life [4]. Embodiment is related to the perceptual processes that give meaning, representation, and awareness to the body. These sensory and perceptual processes involve body image and body awareness. Body image has neurophysiological, psychological, and behavioral information that shapes the self-image that each person has of his or her own body [5]. Body awareness is the ability to identify the body's signals to respond in time to situations that may affect health [6]. Body awareness requires information that the body receives from different sources. This information is processed at the neurophysiological level and converted into meanings, known as perceptions, which leave an imprint at the molecular level [7].

When individuals identify bodily sensations and their meaning, they are making themselves conscious of the internal information of their bodies, which is known as interoceptive body awareness. Body awareness can be affected by socioeconomic, cultural, and environmental conditions, and is rarely assessed in university students [4]. Identifying the body awareness status of students is important for creating self-care and emotion management programs. Wellness units are increasingly looking for tools that allow early identification of risks that may affect students' health conditions, in order to implement promotion and prevention programs [3].

Interoceptive awareness refers to the ability to perceive and understand internal bodily signals, which is important for emotional regulation, decision-making, and stress adaptation. Evaluating interoceptive awareness requires sophisticated techniques and is typically conducted by specialists. Self-report questionnaires are an easy and cost-effective technique that can provide valuable information on how individuals perceive their bodily sensations, identify health issues, and track changes over time. However, self-report questionnaires may have limitations, such as potential for bias, lack of objectivity, and limited ability to measure the physiological aspects of interoceptive awareness. Nonetheless, self-report questionnaires remain a useful and accessible tool for evaluating interoceptive awareness [8,9].

Few tools exist to assess interoceptive body awareness in a multidimensional manner. A study conducted by two universities in the United Kingdom proposes a three-dimensional model that assesses interoceptive accuracy (performance in objective behavioral tests of beat detection, interoceptive sensitivity, and interoceptive awareness [10].

There are other tools to assess body awareness qualitatively, such as BARS; however, to use it, it is necessary to be a basal body awareness therapist [11]. These considerations served as the basis for the creation of the MAIA questionnaire, a multidimensional self-report instrument designed to measure interoceptive body awareness [12]. The MAIA is one of the few instruments that allows a comprehensive assessment of interoceptive body awareness by involving eight dimensions of analysis through 32 items. There is also a 37-item version and another for children aged 7 to 17 years. For this reason, it is being used in different countries and populations. It is currently free to use, and 28 translations

have been made available on the website of the Osher Center for Integrative Medicine www.osher.ucsf.edu/maia (accesed 3 June 2022).

To date, studies have been conducted on the psychometric characteristics of the MAIA in different linguistic and sociocultural groups. Most studies have maintained the original eight-factor model. Some have found problems with the estimation of the Not Distracted and Not Worried subscales. Items 8 and 10 of the Not Worried subscales have been consistently problematic because of their low factor loadings or loading on other factors [13–15]. There are proposed six-factor versions, excluding the dimensions mentioned above, and other proposals that maintain the eight factors with item modifications.

The purpose of this paper is to present the psychometric properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) to observe to what extent the hypothesized model fits the population of university students in Colombia. Based on the studies taken as the background to our study, confirmatory analysis was applied with the model proposed by Chile, since this version was applied to a Spanish-speaking population; however, the model did not converge with the data from the Colombian student population; therefore, the original version of the MAIA was used.

Factor analyses are useful for researchers who apply instruments because they allow verification of the hypotheses of theoretical constructs, their validity, and reliability for application in specific populations. Confirmatory factor analysis allows the researcher to verify a questionnaire for use in different cultural contexts. The exploratory and confirmatory factor analysis of the original version of MAIA will be conducted to test the model in the Colombian university student population, replacing the previous analysis [16].

2. Materials and Methods

2.1. Sample and Validation Compliance with the Assumptions for the Application of Factor Analysis

The aim of this study is to present the psychometric properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) to observe to what extent the hypothesized model fits the population of university students in Colombia. The questionnaire was applied to a sample of 232 students, with a final sample of 202. Incomplete questionnaire data were excluded. According to Parra (2019), for sample calculation, 5 to 10 participants per item should be recruited [17]. For the MAIA questionnaire, which has 32 items, the minimum sample should be 160 participants. As a reference for this sample, a study was found that conducted a factor analysis of the psychometric properties of MAIA in a respondent sample of 204 Portuguese university students (52% female; M = 21.3, SD = 3.9 years), where MAIA version 2 was applied [18].

This study was conducted with undergraduate university students from the Escuela Colombiana de Rehabilitación in the city of Bogotá and the Universidad de Manizales in the city of Manizales. A cross-sectional study was used with convenience sampling. The sample consisted of 202 students who met the criterion of being undergraduate university students. Postgraduate students were not included due to the short time they remained in the institutions. The reference age presented in a mean of 21 years, as most of the sample fell within this range.

For the description of the psychometric characteristics of the MAIA questionnaire, both exploratory and confirmatory factor analyses were conducted The Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett's test of sphericity were used to assess data factorability. Bartlett's test of significant sphericity ($p < 0.0001$) and the KMO index < 0.50 indicate an adequate sample to support factor analysis and the correlation matrix determinant was 2.29×10^{-10}. Based on the results obtained, it was possible to perform exploratory and confirmatory factor analyses [19,20]. In the EFA, multiple criteria were used to determine the number of factors to retain, such as the simplicity of the solution (factor loadings 0.30 and no cross-loadings), examination of eigenvalues > 1, and the interpretability of the factor structure [21]. Internal consistency reliability was determined by calculating Cronbach's alpha coefficient. Construct validity was estimated following Terwee's recommendations [22].

2.2. Instruments

All participants completed the Spanish version of the MAIA, using ArcGIS Survey123, a free-to-use Spanish version, which analyzes interoceptive body awareness in 8 categories through 32 questions as follows (Table 1).

Table 1. MAIA categories and questions.

Categories	Questions
Noticing: Awareness of discomfort, comfort, and neutral bodily sensations	1, 2, 3, and 4
Not distracting: The tendency not to ignore or distract from the feeling of pain or discomfort	5, 6, and 7
Not Worrying: Tendency not to worry or to experience emotional stress with sensations of pain or discomfort	8, 9, and 10
Attention Regulation: The ability to sustain and control attention to bodily sensations.	11, 12, 13, 14, 15, 16, and 17
Emotional Awareness: Awareness of the connection between bodily sensations and emotional states.	18, 19, 20, 21, and 22
Self-Regulation: The ability to regulate tension/distress/grief through paying attention to bodily sensations	23, 24, 25, and 26
Body Listening: Actively listening to the body to clarify itself	27, 28, and 29
Trusting: Trusting that the body manifests itself safely and reliably	30, 31, and 32

The scale uses a Likert-type measurement scale from 0 (never) to 5 (always). It gives a total score for the level of body awareness and a dimensional assessment. For the dimensional assessment, it is important to note that questions 5, 6, 7, 8, and 9 are reverse scored [12].

Before answering the questionnaire, the ethical considerations of the study were explained through informed consent, and it was verified that all students who responded had no cognitive difficulties in understanding the questions.

For the present study, we took as background research prior studies on the psychometric characteristics of the 32-item version of the MAIA, in order to conduct our study in a population of Spanish-speaking university students (Table 2).

Table 2. Prior studies.

Authors	Country	Language	N	Population	Proposal
Abbasi et al. (2018) [23]	Iran	Persian	225	University students	They preserve MAIA's original structure. The results of this study confirmed the validity and reliability of MAIA in an Iranian student population.
Baranauskas et al. (2018) [24]	Lithuania	Lithuanian	386	Students (biomedical sciences, humanitarian sciences, physical sciences, social sciences, technological sciences, and arts)	They propose a six-factor structure with 25 items. They remove Not Distracting and Noticing before the AFC due to their low α.
Calı et al. (2015) [13]	Italy	Italian	321	Healthy Italian psychology students	They keep the eight-factor structure, proposing 29 items with modifications.

Table 2. *Cont.*

Authors	Country	Language	N	Population	Proposal
Fujino (2019) [25]	Japan	Japanese	268	University students	They propose a six-factor structure with 25 items. They remove Not Worrying and Self-Regulation.
Shoji et al. (2018) [26]	Japan	Japanese	390	University students	They propose a six-factor structure with 25 items. Not Worrying and Self-Regulation were eliminated.
Valenzuela-Moguillansky & Reyes-Reyes (2015) [14]	Chile	Spanish	470	Undergraduate and postgraduate students	They keep the eight-factor structure, proposing 30 items with modifications.

The original version of the MAIA validated in a Chilean population was used as a reference for the factorial analysis [14].

2.3. Statistical Analysis

A descriptive analysis was conducted on sociodemographic variables including age, gender, city, marital status, discipline, and history of chronic diseases. For the factor analysis, statistical software JASP 0.16.4.0 and Python were utilized.

3. Results

3.1. Participant Characteristics

Most of the participating students were women (64%), were studying BHASE disciplines (91%), and were aged between 18 and 49 years for 55% were under 21 years of age, with a median age of 21 and a SD o±3.48. 96%. Most were single (65%) and lived in the city of Bogota. Of the participants, 16% reported having a history of chronic diseases. The presence of these chronic diseases was investigated, and it was found that 32% of this subgroup of students reported a history of diseases such as diabetes and respiratory diseases. This information was included in the characterization of students to obtain a general health profile. These histories were not exclusion criteria for administering the questionnaire since MAIA, being a self-report questionnaire, aims to evaluate the perception of interoceptive awareness (Table 3).

3.2. Exploratory Factor Analysis (EFA)

The calculation of the eigenvalues was carried out, obtaining eight factors corresponding to the values higher than 1.0: 11.4377455, 2.90782465, 2.0218799, 1.54278935, 1.40393595, 1.35838162, 1.13057784, 1.02032593.

For these eigenvalues, the contribution rate of the variation and the cumulative contribution rate of the variation are calculated, obtaining the results shown in Table 4.

The factor load is analyzed, and no clearly defined factors are obtained, so a varimax rotation is applied; in addition, the questions are separated according to the factors and dimensions proposed by the MAIA questionnaire and the following values are obtained. Based on this analysis, a grouping of questions with high values into a single factor is not identified in the dimensions of Noticing, Not Distracting, Not Worrying and Attention Regulation (Table 5).

Table 3. Demographics of university students (n = 202).

		n (%)	Total
Age	<21	111 (55)	202 (100)
	>21	91 (45)	
Gender	Female	129 (64)	202 (100)
	Male	73 (36)	
City	Bogotá	131 (65)	202 (100)
	Manizales	49 (35)	
Discipline	STEM [1]	18 (9)	202 (100)
	BHASE [2]	184 (91)	
History of illness	Yes	32 (16)	202 (100)
	No	170 (84)	
Marital status	Single	195 (96)	202 (100)
	Other (e.g., married, divorced, widowed)	7 (6)	

[1] STEM = Science, technology, engineering, and maths. [2] BHASE = Business, humanities, health, arts, social science, and education.

Table 4. Contribution rates.

Own Value	Contribution Rate of Change	Cumulative Contribution Rate of Change
11.437745	0.357430	0.357430
2.907825	0.090870	0.448299
2.021880	0.063184	0.511483
1.542789	0.048212	0.559695
1.403933	0.043873	0.603568
1.358381	0.042449	0.646017
1.130573	0.035330	0.681348
1.020317	0.031885	0.713233

Table 5. Factorial load by questions according to MAIA dimensions.

Categories	Questions	F1	F2	F3	F4	F5	F6	F7	F8
Noticing	1	0.20765	0.20801	0.06213	0.00794	0.28629	0.36322	0.12151	0.14692
	2	0.15165	0.41423	0.13721	0.06311	0.57072	0.31138	−0.02324	0.08675
	3	0.41711	0.18719	0.00063	0.20844	0.06006	0.30148	0.19902	−0.18076
	4	0.19250	0.27742	0.16634	0.15372	0.06429	0.61791	−0.09384	0.00947
Not-distracting	5	−0.02683	−0.38841	−0.10949	−0.11728	−0.43014	0.02032	0.18313	−0.25766
	6	−0.00949	0.10221	−0.04071	−0.00496	−0.11134	0.02300	0.34183	−0.06309
	7	0.02309	−0.16059	−0.04698	−0.06020	−0.75344	−0.03383	0.12199	0.07387
Not-Worrying	8	0.01621	−0.26117	−0.03121	0.05407	0.00082	−0.05790	0.74669	0.03557
	9	−0.07004	−0.33186	−0.27186	−0.00514	0.04148	−0.38124	0.14279	−0.11395
	10	0.03963	0.10493	0.28657	0.08421	0.36182	−0.02711	−0.34554	0.30034

Table 5. *Cont.*

Categories	Questions	F1	F2	F3	F4	F5	F6	F7	F8
Attention Regulation	11	0.41465	0.19321	0.22409	0.10943	0.04434	0.18181	0.14671	0.62515
	12	0.35956	0.34224	0.57887	−0.06166	−0.03649	0.14812	0.08199	0.12037
	13	0.43315	0.13321	0.41575	0.22066	0.14997	0.35878	−0.08962	0.20219
	14	0.59964	−0.02457	0.28371	0.25177	0.01257	0.21682	−0.10338	0.00979
	15	0.29328	0.24426	0.54247	0.11761	0.10276	0.16917	0.25450	−0.09232
	16	0.23837	0.02717	0.68363	0.29686	0.17319	0.16821	−0.00144	0.05666
	17	0.22039	0.26814	0.76019	0.14585	0.06409	0.04958	0.06044	0.13230
Emotional Awareness	18	0.14737	0.77073	0.17636	0.21597	0.07851	0.13014	0.04153	−0.01667
	19	0.02696	0.72694	0.19936	−0.00819	0.25174	0.10619	0.05363	0.14865
	20	0.12706	0.71654	0.15779	0.10719	0.20746	0.19411	0.02610	0.09597
	21	0.17741	0.42976	0.39198	0.32846	0.25808	0.28322	0.05093	−0.17304
	22	0.16554	0.62383	0.14844	0.44967	0.10698	0.33288	−0.03908	−0.07341
Self-Regulation	23	0.52981	0.39217	0.03837	0.29841	0.25592	0.10250	−0.17905	0.05633
	24	0.62503	0.16149	0.14513	0.26761	0.12209	0.25809	−0.07940	0.22598
	25	0.35136	0.26023	0.31367	0.52867	0.20211	−0.02938	−0.12081	0.10851
	26	0.70789	0.13777	0.25954	0.27707	0.18182	−0.05147	−0.20550	0.09154
Body Listening	27	0.39265	0.36877	0.48276	0.16569	0.13107	0.06454	0.03456	0.33023
	28	0.72666	0.08741	0.25868	0.00331	−0.12086	0.00182	0.12731	0.10964
	29	0.82190	0.02088	0.18365	0.24502	−0.02224	0.16511	0.19739	0.00822
Trusting	30	0.28326	0.12009	−0.02199	0.76045	0.04376	0.03490	−0.02812	0.19795
	31	0.21471	0.08494	0.17788	0.85530	0.01586	0.03045	0.12089	−0.08772
	32	0.18132	0.16839	0.30496	0.64734	0.07792	0.38204	−0.0894	0.03105

3.3. Confirmatory Factor Analysis

A confirmatory factor analysis was performed based on the proposed factor model of the original MAIA, giving a significant *p*-value, as shown in Table 6.

Table 6. Confirmatory factor analysis.

Model	X^2	gl	*p*
Model base	19,968.750	496	
Model factor	1152.873	456	<0.001

3.4. Factor Loadings

A confirmatory factor analysis of the original MAIA was performed, which resulted in a significant *p*-value and a 95% confidence interval. However, during the factor loading analysis, a low *p*-value was found for item 6 of the Not Distracting factor, and for the entire Not Worrying factor. This suggests that these elements may not fit well with the proposed model, and caution should be exercised when interpreting results related to these elements (Tables 7 and 8).

Table 7. Factor loadings of CFA.

			95% Confidence Interval	
Factor	**Item**	***p***	**Lower**	**Upper**
Noticing	1	<0.001	0.133	0.336
	2	<0.001	0.182	0.460
	3	<0.001	0.144	0.364
	4	<0.001	0.168	0.423
Not Distracting	5	<0.001	0.520	0.863
	6	0.087	−0.009	0.134
	7	<0.001	0.352	0.568
Not Worrying	8	0.404	−0.080	0.199
	9	0.403	−0.264	0.658
	10	0.402	−0.550	0.221
Attention Regulation	11	<0.001	0.241	0.350
	12	<0.001	0.258	0.372
	13	<0.001	0.293	0.419
	14	<0.001	0.244	0.353
	15	<0.001	0.249	0.358
	16	<0.001	0.268	0.383
	17	<0.001	0.283	0.404
Emotional Awareness	18	<0.001	0.470	0.560
	19	<0.001	0.412	0.496
	20	<0.001	0.464	0.555
	21	<0.001	0.497	0.595
	22	<0.001	0.523	0.619
Self-Regulation	23	<0.001	0.206	0.377
	24	<0.001	0.218	0.402
	25	<0.001	0.209	0.385
	26	<0.001	0.219	0.403
Body Listening	27	<0.001	0.320	0.520
	28	<0.001	0.256	0.407
	29	<0.001	0.309	0.496
Trusting	30	<0.001	0.499	0.613
	31	<0.001	0.517	0.625
	32	<0.001	0.573	0.706

Finally, a global Cronbach's alpha (α) of 0.90 and an omega coefficient (Ω = 0.96) were found.

The study conducted among a Chilean student population is the closest to the Colombian population; however, when applying the adjusted six-factor model proposed in the Chilean study, it did not converge with the data from the Colombian student population. The factorial analysis performed in this study used the original version of MAIA translated into Spanish in the validation study conducted by Chile, where they found significant factor loadings for the eight factors and the best goodness-of-fit statistics with 30 items [14].

Table 8. Factor loading.

Factor	*p*	Lower	Upper
Noticing	<0.001	1.116	2.905
Not Distracting	<0.001	−0.839	−0.497
Not Worrying	0.405	−8.143	3.289
Attention Regulation	<0.001	1.681	2.486
Emotional Awareness	<0.001	1.118	1.367
Self-Regulation	<0.001	1.686	3.218
Body Listening	<0.001	1.397	2.326
Trusting	<0.001	0.927	1.168

Overall, the results of the present study suggest that the version of the MAIA used is a useful and reliable tool for measuring interoceptive awareness in the studied population. However, further studies are needed to confirm the validity and reliability of the MAIA in different populations and transcultural contexts, as well as to explore possible adjustments to the proposed model.

4. Discussion

The objective of this study is to present the psychometric properties of the Multidimensional Assessment of Interoceptive Awareness (MAIA) Spanish version to observe to what extent the hypothesized model fits the population of university students in Colombia. The questionnaire was applied to a sample of 202 students. Among this sample, a global Cronbach's alpha (α) of 0.90 was found. Other studies report a Cronbach's alpha (α) of 0.90 was found in 202 students aged between 18 and 32 years. This result is similar to those of the MAIA in the German version, the Spanish version, and the Italian version [14,21,23]. The results reveal an internal consistency through the omega coefficient (Ω = 0.95), which is considered good. Among prior studies carried out using the MAIA, application of the omega coefficient is not found; however, this sample was used in similar studies supporting their findings with the global Cronbach's alpha [27–29].

For the EFA of the present study, an eight-dimensional factorial structure was contemplated. Because no clearly defined factors were obtained, a varimax rotation was applied; additionally, the questions were separated according to the factors and dimensions proposed by the MAIA questionnaire. It was found that there was no group of questions with high values in a single factor in the dimensions relating to noticing, non-restlessness and regulation of attention. This can be coindexed with the study conducted in Chile with a sample of 470 participants aged between 18 and 70 years; the eight-factor EFA results found a model with loads greater than or equal to 0.30, where seven of the eight factors comprised three or more. The eight-factor model achieved the highest quality and was used to perform the AFC. As an analytical strategy, they used the ML method with Spanish Promax rotation [14].

A translation and validation study in Malaysia with 815 Malaysians (403 females) suggested a 19-item, three-factor structure. The confirmatory factor analysis indicated that both the three-factor and eight-factor models exhibited complete strict invariance between the sexes. Overall, the three-dimensional Malaysian MAIA proved to be internally consistent and invariant between the sexes, but further tests of construct and convergent validity are required [27]. A cross-sectional study involving 268 Japanese individuals proposed a six-factor structure that proved useful for assessing interoceptive awareness in the Japanese population [26]. In the confirmatory factorial analysis, the Japanese six-factor model showed a good fit to the original model [30]. The results suggest the need to make minor modifications, such as the elimination or addition of items to the original eight-factor model, to validate the MAIA scale in transcultural contexts.

We propose a seven-factor model with modifications, removing the Not Worrying factor, as it has a *p*-value of 0.0405, and item 6 of the Not Distracting factor, as it has a *p*-value of 0.087. Confirmatory factor analysis was performed with this proposal, giving the following results (Table 9).

Table 9. Adjusted confirmatory factor analysis.

Model	X^2	gl	*p*
Model base	18,943.294	378	
Model factor	899.884	343	<0.001

A confirmatory factor analysis was performed based on the proposed factor model of the original MAIA, giving a significant *p*-value and a 95% confidence interval. However, the factorial loading analysis found a low *p*-value for item 6 of the Not Distracting factor, and for the entire Not Worrying factor (Table 10 and Figure 1).

Table 10. Adjusted factor loading.

Factor	*p*	Lower	Upper
Noticing	<0.001	1.117	2.801
Not Distracting	<0.001	−0.829	−0.484
Attention Regulation	<0.001	1.623	2.340
Emotional Awareness	<0.001	1.097	1.339
Self-Regulation	<0.001	1.691	3.973
Body Listening	<0.001	1.397	2.338
Trusting	<0.001	0.947	1.203

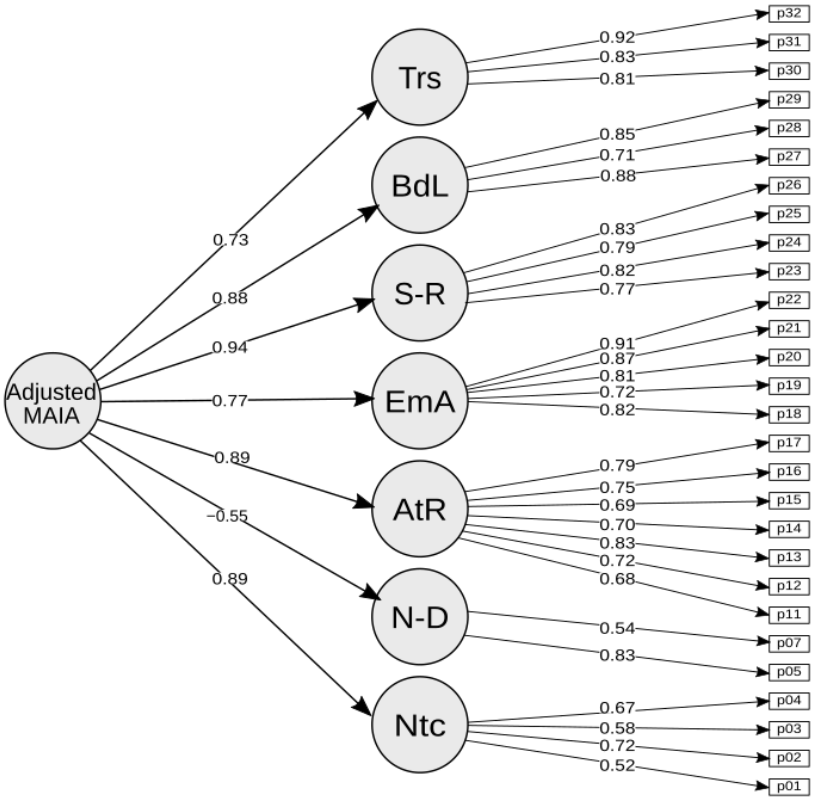

Figure 1. Proposed seven-factor MAIA.

This study showed that the Spanish version of the 32-item MAIA applied to the Colombian population has acceptable psychometric properties. The adjusted exploratory factor analysis suggested an eight-factor model; however, it is suggested to verify the dimension of Noticing, Not Worrying, and Attention Regulation. Some studies suggest models with six or seven factors by discarding some items [25].

5. Conclusions

This study showed that the Spanish version of the 32-item MAIA applied to Colombian university students has adequate psychometric properties in terms of validity and reliability.

The CFA suggested a seven-factor model discarding the entire Not Worrying factor and item 6 of the Not Distracting factor.

The MAIA shows good overall internal consistency reliability and is a suitable instrument to assess interoceptive awareness in the population of university students with different sociodemographic characteristics.

It is important that the questionnaire is completed by university students who understand the questions.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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Exploring the Link between Interoceptive Body Awareness and Suicidal Orientation in University Students: A Cross-Sectional Study

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Abstract: Introduction: The transition to college life can impact the mental health of students. There are mental health care strategies that promote connection with the body's internal signals, which can help to improve mental well-being, manage emotions, and reduce the risk of suicide in university students. Aim: This study aimed to examine the association between interoceptive body awareness variables and suicidal orientation in a sample of 169 undergraduate students in Colombia. Methods: An observational, cross-sectional study was conducted in 2023 with Colombian students as the participants. Results: The findings revealed a significant and moderately negative correlation between the Multidimensional Assessment of Interoceptive Awareness (MAIA) total score and the Inventory of Suicide Orientation (ISO-30) total score ($r = -0.54$, $p < 0.001$). Confidence and self-regulation were identified as the most influential factors in the relationship between MAIA and ISO-30. Significant correlations were observed ($p < 0.001$), indicating moderate correlation values ranging from −0.43 to −0.57. Discussion: Our findings support the existence of a negative correlation between interoceptive body awareness and suicidal orientation. Further research is needed to better understand this relationship and to develop specific interventions based on body awareness to prevent suicide orientation. Conclusion: There are practical implications associated with recognizing the importance of body awareness in relation to decreasing suicidal orientation, and multidisciplinary teams addressing mental health can incorporate this knowledge.

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1. Introduction

Suicide is the intentional act of taking one's own life and usually progresses through several stages, including suicidal ideation (persistent thoughts of wanting to die), planning (developing a specific plan), preparation (taking steps to carry out the plan), the actual suicide attempt, and the outcome, which may be survival or death. Suicidal behavior can be initiated without the presence of an underlying mental disorder [1].

The World Health Organization (WHO) recognizes suicide as a public health problem. Suicide was the fourth leading cause of death in the 15–19-year-old age group in both males and females in the region of the Americas, with relatively similar numbers of deaths in this age group [2,3].

In the latest "Forensis" forensic medicine report for the year 2021 in Colombia, based on the distribution by age group, the highest number of suicides occurred in the 20–24-year-old age group, both in males and females. The highest suicide rate per 100,000 inhabitants was 9.24 in the 18–19-year-old age range [4].

When students enter higher education, they face unique challenges and pressures that can have a significant impact on their mental health [5]. The transition to college life involves new academic responsibilities, personal independence, and the need to adapt to diverse spiritual, ethnic, and gender contexts, as well as a different social environment [6].

In 2014, the report "Preventing Suicide: A Global Imperative" was published with the aim of raising awareness of the relevance of suicide and its prevention in public health programs. This report aims to encourage countries to develop comprehensive suicide prevention strategies within a multisectoral approach to public health. Suicide is also addressed in the Global Action Agenda for Mental Health and is an indicator of the Sustainable Development Goals, which aim to reduce premature mortality from noncommunicable diseases and promote mental health and well-being [7].

In this context, social determinants play an important role in the mental health of university students; external factors such as the socioeconomic environment, access to health services, the quality of education, and social support can influence students' vulnerability and resilience to emotional challenges [8]. Positive social determinants, such as a healthy family environment and a strong social support network, improve students' mental health and coping skills [8].

Some of the interventions that have shown advances in suicide prevention include suicide education, support networks, and interoceptive body awareness work [9,10]. Interoceptive awareness refers to the ability to perceive and understand internal body signals, such as visceral sensations, the heartbeat, breathing, and other bodily cues [11]. There is also the practice of mindfulness, which consists of intentionally and nonjudgmentally paying attention to the physical sensations, emotions, and thoughts of the present moment [12].

Through meditation, exercise, and mindful breathing, students can learn to connect with their bodies and respond more healthfully to the stresses and strains of college life [13,14]. These practices help cultivate self-awareness, emotional regulation, and resilience, which contributes to improved mental well-being and potentially reduced suicidal orientation [15].

Body awareness refers to a person's ability to be aware of and connected to his or her body, physical sensations, and emotions. It involves paying attention to the signals sent by the body and responding appropriately to them [16]. By developing body awareness, individuals can improve their understanding of their own physical and emotional states, which can lead to improved self-regulation and overall well-being [16,17].

There are strategies using interoceptive body awareness that have demonstrated benefits for students' mental health; for example, one study examined the effects of a telerehabilitation-based Basic Body Awareness Therapy (BBAT) approach on body aware-

ness, musculoskeletal pain, sleep, and quality of life in college students during the COVID-19 pandemic. Two groups were evaluated: one received BBAT (n = 20) and the other served as a control group (n = 20). The treatment group received online BBAT three days a week for six weeks. The results showed significant improvements in the treatment group in terms of pain, sleep quality, body awareness, and quality of life. This telerehabilitation-based BBAT approach proved effective during the COVID-19 pandemic [18].

Another study evaluated the effects of Pilates training on body awareness and social appearance anxiety in university students. Eighty students participated, and they were divided into a Pilates group (n = 40) and a control group (n = 40). Significant differences were observed between the groups in terms of body awareness and social appearance anxiety scores after the Pilates program. These results highlight the importance of including Pilates programs in the training of physical therapy students and suggest the need for future research with larger numbers of participants [19].

Also, a study examined the relationship between mindfulness, well-being, and body satisfaction in university students. Data were collected from 369 students (220 females and 149 males) at Uşak University during the 2017–2018 academic year. The results showed that gender differences in body satisfaction were not significant. However, female students reported higher well-being, while male students showed higher conscious awareness. There was a positive, albeit weak, relationship between body awareness and well-being and body satisfaction. Both body satisfaction and well-being were significant predictors of mindfulness [20].

The importance of body awareness lies in its ability to help college students recognize and address stress, anxiety, and other emotional issues that may contribute to suicide risk. By cultivating a strong connection with their bodies, students can become more in tune with their emotions, physical sensations, and overall well-being. This heightened awareness allows them to identify early signs of distress and implement appropriate self-care and support strategies [17].

Emotional distress and psychological suffering can disconnect the person from their body, making it difficult to identify and manage signs of mental distress [16]. Studies have demonstrated the benefits of certain interventions [14,16,17]. However, no study has established the relationships between body awareness and suicidal orientation. The aim of this study was to analyze the relationship between body awareness variables and suicidal orientation in a population of undergraduate students in Colombia.

2. Methods

2.1. Study Design

An observational, cross-sectional study was conducted between February and April 2023. Convenience sampling was carried out with students studying Rehabilitation Sciences from a Colombian university. Undergraduate students were invited to participate on a voluntary basis, and no exclusion of any kind was made. The questionnaires were applied through Google Forms in three meetings, and a researcher was always present in case any student had any doubts.

This study was conducted with the approval of the bioethics committee of the Colombian School of Rehabilitation (ECR-CI-INV-121-2021) within the framework of the early warning program for mental health conditions, which is supported by the research unit and the university welfare unit. Students completed two online questionnaires in February 2023. The questionnaires used were the MAIA to measure body awareness and the ISO-30 to assess suicidal orientation. Before the students answered the questionnaires, the ethical considerations of the study were explained and informed consent was obtained.

2.2. Tools

In terms of the selection in relation to the questionnaires applied, it was considered that they were validated in a population of university students in Colombia and that they evaluated the variables under study. The questionnaires are described below.

2.2.1. Multidimensional Assessment of Interoceptive Awareness (MAIA)

The Multidimensional Assessment of Interoceptive Awareness (MAIA) is a questionnaire used to measure interoceptive body awareness in individuals [21]. A study conducted in 2023 examined the psychometric properties of the 32-item MAIA in Colombian university students. The study reported an overall Cronbach's alpha (α) of 0.90 and an omega coefficient (Ω) of 0.96. Additionally, the study proposed a seven-factor model, which, in terms of our application, was not considered due to the confidence intervals provided for the original version [11].

The 32-item MAIA consists of 8 dimensions that assess aspects of interoceptive awareness. It uses a Likert-type measurement scale ranging from 0 (never) to 5 (always). It provides a total score for the level of body awareness and a dimensional assessment. For the dimensional assessment, it is important to note that questions 5, 6, 7, 8, and 9 are reverse-scored. The MAIA total is given by the sum of all items divided by 32. The score is set on a scale of 0 to 5 for each dimension. The interpretation is that higher total scores indicate higher levels of positive awareness. Table 1 presents the definitions of the dimensions [22].

Table 1. MAIA: definitions of dimensions.

Dimension	Definition
Noticing	Measures the ability to maintain attention to interoceptive cues without being distracted by external factors
Not distracting	Refers to the ability to maintain focus on interoceptive signals without being distracted by external factors
Not worrying	Assesses the ability not to feel uncomfortable or anxious when experiencing internal bodily sensations.
Attention regulation	Refers to the ability to regulate and pay direct attention to internal bodily signals
Emotional awareness	Measures the ability to recognize and understand emotions and associated bodily sensations
Self-regulation	Assesses the ability to regulate and respond adaptively to internal body signals
Body listening	Refers to the ability to attend to and listen to the body's needs and signals
Trusting	Measures confidence in one's ability to interpret and understand internal body signals
MAIA Total	Sum of all scores

2.2.2. Inventory of Suicide Orientation (ISO-30)

The ISO-30 questionnaire is composed of 30 questions that detect the possible presence of suicidal orientation [23]. It is self-administered, and the questions are formulated positively and negatively, with answers given on a four-position Likert-type scale (0: strongly disagree, 1: partially disagree, 2: partially agree, and 3: strongly agree).

The objective of the ISO-30 questionnaire is to assess the presence and intensity of suicidal orientation in an individual over a 30-day period. Its purpose is to assist in the early identification of individuals at risk of suicidal behaviors and to provide relevant information for intervention and treatment [24]. This questionnaire has been previously used in a Colombian population of university students with a Cronbach's alpha of 0.899 [24]. For the present study, the Cronbach's alpha was verified in university students, with a result of 0.9333 and a 95% confidence interval between 0.918 and 0.947.

The ISO-30 presents 5 dimensions. Scoring is on a scale between 0 and 18 for each dimension, between 0 and 90 for the total ISO-30, and either true or false for the critical factors [25]. Table 2 presents the definitions of the dimensions

2.3. Statistical Analysis

For the analysis of the data, we used the programming language Python. The normality of the variables analyzed was verified using the D'Agostino test; since, in some cases, the null hypothesis of the normality of the variables was rejected, it was decided to use the

Spearman correlation, which is more robust for variables that do not correspond to the criteria of normality. In addition, considering that the ISO-30 critical factor variable is binomial, the biserial point correlation was applied in this case.

Table 2. ISO-30: definitions of dimensions.

Dimension	Definition
Low self-esteem	Negative and unhealthy perception that a person has of him/herself. It refers to a lack of confidence in one's abilities, value, and self-image.
Hopelessness	This refers to an emotional state in which a person feels that there is no hope or possibility of improvement in his or her current situation or in the future.
Inability to control emotions	This means that a person has difficulty managing and modulating their emotions effectively.
Social isolation	This refers to a state in which an individual has limited contact or interaction with others. It often involves physical separation from social networks, such as friends, family, or the broader community. Social isolation can be voluntary, such as when someone chooses to live alone in a remote area, or it can be involuntary.
Suicidal ideation	Persistent thoughts of wanting to die
Total	Sum of all scores
Critical factors	True if the person scores two or more items (5, 10, 15, 20, 25, and 30) with a score higher than 2; false otherwise

We examined whether there was a correlation and the level of significance of the correlation between the MAIA total score and the ISO-30 total score. When a significant correlation was found, an analysis of the relationships between all the dimensions of both questionnaires was performed.

3. Results

The questionnaires were distributed to 187 students, with 3 students opting not to participate. Out of the remaining 184 participants, 15 chose not to complete the ISO-30 questionnaire. The final sample included 169 students who provided responses to both questionnaires.

Among the students who completed the online questionnaires, 80% were female, 93% were single, and 86% were living in Bogotá. The age range of the participants spanned from 16 to 42 years, with an average age of 20 years.

Table 3 reveals varying degrees of variability among the specific dimensions of the MAIA. The "not distracted" and "attention regulation" dimensions showed greater variability, as evidenced by their standard deviations of 0.92 and 0.91, respectively. This suggests notable differences in how participants responded to these dimensions.

On the other hand, the "perception" and "emotional awareness" dimensions showed a more consistent level of response across participants, with standard deviations of 0.88 and 0.97, respectively. This implies that, in general, participants showed a higher level of interoceptive awareness in these areas.

The total ISO-30 scores indicate a considerable range of levels of suicidal orientation within the sample, with a standard deviation of 17.00 and a mean score of 34.00.

When specific dimensions of the ISO-30, such as low self-esteem, hopelessness, inability to cope, loneliness–isolation, and suicidal ideation, are examined, it becomes apparent that participants' responses also varied significantly, with standard deviations ranging from 3.03 to 4.67.

Table 3. Characteristics of participants (n = 169).

Variable	Minimum	Maximum	Mean	Average	Standard Deviation
Age	16.00	47.00	20.00	21.60	5.22
MAIA Perceives	1.25	5.00	3.75	3.53	0.88
MAIA Not Distracted	0.00	4.33	2.00	1.93	0.92
MAIA Not Worrying	0.00	5.00	2.33	2.34	0.96
MAIA Attention Regulation	0.29	4.86	2.86	2.80	0.91
MAIA Emotional Awareness	0.80	5.00	4.00	3.76	0.97
MAIA Self-Regulation	0.00	5.00	2.75	2.69	1.18
MAIA Listening to the Body	0.25	4.75	2.50	2.50	1.09
MAIA Confidence	0.00	5.00	3.33	3.18	1.22
MAIA Total	0.70	4.02	2.90	2.84	0.59
ISO-30 Low Self-Esteem	0.00	18.00	6.00	6.67	3.75
ISO-30 Hopelessness	0.00	18.00	6.00	6.34	4.02
ISO-30 Inability to Control Emotions	0.00	17.00	9.00	9.08	3.03
ISO-30 Loneliness–Isolation	0.00	18.00	7.00	7.62	4.30
ISO-30 Suicidal Ideations	0.00	18.00	4.00	5.43	4.67
ISO-30 Total	3.00	81.00	34.00	35.14	17.00

It is important to note that higher scores on the ISO-30 dimensions correspond with a greater presence of suicidal orientation. Certain critical ISO-30 factors merit separate analysis, and these will be explored in greater detail in Section 3, along with the relationships identified with the MAIA dimensions.

It was found that there was a moderate and significant negative correlation between the total score of the MAIA and the total score of the ISO-30 ($r = -0.54$, $p < 0.001$).

Once the correlation between the MAIA and ISO-30 was established, the total score in the ISO-30 inventory was further analyzed in relation to the factors that compose the MAIA questionnaire. The findings are described below, as shown in Table 4.

Table 4. Correlation between ISO-30 total value and MAIA dimensions.

	x	y	r	Correlation Interp.	*p*-Unc	*p*-Value Interp.
0	ISO-30 Total	MAIA Noticing	0.026	Very weak	0.733	Not significant
1	ISO-30 Total	MAIA Not Distracting	−0.295	Weak	0.000	<0.001
2	ISO-30 Total	MAIA Not Worrying	−0.061	Very weak	0.428	Not significant
3	ISO-30 Total	MAIA Attention Regulation	−0.400	Moderate	0.000	<0.001
4	ISO-30 Total	MAIA Emotional Awareness	−0.116	Very weak	0.131	Not significant
5	ISO-30 Total	MAIA Self-Regulation	−0.506	Moderate	0.000	<0.001
6	ISO-30 Total	MAIA Body Listening	−0.419	Moderate	0.000	<0.001
7	ISO-30 Total	MAIA Trusting	−0.578	Moderate	0.000	<0.001

There was a moderate and significant negative correlation between ISO-30 total and MAIA not distracting ($r = -0.295$, $p < 0.001$). A moderate and significant correlation was found between ISO-30 total and MAIA attention regulation ($r = -0.400$, $p < 0.001$). A moderate and significant correlation was found between ISO-30 total and MAIA self-regulation ($r = -0.506$, $p < 0.001$). A moderate and significant correlation was found between ISO-30 total and MAIA body listening ($r = -0.419$, $p < 0.001$). A moderate and significant correlation was found between ISO-30 total and MAIA trusting ($r = -0.578$, $p < 0.001$).

In addition, the study revealed that 15% of the population had critical factors. In examining the relationships with MAIA, Table 5 illustrates two weak but significant negative correlations between the ISO-30 critical factors and the MAIA factors of not distracted ($r = -0.217$, $p < 0.001$) and attention regulation ($r = -0.209$, $p < 0.001$); see Table 5.

Subsequently, all the factors of ISO-30 were analyzed with all of the factors of MAIA. Table 6 presents the findings.

According to Table 6, the most relevant relationships were found between the MAIA factors of trusting and self-regulation. All correlations were significant ($p < 0.001$) and generally moderate (correlation values ranging from −0.43 to −0.57). The correlations

were only weak in the cases of self-regulation with ISO-30 low self-esteem (r = −0.38) and self-regulation with ISO-30 suicidal ideation (r = −0.38); see Table 6.

Table 5. Critical factors.

	x	y	r	Correlation Interp.	*p*-Unc	*p*-Value Interp.
0	ISO-30 Critical items	MAIA Noticing	0.080	Very weak	0.303	Not significant
1	ISO-30 Critical items	MAIA Not Distracting	−0.217	Weak	0.005	<0.01
2	ISO-30 Critical items	MAIA Not Worrying	−0.042	Very weak	0.586	Not significant
3	ISO-30 Critical items	MAIA Attention Regulation	−0.209	Weak	0.006	<0.01
4	ISO-30 Critical items	MAIA Emotional Awareness	−0.083	Very weak	0.283	Not significant
5	ISO-30 Critical items	MAIA Self-Regulation	−0.192	Very weak	0.012	<0.05
6	ISO-30 Critical items	MAIA Body Listening	−0.081	Very weak	0.296	Not significant
7	ISO-30 Critical items	MAIA Trusting	−0.169	Very weak	0.028	<0.05

Table 6. Correlation between relevant MAIA-ISO-30 factors.

	x	y	r	Correlation Interp.	*p*-Unc	*p*-Value Interp.
1	MAIA Self-Regulation	ISO-30 Low self-esteem	−0.380	Weak	0.0	<0.001
2	MAIA Self-Regulation	ISO-30 Hopelessness	−0.491	Moderate	0.0	<0.001
3	MAIA Self-Regulation	ISO-30 Inability to control emotions	−0.469	Moderate	0.0	<0.001
4	MAIA Self-Regulation	ISO-30 Social isolation	−0.493	Moderate	0.0	<0.001
5	MAIA Self-Regulation	ISO-30 Suicidal ideation	−0.376	Weak	0.0	<0.001
6	MAIA Trusting	ISO-30 Low self-esteem	−0.471	Moderate	0.0	<0.001
7	MAIA Trusting	ISO-30 Hopelessness	−0.531	Moderate	0.0	<0.001
8	MAIA Trusting	ISO-30 Inability to control emotions	−0.510	Moderate	0.0	<0.001
9	MAIA Trusting	ISO-30 Social isolation	−0.570	Moderate	0.0	<0.001
10	MAIA Trusting	ISO-30 Suicidal ideation	−0.432	moderate	0.0	<0.001

4. Discussion

The MAIA dimensions related to self-regulation and confidence in bodily sensations are significantly associated with critical factors of the ISO-30 questionnaire. Lower levels of self-regulation and confidence in bodily sensations are associated with a higher suicidal orientation and factors such as low self-esteem, hopelessness, inability to control emotions, and social isolation.

This may support the findings of a 6-month study involving 43 adults with recent suicidal ideation and non-suicidal self-injury (NSSI). Interoception assessments were conducted during an initial visit. Participants then completed biweekly assessments for 6 months, reporting the presence and severity/frequency of suicidal ideation and NSSI. The findings revealed that reduced body trust predicted the presence of suicidal ideation, the severity of suicidal ideation, and the presence of NSSI, while other metrics of interoceptive skills did not predict any outcomes or predicted only one or two outcomes [26]. This suggests that trusting one's own body and feeling secure in it are essential components of one's personality, and a lack of trust in the body can manifest as a negative attitude towards it [27].

In our study, correlations indicate that interoceptive awareness, particularly in the domains of not being distracted, attention regulation, self-regulation, body listening, and trust in bodily sensations, is associated with the presence of suicidal orientation. Individuals with a higher suicidal orientation tend to show lower levels of interoceptive awareness in these domains. However, it is important to note that these correlations do not imply causality, and further research may be needed to explore the underlying mechanisms of these relationships.

A study investigated whether attenuated interoceptive processing is associated with self-reported suicide attempts in individuals with a variety of psychiatric disorders including depression, anxiety, post-traumatic stress disorder, eating disorders, and/or substance use disorders. The results revealed that people who attempted suicide showed reduced

responses to homeostatic threats to the body, such as an increased tolerance to sensations of breathlessness and an increased threshold to cold pain compared to those who did not attempt suicide. In addition, suicide attempters showed a lower accuracy in heartbeat perception and lower activity in the medial and posterior insula when paying attention to the sensations of the heart, an interoceptive organ vital for survival [28]. Taken together, these findings provide initial support for the hypothesis that an increased ability to engage in self-destructive and potentially life-threatening behaviors is associated, both behaviorally and neurobiologically, with reduced sensitivity to internal body cues [28].

Self-confidence and trust in others have been associated with greater psychological well-being and an improved quality of life; studies have found that confidence in interpersonal relationships and self-confidence are associated with a lower likelihood of experiencing depressive symptoms and greater psychological resilience [28]. This could justify the significant inverse correlation value in the MAIA confidence factor in relation to the ISO-30 factors. Importantly, the correlations were weakest for self-regulation with ISO-30 low self-esteem ($r = -0.38$) and self-regulation with ISO-30 suicidal ideation ($r = -0.38$). This suggests that the relationship between emotional self-regulation and these ISO-30-specific factors may be more complex and requires further analysis.

In our study, 15% of the student population was observed to have critical factors, which led to examining their association with the Multidimensional Assessment of Interoceptive Awareness (MAIA). The results presented in Table 5 reveal two weak but significant negative correlations between critical factors associated with suicidal orientation (ISO-30) and two MAIA factors: no distraction ($r = -0.217$, $p < 0.001$) and attention regulation ($r = -0.209$, $p < 0.001$) [29]. This is consistent with the results of a systematic review (2021) that drew on data from four databases and examined the influence of various measures of interoception along the suicide continuum. The analysis included 22 studies with a total of 14,988 participants. The findings of this review suggest that there is a relationship between interoceptive dysfunction and the risk of suicidal thoughts, intentions, and behaviors. Preliminary evidence was found indicating that interoceptive accuracy may be decreased in those who have previously attempted suicide. In addition, alterations in interoceptive sensitivity were identified at all stages of suicide, with individuals reporting distrust in their own bodily sensations and difficulties in maintaining and regulating attention to these sensations. This review highlights the importance of interoception in understanding suicidality but also underscores the need for further research addressing the causal relationships and mediating variables involved [30].

Studying the relationship between interoceptive body awareness and suicidal orientation is gaining interest, as evidenced by "Reconnecting to Internal Sensation and Experiences: A Pilot Feasibility Study of an Online Intervention to Improve Interoception and Reduce Suicidal Ideation" and "Body trust as a moderator of the association between exercise dependence and suicidality"; in addition to identifying inverse relationships of body trust and emotional awareness with suicidal intent, the authors of these papers recommend studies for generating scientific evidence [31,32].

5. Conclusions

Our findings support the existence of a negative correlation between body awareness and suicidal orientation. However, more research is needed to better understand this relationship and to develop specific body-awareness-based interventions to prevent suicidal risk.

This study examined the association between interoceptive body awareness and suicidal orientation in university students in Colombia. A significant and moderate correlation was found between the Multidimensional Assessment of Interoceptive Awareness (MAIA) total score and the Inventory of Suicide Orientation (ISO-30) total score ($r = -0.54$, $p < 0.001$). Confidence and self-regulation were identified as the most influential factors in the relationship between the MAIA and ISO-30. Significant correlations ($p < 0.001$) were observed with moderate correlation values ranging from -0.43 to -0.57.

Our findings support the existence of a negative correlation between interoceptive body awareness and suicidal orientation. Further research is needed to better understand this relationship and to develop specific interventions based on body awareness to prevent suicidal orientation.

In addition, other studies have suggested that self-confidence and trust in others are associated with greater psychological well-being and improved quality of life. This could justify the value of the significant inverse correlation in the confidence factor of the MAIA in relation to the ISO-30 factors. Importantly, the correlations were weakest for self-regulation with low self-esteem on the ISO-30 ($r = -0.38$) and self-regulation with suicidal ideation on the ISO-30 ($r = -0.38$). This suggests that the relationship between emotional self-regulation and these ISO-30-specific factors may be more complex and requires further analysis.

6. Limitations

A limitation of this study was the convenience sample, which was intended for initial screening. Future studies with larger, more diverse, and randomized samples are needed. The results presented here are based on a correlational study design, which cannot establish causality. Although the study identified a significant negative correlation between the MAIA total score and the ISO-30 total score, it is important to note that correlation does not imply causation. Future research using experimental or longitudinal designs could provide a more complete understanding of the causal relationships between these variables.

The sample was obtained from a university with professions that have a higher selection of women, which was a limitation for gender analysis.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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Body Awareness as a Protective Factor against Suicidal Orientations in College Students

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Abstract: In this study, binary logistic regression and linear regression analyses were used to examine the relationship between interoceptive body awareness and suicidal orientation among Colombian university students. Additionally, the bootstrap technique was employed to resample and estimate the distribution of the data. The results support the idea that greater interoceptive awareness may protect against suicidal orientation by improving emotional regulation. An inverse relationship was found between interoceptive awareness and suicidal ideation. These findings align with previous literature emphasizing the importance of body awareness for emotional well-being. Further longitudinal research is needed to explore this relationship more deeply.

Keywords: body awareness; interoception; suicide prevention; attempted suicide

1. Introduction

Suicide poses a complex challenge to public health and is influenced by various biological, psychological, social, and environmental factors. According to the three-stage theory, which includes suicidal ideation, planning, and execution, identifying warning signs in each phase is crucial for prevention and intervention [1]. The World Health Organization (WHO) recognizes suicide as the fourth leading cause of death among individuals aged 15–19 years in the Americas [2]. In Colombia, young adults between 20 and 24 years of age, and especially those aged 18 and 19 years, have a high suicide rate. Therefore,

understanding the protective factors is essential for effective prevention and treatment, particularly among university students [3].

On the other hand, interoception, defined as the ability to perceive and recognize internal body signals such as pain, temperature, hunger, and thirst, plays a vital role in the regulation of physical and emotional well-being. This ability differs from external perception, which processes environmental stimuli and is responsible for monitoring and regulating internal bodily functions to maintain homeostatic balance. Fundamental to understanding the internal physiological state, interoception involves both the perception of basic bodily sensations and the management of autonomic motor control, thus distinguishing it from the exteroceptive system, which influences somatic motor activity such as cutaneous perception and proprioception. This ability is crucial not only for the regulation of internal bodily functions but also for the adaptation of the organism to changes in its physiological state, thus ensuring well-being and survival [4].

In addition, interoception plays an essential role in the generation of emotions and in the development of body awareness and perception of the "self" as an emotional and conscious entity. Its importance extends beyond the physical realm as it is linked to various psychological conditions. Alterations in this capacity can affect emotional regulation and the ability to appropriately interpret and respond to internal cues, which is associated with anxiety, eating, and mood disorders. Therefore, a thorough understanding of interoception is critical to address these mental health issues [5].

Individuals with suicidal tendencies may have a reduced interoceptive sensitivity. Those who have attempted suicide have been observed to have reduced interoceptive sensitivity compared with those who have only contemplated or planned suicide. Furthermore, impaired interoceptive sensitivity is indirectly related to suicide attempts through mediating variables. It is proposed that individuals with suicidal ideation do not necessarily lack the ability to recognize their own bodily cues but may feel less able to use these cues beneficially. Differences between individuals with and without suicidal ideation are often influenced primarily by depressive symptoms [6].

Interoceptive dysfunction, which involves disconnection from these bodily sensations, is associated with several psychiatric disorders and may be a modifiable risk factor for suicidal ideation and behavior. This disconnection facilitates self-harm, because it may be easier to harm a body to which one does not feel emotionally connected. Interoceptive dysfunction may not only differentiate individuals with suicidal ideation from those who actually attempt suicide but may also be a modifiable risk factor [7].

The importance of interoception in mental health is highlighted by discussions on how individuals who are more attuned to bodily responses experience emotions with greater intensity. It is also emphasized that interoception is relevant to emotional theories that propose a basis for emotional states in the central representation and perception of changes in bodily physiology. These aspects underscore the link between interoception and emotional experience, which may be relevant in the context of mental health and emotional well-being [8].

In Colombia, mental health care in the university setting is a priority for both the Ministry of Health and Ministry of Education, as reflected in the Guidelines on Mental Health and Psychosocial Disability in the Colombian Higher Education System. These guidelines emphasize the importance of implementing policies and practices aimed at fostering a supportive and emotional caring environment within higher education institutions. This includes not only the availability of counseling and psychological support services but also the active promotion of healthy self-care and wellness practices among students [9].

In this context, body awareness, particularly interoceptive body awareness, emerges as an important but under-explored factor [8]. Despite increasing attention paid to mental health in the university setting, research addressing the conceptual and methodological challenges associated with health promotion is still lacking.

Therefore, this study aimed to investigate whether there is a predictive relationship between interoceptive awareness and suicidal intent by examining the ability of the vari-

ables to predict the latter. In addition, we explored how one variable might affect the other and used methods such as bootstrapping to obtain more precise estimates of results when the data deviated from a normal distribution.

2. Materials and Methods

2.1. Study Type

A cross-sectional observational study was conducted to examine the relationship between body image and suicidal orientation among rehabilitation science students at a Colombian university in 2023.

2.2. Population and Sample

Convenience sampling was employed to recruit undergraduate rehabilitation science students from a Colombian university. This method was chosen because of the accessibility and availability of the target population, which facilitated efficient data collection. Given the study's focus on the specific demographics of university students, convenience sampling enabled a quick and practical participant selection process. The selection criteria were focused on undergraduate rehabilitation science students at the Department of Colombian University, ensuring homogeneity in academic and disciplinary contexts to enhance the comparability of results within the sample. The bootstrapping method was utilized to increase the sample size and enhance the precision of the results, particularly for non-normally distributed data. This technique involves generating multiple samples from the original data by sampling with replacement, allowing for a more accurate parameter estimation and robust assessment of statistical significance. Online questionnaires were distributed via Google Forms in three sessions with a researcher available to address any queries or concerns.

2.3. Instruments

The instruments used in this study were the Multidimensional Assessment of Interoceptive Awareness (MAIA) and the Inventory of Suicide Orientation (ISO-30). These instruments were validated and applied to Colombian university students.

Multidimensional Assessment of Interoceptive Awareness (MAIA): The MAIA is a questionnaire used to measure interoceptive body awareness in individuals. It consists of 32 items categorized into eight dimensions, evaluating interoceptive awareness using a Likert scale ranging from 0 (never) to 5 (always). It provides a total score for the level of body awareness and dimensional assessment. The MAIA has been found to have high reliability, with a Cronbach's alpha of 0.90 and an omega coefficient of 0.96 in a sample of Colombian university students. Each dimension of the MAIA is defined based on specific aspects of body awareness, such as attention to interoceptive signals, emotional regulation, and confidence in interpreting bodily signals [10,11].

Inventory of Suicide Orientation (ISO-30): The ISO-30 is a questionnaire comprising 30 questions designed to detect the possible presence of suicidal orientation. The questions are formulated as positive and negative, with responses given on a four-point Likert scale (0 = disagree, 1 = partially disagree, 2 = partially agree, and 3 = strongly agree). The ISO-30 assesses the presence and intensity of suicidal orientation over a 30-day period. It has been found to have good reliability, with a Cronbach's alpha of 0.899 in a population of Colombian university students. This questionnaire provides relevant information for the early identification of individuals at risk of suicidal behaviors and for appropriate intervention and treatment [12].

2.4. Statistical Analysis

Statistical analysis of interoceptive body awareness and suicidal orientations in university students was conducted using JASP software 0.13.1. This included the following:

- MAIA scoring: Based on a median of 2.9, where higher scores indicate better interoceptive awareness, and lower scores indicate poorer awareness. The samples were divided into quartiles of 25, 50, and 75%.
- ISO-30 scoring: Based on a median score of 34, where scores equal to or above this indicate higher suicidal intent and scores below indicate lower intent. The sample was similarly divided into quartiles of 25%, 50%, and 75%.
- Comparison of MAIA and ISO-30 variable frequencies between males and females: This helped to examine potential gender differences in body awareness and suicidal intent.
- Chi-squared test: This was used to examine differences in variable frequencies between males and females, providing additional information on how these gender differences may affect the relationship between body awareness and suicidal orientation.
- Binary logistic regression: This study assessed the association between MAIA and ISO-30 scores, allowing determination of whether a significant relationship exists between body awareness and suicidal intent after controlling for other relevant factors.
- Evaluation of area under the curve, sensitivity, and specificity: Information on the accuracy of the statistical models used and their ability to predict suicidal intent based on body awareness.
- Linear regression: To investigate whether the total MAIA score explains the variation in the total ISO-30 score, aiding a better understanding of the relationship between body awareness and suicidal intent in quantitative terms.

3. Results

Based on the division of the sample according to the median cut-off points for the MAIA and ISO-30, it was observed that a higher percentage (51.8%) of students fell below the median in the MAIA percentile, indicating lower interoceptive awareness in this group. This categorization approach enabled the identification of individuals with lower interoceptive body awareness. Additionally, those who scored above the median on the ISO-30 were categorized as having higher interoceptive awareness. These findings align with the data presented in Table 1.

Table 1. Descriptive statistics.

Gender					
	MAIA Percentile		**ISO-30 Percentile**		
	Female	**Male**	**Female**	**Male**	
Valid	135	34	135	34	
Missing	0	0	0	0	
Frequencies for MAIA Percentile					
Gender	**MAIA Percentile**	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Female	Below median 2.90	70	51.85	51.85	51.85
	At or above median 2.90	65	48.15	48.15	100.00
	Missing	0	0.00		
	Total	135	100.00		
Male	Below median 2.90	15	44.12	44.12	44.12
	At or above 2.90	19	55.88	55.88	100.00
	Missing	0	0.00		
	Total	34	100.00		

Table 1. *Cont.*

Frequencies for ISSO-30 Percentile					
Gender	**ISSO-30 percentile**	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Female	Below median 34	65	48.15	48.15	48.15
	At or above median 34	70	51.85	51.85	100.00
	Missing	0	0.00		
	Total	135	100.00		
Male	Below median 34	19	55.88	55.88	55.88
	At or above median 34	15	44.12	44.12	100.00
	Missing	0	0.00		
	Total	34	100.00		

The data, as shown in Table 2, illustrate the frequency distribution of participants by gender and their classification into MAIA and ISSO-30 percentiles. However, chi-squared tests and log odds ratio analyses demonstrate no significant association between gender and MAIA and ISSO-30 percentiles. This suggests that gender is not significantly related to interoceptive awareness and suicidal intent in this sample.

Table 2. Contingency tables.

Contingency MAIA				
		Gender		
MAIA Percentile	**Female**	**Male**	**Total**	
Below median 2.90	70	15	85	
At or above median 2.90	65	19	84	
Total	135	34	169	
Chi-Squared Tests				
	Value	**df**	***p***	
X^2	0.65	1	0.42	
X^2 continuity correction	0.38	1	0.54	
N	169			
Log Odds Ratio				
		95% Confidence Intervals		
	Log Odds Ratio	**Lower**	**Upper**	***p***
Odds ratio	0.31	−0.45	1.07	
Fisher's exact test	0.31	−0.51	1.14	0.45
Contingency ISO-30				
		Gender		
ISSO-30 Percentile	**Female**	**Male**	**Total**	
Below median 34	65	19	84	
At or above median 34	70	15	85	
Total	135	34	169	

Table 2. *Cont.*

Chi-Squared Tests				
	Value	**df**	***p***	
X^2	0.65	1	0.42	
X^2 continuity correction	0.38	1	0.54	
N	169			
Log Odds Ratio				
		95% Confidence Intervals		
	Log Odds Ratio	**Lower**	**Upper**	***p***
Odds ratio	−0.31	−1.07	0.45	
Fisher's exact test	−0.31	−1.14	0.51	0.45

The logistic regression model presented in Table 3 indicates that between 16% and 21% of the variance in the ISSO-30 percentile is accounted for by the MAIA percentile (Cox and Snell R^2 = 0.16; Nagelkerke R^2 = 0.21; $p < 0.01$). Age does not exhibit a statistically significant influence in this model (considered as a confounding variable; $p = 0.46$). Furthermore, individuals with a MAIA score of 2.9 or higher demonstrate a significantly reduced likelihood of suicidal ideation, with an odds ratio of 0.17 ($p = 2.41 \times 10^{-7}$), representing a protective factor of 83%.

Table 3. Model summary: ISSO-30 percentile.

Model	**Deviance**	**AIC**	**BIC**	**df**	**X^2**	***p***	**McFadden R^2**	**Nagelkerke R^2**	**Tjur R^2**	**Cox and Snell R^2**
H_0	234.28	236.28	239.41	168						
H_1	204.73	210.73	220.12	166	29.55	3.83×10^{-7}	0.13	0.21	0.17	0.16
Coefficients										
					Wald Test			**95% Confidence Interval (Odds Ratio Scale)**		
	Estimate	**Standard Error**	**Odds Ratio**	**z**	**Wald Statistic**	**df**	***p***	**Lower Bound**	**Upper Bound**	
(Intercept)	1.40	0.77	4.08	1.83	3.36	1	0.07	0.91	18.29	
Age	−0.02	0.03	0.98	−0.73	0.53	1	0.46	0.91	1.04	
MAIA percentile (At or above median 2.90)	−1.75	0.34	0.17	−5.16	26.67	1	2.41×10^{-7}	0.09	0.34	

Note: ISSO-30 percentile level "At or above median 34" coded as class 1.

The performance metrics, as depicted in Table 4, highlight the model's effectiveness in predicting suicidal intent based on the ISO-30 percentile. The AUC (area under the curve) value of 0.69 suggests a moderate discriminative power of the model. Sensitivity, which denotes the proportion of true positives correctly identified, stands at 0.71, indicating that the model accurately identifies suicidal individuals 71% of the time. Specificity, representing the proportion of true negatives correctly identified, is 0.70, indicating a 70% accuracy in identifying non-suicidal individuals. Accuracy, also referred to as positive predictive value, is 0.71, indicating the proportion of true positive predictions out of all positive predictions made by the model. Overall, these metrics suggest moderate performance in predicting suicidal intent.

Table 4. Evaluation of model performance.

Performance Metrics	
	Value
AUC	0.69
Sensitivity	0.71
Specificity	0.70
Precision	0.71

Model Summary—ISO30_total_score				
Model	**R**	**R^2**	**Adjusted R^2**	**RMSE**
H_0	0.00	0.00	0.00	17.00
H_1	0.55	0.31	0.30	14.19

ANOVA						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	***p***
H_1	Regression	14,920.36	1	14920.36	74.06	5.37×10^{-15}
	Residual	33,643.51	167	201.46		
	Total	48,563.87	168			

Note: The intercept model has been omitted, as it does not provide meaningful information.

The data from the Model Summary—ISO30_total_score indicate that the linear regression model applied to the ISO-30 total score yields a coefficient of determination (R^2) of 31% in its fitted form, implying that the model explains approximately 31% of the variability in the ISO-30 total score. This suggests a moderate ability of the model to predict the ISO-30 total score.

These data represent an Analysis of Variance (ANOVA) conducted on the regression model. The table illustrates that the regression is statistically significant, with an F-value of 74.06 and an extremely low *p*-value (5.37×10^{-15}), indicating the significance of the regression model. This suggests that at least one of the independent variables incorporated in the model significantly impacts the dependent variable (ISO30_total_score).

In this analysis (Tables 5–7 and Figure 1), an inverse relationship between the MAIA score and ISO-30 is evident. As the MAIA score increases, the ISO-30 score decreases (B unstandardized = −15.95; $p = 5.37 \times 10^{-15}$ --> $p < 0.000000000000005$). Moreover, it was confirmed that there is no multicollinearity, as the tolerance values exceed 0.25 and the variance inflation factors (VIFs) are less than 4. By replicating the sample 1000 times (169,000 data points), it was observed that this relationship persists (B unstandardized = −16) and the confidence interval remains significant (−19.57, −11.60). This underscores the consistency and robustness of the relationship between the MAIA and ISO-30 scores.

Table 5. Coefficients.

							95% CI		Collinearity Statistics	
Model		**Unstandardized**	**Standard Error**	**Standardized**	**t**	***p***	**Lower**	**Upper**	**Tolerance**	**VIF**
H_0	(Intercept)	35.14	1.31		26.87	1.05×10^{-62}	32.55	37.72		
H_1	(Intercept)	80.47	5.38		14.96	1.21×10^{-32}	69.85	91.09		
	MAIA total score	−15.95	1.85	−0.55	−8.61	5.37×10^{-15}	−19.61	−12.29	1.00	1.00

Table 6. Bootstrap coefficients.

Model		Unstandardized	Bias	Standard Error	95% bca * CI	
					Lower	Upper
H_0	(Intercept)	35.13	−0.05	1.27	32.57	37.61
H_1	(Intercept)	80.40	−0.20	5.89	68.08	91.80
	MAIA total score	−16.00	0.07	2.00	−19.57	−11.60

* Bias-corrected and accelerated. Note: Bootstrapping based on 1000 replicates. Note: Coefficient estimate is based on the median of the bootstrap distribution.

Table 7. Collinearity diagnostics.

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Intercept)	MAIA Total Score
H_1	1	1.98	1.00	0.01	0.01
	2	0.02	9.75	0.99	0.99

Note: The intercept model is omitted, as no meaningful information can be shown.

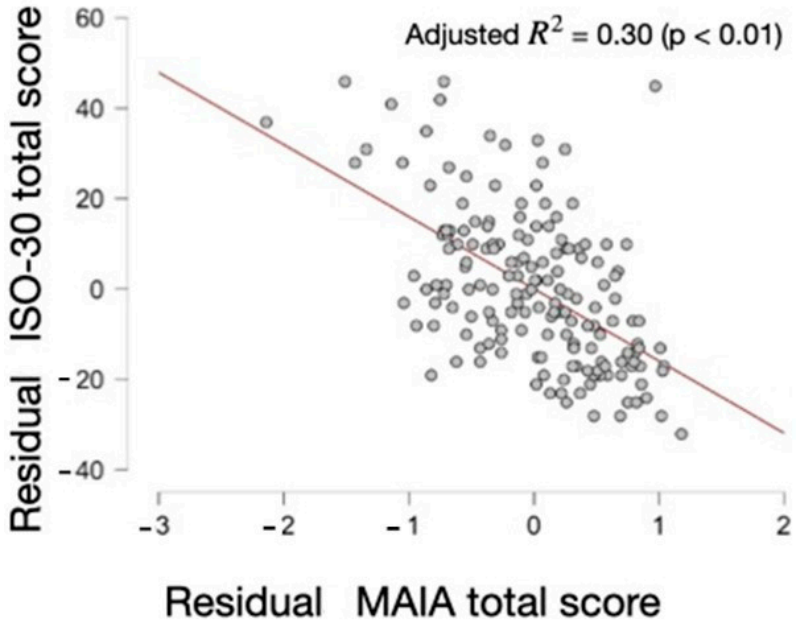

Figure 1. ISO-30 total score vs. MAIA total score.

The data presented illustrate the coefficients and collinearity diagnostics for the H_1 model. According to the coefficients, there exists a significant negative relationship between the MAIA total score and ISO-30 total score (B = −16.00, $p < 0.000000000000005$), indicating that as interoceptive awareness increases, suicidality decreases. Furthermore, collinearity diagnostics reveal no significant collinearity issues between the variables in the model, enhancing the reliability of the obtained results.

4. Discussion

In our study, logistic regression modeling revealed that 16–21% of the variability in the ISO-30 percentile could be accounted for by the MAIA percentile, suggesting a potential role of interoceptive awareness in predicting suicidal orientations. This finding was further supported by the model performance analysis, demonstrating a moderate ability to predict suicidal tendencies based on the ISO-30 percentile. Additionally, linear regression analysis indicated a significant negative association between the MAIA and ISO-30 scores, implying that higher interoceptive awareness is linked to lower levels of suicidal ideation. This relationship remains consistent across multiple samples, indicating reliability.

Similar studies underscored the importance of addressing interoceptive body awareness. For instance, a study involving 319 adults undergoing specialized treatment for eating disorders found that low body confidence was associated with increased severity of suicidal ideation [13]. Research on non-suicidal self-injury (NSSI) has explored how difficulties in body perception could relate to this behavior, suggesting potential areas for clinical intervention [14–16]. Furthermore, investigations into the relationship between interoceptive dysfunction and suicidal behavior in participants with a history of suicide at-tempts have emphasized the importance of further exploring the association between in-ternal body perception and mental health [17,18].

Additionally, a study assessed the impact of a Biological Movement (BM) program, based on mindful movement, on the psychological well-being and interoceptive awareness of participants. The study implemented an 8-week training program for kinesiology students at the University of Perugia, Italy. The results indicated significant improvements in interoceptive awareness and positive mental health among the participants. The BM program enhanced participants' psychological well-being and fostered a stronger connection between physical and emotional sensations [19].

Our study supports previous research highlighting the importance of body aware-ness in mental health and emotional well-being, suggesting that a greater ability to perceive and understand internal bodily sensations may offer protection against suicidal orientation. Interoception concepts, including interoceptive accuracy and sensitivity, can help us understand how we experience and relate to our internal bodily sensations.

Interoception, the awareness of internal bodily sensations, could benefit from techniques such as mindfulness and meditation, thereby strengthening the mind–body connection. These practices help individuals be more present in their bodies, recognize and regulate their physiological responses, and better understand their emotional states. Mindfulness enhances internal awareness, which can reduce suicide risk by promoting greater acceptance of internal experiences and improving emotional regulation. In summary, mindfulness strengthens interoception and reduces suicide risk by enhancing emotional awareness and managing distress [8,20].

One study examined suicide risk among college students and how alexithymia, or difficulty verbally identifying and expressing emotions, mediates the relationship between mindfulness and suicide risk. Approximately 13.5% of participants were found to be at risk for nonclinical suicide, a lower rate than that in previous studies, possibly due to the low level of stress among first-year students. Females showed a higher likelihood of suicide risk, possibly due to higher psychological stress and difficulty in identifying feelings. The results indicated that mindfulness was negatively related to alexithymia and suicide risk and that alexithymia mediated the relationship between mindfulness and suicide risk, especially in females. This suggests that mindfulness may promote greater emotional awareness and reduce suicide risk by improving emotion regulation. In addition, increases in mindfulness were associated with decreases in difficulty identifying emotions, which may be related to changes in insular function and structure. This study has some limitations, such as the lack of generalizability to other populations and the inability to establish causal relationships due to its cross-sectional design [21].

A cross-sectional observational study recruited 537 individuals via Amazon's Mechanical Turk (MTurk), aged between 18 and 71 years. The Multidimensional Assessment of Interoceptive Awareness and a series of questions regarding the presence of lifetime suicidal ideation, plans, and attempts were used. The results indicate that interoception deficits could play a significant role in predicting and treating suicidality. Those with a history of suicidal thoughts exhibited greater concern or emotional distress towards negative bodily sensations associated with difficulties in emotional regulation and anxiety. Conversely, individuals who have attempted suicide tend to ignore or distract themselves from uncomfortable bodily sensations, possibly engaging in activities that increase their capability to commit suicide. Lack of self-regulation through attention to bodily sensations may be linked to overwhelming levels of arousal and distress, contributing to suicide

attempts as a means of alleviating negative emotions. Finally, those with a history of suicidality have less trust in their bodily sensations, which may facilitate self-destructive behavior [22].

Our study supports the use of strategies that promote interoceptive body awareness as a complement to other interventions in primary healthcare, as demonstrated by a single-group clinical trial involving 43 adolescents with depression in primary care, predominantly of Hispanic/Latino origin and female sex. Self-report measures were assessed using the Childhood Depression Inventory-2, the Suicidal Ideation Questionnaire, the Mindfulness Scale, Self-Efficacy for Depressed Adolescents, the rumination subscale of the Children's Response Styles Questionnaire, and an acceptability questionnaire. A 10-week Mind–Body Skills Group program was conducted in primary care. The participants completed assessments at three time points: at baseline, post-intervention, and at the 3-month follow-up. We observed a significant improvement in total depression scores post-intervention, as well as improvements in mindfulness, self-efficacy, rumination, and suicidal ideation [23].

Assessing interoceptive body awareness can support primary care strategies. Regarding interoception, the ability to sense internal bodily sensations is compromised in individuals with suicidal tendencies. Two studies compared interoception among individuals with varying degrees of suicidal tendencies and found that those with suicidal tendencies had poorer interoception than the controls. In addition, those who had a recent suicide attempt had greater interoceptive deficits than those who had not. These findings suggest that impaired interoception may be significant for engaging in serious self-harm and that improving the connection with the body could help prevent suicidal behavior [24].

Primary healthcare can assist in detecting early warning signs of mental disorders and in timely referral to specialized mental health services when necessary. Interdisciplinary collaboration between primary healthcare personnel and mental health professionals can significantly enhance the quality and effectiveness of mental health services in university settings. Furthermore, to strengthen interoceptive body awareness in the context of university primary healthcare, it is essential to implement specific strategies aimed at enhancing students' mind–body connections. These strategies may include integrating mindfulness and mindful awareness practices, promoting mindful physical activities, educating about the importance of body awareness in mental health, and incorporating relaxation techniques and emotional self-regulation [25–29].

5. Conclusions

Our study revealed a significant association between interoceptive awareness and suicidal orientation in Colombian university students. Through logistic regression analysis, we underscored this correlation, emphasizing the role of interoceptive awareness in predicting suicidal orientation. This was further supported by an inverse correlation between the MAIA and ISO-30 scores, suggesting that higher interoceptive awareness correlates with lower suicidal orientation. These findings are consistent with the existing literature, which highlights the importance of body awareness in mental health and emotional well-being.

It is important to acknowledge that our study focuses on correlational relationships without delving into the underlying causal mechanisms. The cross-sectional nature of the study design prevents us from establishing definitive causal relationships, and the limitation of the sample to Colombian university students may affect the generalizability of the findings.

To address these gaps, future research should focus on exploring the causal mechanisms, employing longitudinal designs, and considering more diverse populations. This would enhance our understanding of the applicability of the results to clinical practice and preventive interventions. Further investigation is necessary to fully understand these relationships.

There is an evident need to conduct longitudinal assessment and intervention studies in this population to deepen our understanding of these phenomena and develop effective prevention and care strategies. Longitudinal studies would allow us to follow students over time, providing information on how the relationship between interoceptive awareness

and suicidal orientation changes. This would help identify potential risk and protective factors as well as allow for better understanding of the underlying mechanisms linking interoceptive awareness to mental health and suicidal behavior.

Longitudinal intervention studies could evaluate the effectiveness of different interventions aimed at improving interoceptive awareness and reducing suicidal orientation in university students. These interventions could include mindfulness programs, cognitive-behavioral therapy, mindful physical activities, and other approaches focused on strengthening the mind–body connection.

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Institutional Review Board Statement: This study was approved by the Bioethics Committee of the Colombian School of Rehabilitation (ECR-CI-INV-121-2021) within the framework of the Mental Health Early Warning Program. Two online questionnaires were used: the Multidimensional Assessment of Interoceptive Awareness (MAIA) to measure body awareness and the Inventory of Suicide Orientation-30 (ISO-30) to assess suicidal orientation. Informed consent was obtained from participants before they completed the questionnaires.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available on request from the first author.

Conflicts of Interest: The authors declare no conflicts of interest.

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