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A Comparative Study of Health, School Performance and Well-being in Perúvian School Children and Adolescents Who Meditate

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Abstract: Our prior research with Indigenous school children and adolescents in Perú, often in remote high-altitude Andean locations, mostly centers on an exploration of health and school performance and their relation to the practice of Transcendental Meditation, a natural and easy-to-learn technique for mental and physiological rest and stress reduction. We have established that higher levels of health and school performance are associated with regularity of meditation practice. However, most attempts to identify a causal link between the two have been deferred until more reliable data become available. The present cross-sectional study seeks to build on these earlier findings in three ways: first, we have expanded the variable range from health and school performance to include personal well-being as a measure of holistic student development; second, we compare educational outcomes at three new schools in Cusco, Huancayo, and Acomayo (N = 248) with normative data (N = 610) from five other schools in Perú and with sample international educational settings; and third, using multiple linear regression, we endeavor to establish preliminary evidence of a possible causal link between the regularity with which students practice Transcendental Meditation (y) and physical health, cognitive health, emotional health, school performance, and personal well-being (x). The preliminary results mainly support, and in some cases strengthen, our earlier findings about the relationship of Transcendental Meditation to health and school performance, and now include results for personal well-being. We conclude that controlled, longitudinal research on meditation, health, and well-being may be warranted in primary and secondary school settings in Perú.

Keywords: *Health, school performance, well-being, Perú, school children and adolescents, Transcendental Meditation*

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This exploratory study is part of a broader research program in Perú that spans the pre-, peri-, and post-pandemic periods, focusing on the health and well-being of students, teachers, parents, orphans, and caregivers who practice the Transcendental Meditation technique for personal and social development (e.g., Fergusson et al., 2020; 2021a; 2023a; 2023b). Rather than seeking probative value, this line of research emphasizes confirmatory and predictive insights.

Our continuing examination of these topics now seeks to analyze data from 248 primary and secondary school children and adolescents at three new Perú schools to compare results to previous findings from five other schools ($N = 610$) and several diverse international educational settings. The purpose of the study is to determine whether these new data provide enough reliable evidence to undertake further longitudinal research related to meditation, education and well-being, particularly with Indigenous Aymara and Quechua populations who make up 27% of the country's population (Bullock et al., 2021).

This study builds on a growing body of evidence about the potential value to students practicing meditation as part of their school curriculum, and is supported by a significant corpus of international empirical research in educational settings beyond the borders of Perú, for example, in the work of Conti et al. (2022), Nidich et al. (2011), and Travis et al. (2009). While an exhaustive critical analysis of this evidence is unnecessary here, a brief summary of it will contextualize our present endeavor.

Literature Review

Wellness and Stress-Reduction Programs in Schools

The integration into school curricula of various wellness techniques for coping with stress, and for mental, physical, and social improvement, is not new (e.g., Shapiro et al., 2016). Over the last five decades, research suggests that at least some of these initiatives may benefit some students in reducing stress and anxiety, developing cognitive function, enhancing inter-student relations, and boosting academic performance. Although the most dominant approach to stress management in education is cognitive behavioral therapy (CBT), such as Anti-Stress Training (AST) and cognitive restructuring (Shapiro et al., 2016), school-based mindfulness training (SBMT) and mindfulness-based stress reduction (MBSR) programs have become increasingly popular in school mental health initiatives because they have shown to reduce stress and promote well-being (Marshall et al., 2024; Vuijk et al., 2024), addressing more than the cognitive challenges associated with adolescence.

Yet, the evidence base remains mixed. In a study involving 3,678 students in the U.K., Kuyken et al. (2022) found that SBMT was no more effective than teaching-as-usual in

managing students' mental health. A larger follow-up study with 8,376 students revealed that SBMT produced slightly worse outcomes in terms of depression and well-being, although the differences were "small and not clinically relevant" (Montero-Marin et al., 2022, p. 171). The authors further noted that SBMT might be contraindicated for students with existing or emerging mental health concerns, and that increased exposure did not necessarily yield better outcomes. Other meditation-like initiatives have been evaluated as well. For example, StressOFF Strategies combines cognitive behavioral techniques (e.g., cognitive restructuring, progressive muscle relaxation) with mindfulness practices (e.g., present-moment awareness and acceptance) to improve students' willingness to engage in stress-reduction activities. Research showed that this approach increased students' willingness to participate in stress reduction (Shapiro et al., 2016). Similarly, research on the Healthy High School (HHS), implemented with over 2,000 students, found that stress prevention was more appreciated by students with lower stress levels, raising questions about how to best engage those who may benefit the most (Bonnesen et al., 2020).

Transcendental Meditation and Contemplative Education

Among the first and most publicized examples of *contemplative education* (Waters et al., 2015) was the introduction of the Transcendental Meditation technique to U.S. secondary schools in the early 1970s and its subsequent implementation in schools around the world through the David Lynch Foundation (Conti et al., 2022). The technique is taught in four, one-hour group sessions and involves the easy and unforced use of a specific sound called a 'mantra.' It has been described as a simple and effortless mental procedure that allows the conscious mind to relax and experience a state of deep silence along with a corresponding level of deep physiological rest (Schneider et al., 2024). The technique requires no changes in lifestyle or beliefs, with students practicing it for 10–15 minutes in their classroom at the beginning and end of the school day. As noted by Vela Valenzuela et al. (2022), this experience is associated with "a unique state of restful alertness and increased brain wave coherence" as well as "improved efficiency and coherence of brain functioning during cognitive tasks outside the practice" (p. 102). This observed state of inner peacefulness arsing from Transcendental Meditation is said to serve as preparation for more dynamic and successful action in daily life (Schneider et al., 2024). Waters et al. (2015) reviewed a number of school meditation programs with respect to well-being, social competence, and academic achievement, and concluded "Transcendental Meditation programs had a higher percentage of significant effects than mindfulness-based and other types of meditation programs" (p. 103).

Empirical research on the effectiveness of Transcendental Meditation is significant, with more than 650 published studies in peer-reviewed journals over the past five decades (Dillbeck, 2020), many in top international scientific journals. Of the many findings associated with Transcendental Meditation, we highlight the ones that are most relevant to this study. First, research has documented reductions in stress and anxiety and increased well-being, with the practice apparently impacting biological stress system functioning (Avvenuti et al., 2020; Klimes-Dougan et al., 2020). Second, the approach also has led to reduced depression, anxiety, stress, and sleep disturbance (Azizoddin et al., 2021). Third, high school students in Mexico, for example, benefited from increased intellectual ability, personal well-being, and academic performance (Vela Valenzuela et al., 2022). Lastly, research found improvements in mental health and well-being (Nestor et al., 2023).

The Latin American Context and the Perúvian Case

Despite this robust international literature, the practice of Transcendental Meditation in schools has yet to be thoroughly investigated in Latin America generally, and in Perú specifically, hence the need for extending our current research program to measure new variables in other schools with different cohorts of students to aid in its evaluation by educators and school administrators. As Waters et al. (2015) argued, "schools need reliable evidence about the outcomes of meditation programs before they consider if and how such programmes can influence learning agendas, curriculum and timetables" (p. 103).

Through this study, we aim to extend our longitudinal research program and contribute to a growing international interest in context-sensitive, non-pharmacological strategies for enhancing student well-being. Our work is guided by the following four research questions:

RQ1: How do self-reported scores of physical health, cognitive health, emotional health, school performance, and personal well-being in Perúvian school children and adolescents who practice Transcendental Meditation compare with normative data from a larger sample of Perúvian students who meditate and others who do not?

RQ2: Are physical health, cognitive health, emotional health, school performance, and personal well-being related to each other in Perúvian school children and adolescents who meditate?

RQ3: Is there any evidence to indicate that the regularity with which school children and adolescents meditate is related to physical health, cognitive health, emotional health, school performance, and personal well-being? and

RQ4: Do these data suggest controlled, longitudinal research of meditation, health, and personal well-being may be warranted in Perú?

Method

Participating Schools and Students

A total of 248 students participated in this study. Students were convenience sampled primary (n = 143) and secondary (n = 105) school children and adolescents who practice Transcendental Meditation (M_{age} = 11.1 years; SD_{age} = 1.28 years) in three Perúvian schools: Institución Educativa Sol Radiante; Gotitas de Rocío; and Institución Educativa La Merced. Across the three schools, students received Transcendental Meditation instruction in small groups (i.e., 30 students per group at the first two schools and 25 at the third school). At both I.E. Sol Radiante and Gotitas de Rocío, 150 students participated out of approximately 350 enrolled. At I.E. La Merced, 150 students participated out of an estimated 200. Table 1 provides descriptive data on these students and schools.

School No. 1: Institución Educativa Sol Radiante

From I.E. Sol Radiante, 82 primary school students participated (M_{age} = 11.1 years; SD_{age} = 0.70 years). Located in the municipality of Santiago, a province of Cusco, Sol Radiante is a government-run, co-educational primary school (grades 1–6) located at an altitude of approximately 3,400m. The school seeks to be a leader in education by providing comprehensive high-level academic training to the students of Santiago and seeks to use creative and innovative teaching to promote thinking which ensures students will have a range of professional options in

the future as well as cultivate virtues in them that contribute to the development of the Cusco region.

School No. 2: Gotitas de Rocío

From Gotitas de Rocío, 105 primary and secondary students participated (M_{age} = 11.5 years; SD_{age} = 1.65 years). A private primary (grades 1–6) and secondary school (grades 1–3) in San Carlos, Huancayo, Gotitas de Rocío is located at an altitude of 3,250m in the central highlands of Perú in a fertile basin drained by the Mantaro River. Huancayo is the capital city of Junín region, in central Perú, and is linked to the capital Lima via the trans-Andean Ferrocarril Central Andino, one of the world's highest train routes. San Carlos' Parque de la Identidad Huanca pays homage to the region's pre-Incan culture, and its neoclassical Catedral de Huancayo overlooks the central Plaza de la Constitución.

School No. 3: Institución Educativa La Merced

From I.E. La Merced, 61 primary school students participated (M_{age} = 10.9 years; SD_{age} = 1.07 years). La Merced is a primary school (grades 1–6), located in Acomayo in the Cusco region at an altitude of 3,220 m three hours from Cusco, the capital city. Acomayo is the capital of Acomayo province with a population of about 5,000 people.

The normative data of school children and adolescents presented in Tables 2, 4 and 5 are the average results from students who meditate at five schools in Perú: 1) Emblematica Cesar Vallejo in Lima (n = 280); 2) I.E. Privada Prescott in Puno (in two cohorts: n = 53 and n = 54); 3) I.E. Colegio Santa María Reyna in Callao (n = 70); 4) Colegio Tomasa Ttito Condemayta in Acamayo (n = 117); and 5) Hogar de Niñas Virgen de Fatima de Chejoña in Puno (n = 36), for a total of N = 610 children and adolescents (Fergusson et al., 2022a, 2022b, 2023c). The published sources of other international normative data have been cited in Table 6.

Table 1

Descriptive Statistics by School, Gender, Age, and Grade Level

School	Total	Girls	Boys	4th Grade (Prim)	5th Grade (Prim)	6th Grade (Prim)	1st Grade (Sec)	2nd Grade (Sec)	3rd Grade (Sec)
I.E. Sol	n = 82	41	41	—	39	43	—	—	—
Radiante	33%	50%	50%	—	48%	52%	—	—	—
	M_{age} = 11.1	11.1	11.1	—	10.6	11.6	—	—	—
	SD_{age} = 0.70	0.70	0.70	—	0.48	0.54	—	—	—
Gotitas	n = 105	52	53	44	27	14	8	4	8
de Rocío	42%	50%	50%	42%	25%	13%	8%	4%	8%
	M_{age} = 11.5	10.8	12.2	9.7	10.9	11.7	12.9	14.2	15.0
	SD_{age} = 1.65	1.46	1.84	0.46	0.32	0.47	0.35	0.50	0.53
I.E. La	n = 61	27	34	16	17	28	—	—	—
Merced	25%	44%	56%	26%	28%	46%	—	—	—
	M_{age} = 10.9	10.7	11.0	9.6	10.7	11.8	—	—	—
	SD_{age} = 1.07	1.03	1.09	0.50	0.70	0.59	—	—	—

Total	$N = 248$	120	128	60	83	85	8	4	8
	100%	48%	52%	24%	34%	34%	3%	2%	3%
	$M_{age} = 11.2$	10.9	11.4	9.65	10.7	11.7	12.9	14.2	15.0
	$SD_{age} = 1.13$	1.06	1.21	0.48	0.50	0.53	0.35	0.50	0.53

Research Design

This study used a cross-sectional, post-Transcendental Meditation research design, meaning all measures were completed after students had learned and practiced meditation for approximately six months. Participants learned Transcendental Meditation in June 2023 and practiced it together thereafter in their classrooms at the beginning of each school day. Then, they completed two test instruments under conditions of information privacy in single classroom sittings in November and December 2023.

Research Instruments

Two test instruments were used in this study. First, the *Test de Autoevaluación de Meditación Transcendental* (i.e., Self-Assessment Test of Transcendental Meditation) was developed in Perú by Instituto Maharishi de Ciencia y Tecnologia del Perú to measure self-reported levels of physical health, cognitive health, emotional health, and school performance as a result of practicing Transcendental Meditation, as well as the regularity of meditation practice. The design and implementation procedures of this paper-and-pencil test have been thoroughly documented in Fergusson et al. (2021b; 2022a).

For the purposes of this study, we defined and measured the following domains: *physical health* as a student's level of tiredness, energy, sickness, quality of sleep, and athletic ability; *cognitive health* as a student's capacity for memory, comprehension, and problem-solving ability; *emotional health* as a a student's level of aggression, affective relations, friendliness, and happiness at school; and *school performance* as a student's satisfaction with their school and schooling, getting along with classmates, academic achievement, and truancy.

This Spanish-language questionnaire consisted of 47 statements, requiring a self-reported rating on a 1–10 Likert-type scale, with 1–3 (*Definitely disagree*), 4–5 *Disagree*), 6–7 (*Agree*), and 8–10 (*Definitely agree*). Scores of < 5.50 meant that a student definitely disagrees or disagrees with the statement that Transcendental Meditation salutarily affected their health or school performance, while scores of ≥ 5.50 indicated a student agrees or definitely agrees with the statement. Physical health was measured by 13 items (score range: 13–130); cognitive health by 10 items (10–100); emotional health by 12 items (12–120); and school performance by 12 items (12–120). Average scores for each of the four health categories were normalized by scale maximization to 10 (i.e., total score for each category/number of items).

Participants were also asked to rank the regularity with which they practice Transcendental Meditation, using a five-point scale: 5 (The recommended routine of twice a day), 4 (Once a day), 3 (From time-to-time), 2 (When required), and 1 (Never). A recent psychometric study has revalidated the instrument, revising the original 47 items into 43, which were grouped into five newly identified latent factors, and are available in Spanish, Thai, Portuguese, Italian, Nepali, and English versions (Fergusson et al., 2024).

Second, the *Personal Wellbeing Index* (PWI) was used to measure subjective or personal well-being, following guidelines outlined by the instrument's developer for administration to

children and adolescents (Cummins, 2005). Although well-being has been conceptualized in many ways—with Tomyn and Cummins (2011) identifying over 1,000 instruments designed to measure it—this study adopted a definition of personal well-being as an individual's perceived level of life satisfaction across key domains: standard of living, health, achievement, personal relations, safety, sense of community, religion or spirituality, and the future.

Five variations of the PWI have been documented in the literature. The most common version includes seven questions (Q2–Q8 below), as used in studies by Alfaro et al. (2016), Casas, Sarriera et al. (2012), Lau et al. (2005), and Schutz et al. (2022). An extended version includes these seven questions plus two hybrid questions on satisfaction with school and management of time (Casas, Bello et al., 2012). In another version, the two additional hybrid questions focus on satisfaction with self and time management (Casas, Sarriera et al., 2012). An eight-item version (Q1–Q8 below) appears in the work of Pérez-Belmonte et al. (2021) and Casas et al. (2007). Finally, versions designed specifically for children include seven or eight questions, as noted by Anand and Sharma (2011) and Tomyn and Cummins (2011).

Both the children and adult versions of the PWI have been psychometrically validated (Tomyn et al., 2013). Across the literature, these versions have been inconsistently labeled, including designations such as PWI, PWI-A, PWI-7, PWI-9, PWIadp, PWI8adp, PWI-SC, and PWI-SCb. Most use an 11-point Likert-type scale (0–10), with total score ranges varying from 0–70, 0–80, or 0–90, depending on the number of questions included. The Spanish-language version used in this study closely aligns with the eight-question version (excluding Q1) reported by Bullock et al. (2021), and includes the following nine questions, each rated on an 11-point Likert-type scale:

Q1. Thinking about your own life and personal circumstances, how satisfied are you with your life as a whole?
(Pensando en tu propia vida y circunstancias personales, ¿qué tan satisfecho estás con tu vida como entero?)

Q2. How satisfied are you with your standard of living?
(¿Cuán satisfecha/satisfecho estás con tu nivel de vida?)

Q3. How satisfied are you with your health?
(¿Cuán satisfecha/satisfecho estás con tu salud?)

Q4. How satisfied are you with what you have achieved in your life?
(¿Cuán satisfecha/satisfecho estás con lo que has conseguido en tu vida?)

Q5. How satisfied are you with your personal relationships?
(¿Cuán satisfecha/satisfecho estás con tu relaciones personales?)

Q6. How satisfied are you with how safe you feel?
(¿Cuán satisfecha/satisfecho estás con tu seguridad?)

Q7. How satisfied are you with feeling part of your community?
(¿Cuán satisfecha/satisfecho estás con tu sentimiento de formar parte de una comunidad?)

Q8. How satisfied are you with your future security?
(¿Cuán satisfecha/satisfecho estás con tu seguradid futura?)

Q9. How satisfied are you with your spirituality or religion?
(¿Cuán satisfecha/satisfecho estás con tu espiritualidad o religión?)

We specifically used the nine-question, rather than the seven-question, version designed for children (i.e., PWI-SC) for the following reasons. First, a variation of it (Q2–Q9) was recently

used successfully by Bullock et al. (2021) in Perú with Indigenous school children as young as 11 years. Second, Sarriera et al. (2014) suggested the addition of Q9 and Lai et al. (2018) psychometrically determined the value of including it with the original (Q2–Q8) seven questions. Lastly, Alfaro et al. (2016) found only weak correlations between questions on the children's (PWI-SC) version. Finding that Q1 correlated to the total PWI scale at $r = .58$, $p < 0.01$, Casas, Sarriera et al. (2012) added it to the original PWI to account for holistic personal well-being or what they called 'overall life satisfaction', and thus, along with the addition of Q9 by Sarriera et al. (2014), the nine-question version used in the present study was created.

Data Analysis

For purposes of clarity, participating students ($N = 248$) were collectively referred to in this study as belonging to the three Perúvian schools and comparison data ($N = 610$) belonging to the normative Perúvian schools. In addition to standard descriptive measures, including tests of normality (i.e., skewness and kurtosis) and reliability (i.e., Cronbach's alpha and split-halves), multivariate analysis of variance (MANOVA) was conducted to compare data from the three Perúvian schools with that of the normative Perúvian schools to answer RQ1. Where necessary for comparative purposes, scale maximisation conversion ($\%_{SM}$) was performed to account for scores on different versions of the PWI, and Tukey's *post hoc* Honestly Significant Differences (HSD) were calculated to determine inter-school characteristics.

To answer RQ2 and RQ3, Pearson product moment correlation coefficients were calculated. To answer RQ4, multiple linear regression analysis was used to determine the predictive power of regularity of meditation to health and well-being outcomes and to determine whether longitudinal research may be warranted. All measures were tested at the two-tailed, 99.9% ($p < 0.001$) confidence level. We applied this more stringent confidence level because of arguments about Type I errors and replicability advanced by Benjamin et al. (2018).

Ethics

This research was approved in May 2023 by the Research Ethics Approval Committee of Maharishi Vedic Research Institute (MVRI) in Australia, in accordance with both MVRI's *Code of Research Practice and Procedure* and the *Australian Code for the Responsible Conduct of Research* and was conducted under approval number MVRI-2023-31. The project was countenanced in advance by the administrators of I.E. Sol Radiante, Gotitas de Rocío, and I.E. La Merced (Instituto Maharishi de Ciencia y Tecnología del Perú, 2022). School administrators provided written informed consent on behalf of parents and student participants under the terms of their teaching and research agreements with Instituto Maharishi de Ciencia y Tecnología del Perú.

Results

Descriptive Statistics

Skewness and Kurtosis

Variable items ranged from *Skew*[–0.07 to –1.07] (average *Skew*[–0.39]) for physical health; *Skew*[–0.77 to –1.16] (average *Skew*[–0.84]) for cognitive health; *Skew*[–0.55 to –1.16]

(average *Skew*[–0.62]) for emotional health; *Skew*[0.04 to –1.28] (average *Skew*[–0.47]) for school performance; and *Skew*[–0.79 to –1.69] (average *Skew*[1.00]) for personal well-being. Kurtosis of variable items ranged from *Kurt*[–0.36 to 2.49 (average *Kurt*[–0.49]) for physical health; *Kurt*[–0.19 to –2.49] (average *Kurt*[0.80]) for cognitive health; *Kurt*[–0.07 to –1.58] (average *Kurt*[0.08]) for emotional health; *Kurt*[0.12 to 11.40] (average *Kurt*[0.30]) for school performance; and *Kurt*[–0.15 to 3.65] (average *Kurt*[1.45]) for personal well-being.

In the results reported by Casas, Sarriera et al. (2012) from Brazil, Chile and Spain, the skewness of PWI scores ranged from –1.02 to –1.88 and kurtosis from 0.98 to 4.11, which are comparable to our findings. While Casas, Sarriera et al. pointed out that skewness and kurtosis values are considered acceptable for statistical analysis within the range of −7.0 to 7.0, following Cohen and Cohen (1983) and West et al. (1995), more recent guidance has recommended narrower thresholds. Hair et al. (2022) suggested values between −2.0 and 2.0 are deemed acceptable, and values between −1.0 and 1.0 are considered excellent and, therefore, preferable. In this study, seven of the 57 total items exceeded the acceptable range for kurtosis—specifically, one item measuring physical health, three measuring school performance, and three PWI items. However, the average skewness and kurtosis values for the remaining 50 variables fell within either the acceptable or excellent range.

Cronbach's Alpha

For this cohort of three Perúvian schools, Cronbach's alpha coefficients indicated internal consistencies of $C\alpha = 0.85$ for physical health, $C\alpha = 0.84$ for cognitive health, $C\alpha = 0.87$ for emotional health, $C\alpha = 0.85$ for school performance, and $C\alpha = 0.78$ for personal well-being. In all cases, Cronbach's alpha were in the 'good' internal consistency range (Kennedy, 2022). The average reliability score for physical health, cognitive health, emotional health, and school performance ($C\alpha = 0.85$) was somewhat lower than that observed in normative data of 550 meditating students in Perú, as reported earlier (Fergusson et al., 2022a). However, personal well-being results demonstrated comparable scale reliability to normative data presented by Lau et al. (2005) for adults in Hong Kong ($C\alpha = 0.80$) and Australia ($C\alpha = 0.73$), but are slightly lower than data presented by Casas, Sarriera et al. (2012) for children and adolescents in Spain ($C\alpha = 0.84$), Chile ($C\alpha = 0.83$), and Brazil ($C\alpha = 0.81$).

Split-half Reliability

Reliability coefficients were all significant at $p < 0.001$: $r = 0.73$ for physical health; 0.67 for cognitive health; 0.74 for emotional health; 0.70 for school performance; and 0.65 for personal well-being. These values represented 'good' internal reliability (Setyaedhi, 2024).

Table 2 presents the means and standard deviations by school and by normative Perúvian schools' data for physical health, cognitive health, emotional health, school performance, and personal well-being to help answer RQ1.

There was a noticeable difference between the average of the three Perúvian schools and the normative Perúvian schools on some measures, but standard deviations were mostly consistent across the data set. Some variation in means between Gotitas de Rocío and the other two schools was observed for physical health, cognitive health, emotional health and school performance. However, Gotitas de Rocío showed consistency with the normative Perúvian schools' data. In contrast, there was general consistency in personal well-being scores among students across all three Perúvian schools.

At the time of this study, no normative data were available on the personal well-being of other Perúvian school students who practice meditation and, therefore, no comparison is presented in Table 2. As shown in Table 3, a MANOVA confirmed a significant difference between the three Perúvian schools and the normative Perúvian schools' data across all variables. But age and gender did not contribute to this difference. For example, when included as a covariate in the analysis of physical health, age was not a significant factor ($F = 0.32$, $p = 0.57$), and gender was also non-significant ($F = 2.75$, $p = 0.10$).

Table 2

Means and Standard Deviations for Health, School Performance, and Personal Well-being at Three Perúvian Schools and Normative Perúvian Schools

Measure	I.E. Sol Radiante	Gotitas de Rocío	I.E. La Merced	Three Perúvian Schools	Normative Perúvian Schools
Physical Health	*M* = 7.46	*M* = 6.52	*M* = 7.91	*M* = 7.29	*M* = 5.98
	SD = 1.5	*SD* = 1.6	*SD* = 1.4	*SD* = 1.5	*SD* = 1.2
Cognitive Health	*M* = 7.68	*M* = 6.90	*M* = 8.01	*M* = 7.53	*M* = 6.46
	SD = 1.3	*SD* = 1.7	*SD* = 1.5	*SD* = 1.5	*SD* = 1.6
Emotional Health	*M* = 7.55	*M* = 6.80	*M* = 8.32	*M* = 7.55	*M* = 6.48
	SD = 1.5	*SD* = 1.6	*SD* = 1.4	*SD* = 1.5	*SD* = 1.7
School Performance	*M* = 7.68	*M* = 6.65	*M* = 8.32	*M* = 7.66	*M* = 6.55
	SD = 1.5	*SD* = 1.7	*SD* = 1.4	*SD* = 1.5	*SD* = 1.6
Personal Well-being	*M* = 68.1	*M* = 70.2	*M* = 75.8	*M* = 71.3	—
	SD = 12.2	*SD* = 11.4	*SD* = 13.1	*SD* = 12.2	—

Table 3

Multivariate Analysis of Variance for Health and School Performance at Three Perúvian Schools vs. Normative Perúvian Schools

Measure	SS	*Df*	MS	*F*	*p*
Physical Health	41478	3	13826	29.3	<0.001
Residual	360228	764	472	—	—
Cognitive Health	18830	3	6277	21.3	<0.001
Residual	224866	764	294	—	—
Emotional Health	19104	3	6368	16.5	<0.001
Residual	294744	764	387	—	—
School Performance	19379	3	6460	16.3	<0.001
Residual	303267	764	397	—	—

Table 4

Post Hoc Tests of Difference Results for Health, School Performance, and Personal Well-being at Three Perúvian and Normative Perúvian Schools

Measure and School	Gotitas de Rocío	I.E. La Merced	Normative Peruvian Schools
Physical Health			
I.E. Sol Radiante	$Q = 3.82$*	$Q = 1.63^{\dagger}$	$Q = 6.35$*
Gotitas de Rocío	—	$Q = 5.21$*	$Q = 1.79^{\dagger}$
I.E. La Merced	—	—	$Q = 7.61$*
Cognitive Health			
I.E. Sol Radiante	$Q = 3.07^{\dagger}$	$Q = 1.16^{\dagger}$	$Q = 5.58$*
Gotitas de Rocío	—	$Q = 4.03$*	$Q = 1.96^{\dagger}$
I.E. La Merced	—	—	$Q = 6.34$*
Emotional Health			
I.E. Sol Radiante	$Q = 3.10^{\dagger}$	$Q = 2.76^{\dagger}$	$Q = 3.23$*
Gotitas de Rocío	—	$Q = 5.74$*	$Q = 0.69^{\dagger}$
I.E. La Merced	—	—	$Q = 6.28$*
School Performance			
I.E. Sol Radiante	$Q = 4.19$*	$Q = 2.29^{\dagger}$	$Q = 3.05^{\dagger}$
Gotitas de Rocío	—	$Q = 6.25$*	$Q = 2.39^{\dagger}$
I.E. La Merced	—	—	$Q = 5.54$*
Personal Well-being			
I.E. Sol Radiante	$Q = 1.14^{\dagger}$	$Q = 3.74$*	—
I.E. La Merced	$Q = 2.28^{\dagger}$	—	—

† Not significant; * $p < 0.001$

Post hoc results presented in Table 4 identified where significant differences occurred within the data set. For example, Gotitas de Rocío did not differ from the normative Perúvian schools on any variable, nor from Sol Radiante on cognitive health and emotional health, but it did differ from La Merced on all variables. Gotitas de Rocío did not differ from Sol Radiante or Le Merced on personal well-being. La Merced did not differ from Sol Radiante on any variable except personal well-being. Sol Radiante, in turn, differed from the normative Perúvian schools on physical health and cognitive health, but not on emotional health or school performance.

Across the comparative data sets, nearly half (13 out of 27) showed statistically significant differences between students from the three Perúvian schools and those from the normative Perúvian schools, with students from the former generally scoring higher. There was no evidence that age played a part in these personal well-being results (e.g., 72.8 for 4th grade students vs. 74.3 for 6th grade students, $Q = 1.15$, $p = 0.85$; 61.8 for 1st grade vs. 68.4 for 3rd grade students, $Q = 0.66$, $p = 0.98$), and gender also did not appear to play a role. Another way of comparing these data was to examine the percentage of students who rated their health and school performance either unfavorably (i.e., disagreeing with a statement) or favorably (i.e., agreeing with a statement) as a result of practicing Transcendental Meditation.

Table 5 presents the percentage of students who definitely disagreed/disagreed with health and school performance statements and the percentage who agreed/definitely agreed for both the three Perúvian schools and the normative Perúvian schools.

Table 5

Number and Percentage of Students Reporting Agreement or Disagreement on Health and School Performance Items at Three Perúvian and Normative Perúvian Schools

School	Scale Response	I.E. Sol Radiante	Gotitas de Rocío	I.E. La Merced	Three Peruvian Schools	Normative Peruvian Schools
Physical Health	Definitely Disagree/ Disagree	10/82 12%	26/105 25%	7/61 12%	43/248 17%	36/610 6%
	Agree/ Definitely Agree	72/82 88%	79/105 75%	54/61 88%	205/248 83%	574/610 95%
Cognitive Health	Definitely Disagree/ Disagree	4/82 5%	22/105 21%	2/61 12%	28/248 17%	203/610 33%
	Agree/ Definitely Agree	78/82 95%	83/105 79%	59/61 97%	220/248 89%	407/610 67%
Emotional Health	Definitely Disagree/ Disagree	6/82 7%	26/105 25%	3/61 5%	35/248 14%	162/610 27%
	Agree/ Definitely Agree	76/82 93%	79/105 75%	58/61 95%	213/248 86%	448/610 73%
School Performance	Definitely Disagree/ Disagree	6/82 7%	34/105 32%	5/61 8%	45/248 18%	156/610 26%
	Agree/ Definitely Agree	76/82 93%	71/105 68%	56/61 92%	203/248 82%	454/610 74%

Consistent with the findings presented in Table 2, students in three Perúvian schools were generally more likely to agree that their health and school performance had improved as a result of Transcendental Meditation compared to those in the normative Perúvian schools. However, in all cases, more students in both cohorts agreed than disagreed that the practice had a positive effect. For example, 89% of students in the three Perúvian schools agreed or definitely agreed that their cognitive health had improved as a result of practicing Transcendental Meditation, compared to 67% of students in the normative Perúvian schools. Similarly, 82% in the three Perúvian schools agreed or definitely agreed that their school performance improved, compared to 74% in the normative Perúvian schools.

Table 6 presents comparative personal well-being data from three Perúvian schools and schools in Australia, Brazil, Chile, Perú, and Spain to help answer RQ1. Personal well-being results for students from the three Perúvian schools were equivalent to other Indigenous students

in Perú (Bullock et al., 2021) and comparable to within one-half *SD*-unit for similar aged students in Australia (Tomyn & Cummins, 2011), Brazil (Schutz et al., 2022), and Chile (Alfaro et al., 2016). Personal well-being results were also between one-half and one *SD*-unit for similar students in Brazil, Chile and Spain (Casas, Sarriera et al., 2012) but were dissimilar to other students in Spain (Casas, Bello et al., 2012).

Table 6

Descriptive Statistics for Three Perúvian Schools, Other Schools in Perú, and Normative Data From Other Countries for Personal Well-being

School and Location	Author(s) (Date)	Sample Size (*N*)	Age Range	PWI Raw Score (Years)	*SD*	PWI Scale Maximization ($\%_{SM}$)
Total average of Three Peruvian Schools (Peru)	—	248	9–15	71.3	12.2	79.2
Rural village high school in the Loreto region (Peru)	Bullock, Stumpf, and Chang (2021)	172	11–16	—	13.6	77.7
Schools in various urban and regional centers in Victoria (Australia)	Tomyn & Cummins (2011)	338	12–18	73.8	13.5	82.0
Public and private Primary schools in Rio Grande de Sol (Brazil)	Schutz, Sarriera, & Bedin (2022)	1,787	10–12	58.0	11.4	82.9
Undisclosed (Brazil, Chile, and Spain)	Casas, Sarriera, et al. (2012)	4,853	12–16	80.3	13.1	89.2
Undisclosed (Chile)	Alfaro et al. (2016)	1,096	10–12	59.8	17.7	85.4
Undisclosed (Spain)	Casas, Bello, et al. (2012)	834	11–14	87.8	—	97.5

Table 7 presents the correlation matrix for physical health, cognitive health, emotional health, school performance, and personal well-being, all of which were significantly correlated at greater than 99.9% confidence level, to help answer RQ2. Findings indicate that student scores from three Perúvian schools and normative Perúvian schools for each of the three health variables, school performance, and personal well-being were correlated at $p < 0.05$.

Figure 1 presents a proto-theoretical model of the positive associations between regularity of meditation (to the left), physical health, cognitive health, emotional health, school performance (in the centre), and personal well-being (to the right), all of which were significant at greater than the 99.9% confidence level to help answer RQ3.

Table 7

Correlation Statistics for Three Perúvian Schools and Normative Perúvian Schools Data for Health, School Performance, and Personal Well-being

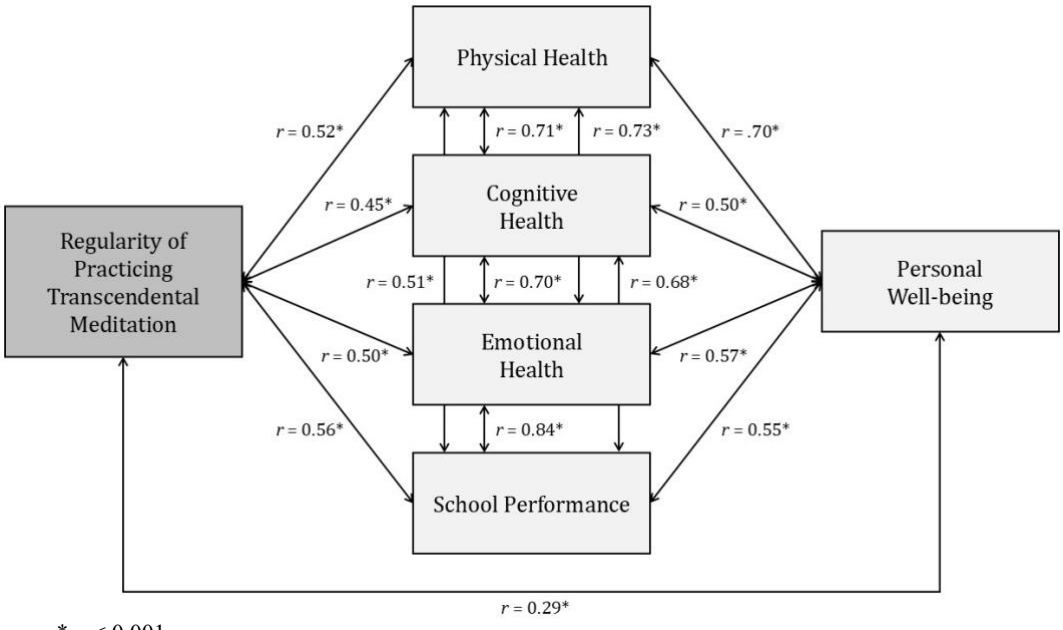
Schools and Measure	Physical Health	Cognitive Health	Emotional Health	School Performance
Three Perúvian Schools				
Cognitive Health	$r = .71$*	—	—	—
Emotional Health	$r = .73$*	$r = .71$*	—	—
School Performance	$r = .51$*	$r = .68$*	$r = .84$*	—
Personal Well-being	$r = .70$*	$r = .50$*	$r = .54$*	$r = .54$*
Normative Perúvian Schools				
Cognitive Health	$r = .74^{\dagger}$	—	—	—
Emotional Health	$r = .72^{\dagger}$	$r = .77^{\dagger}$	—	—
School Performance	$r = .68^{\dagger}$	$r = .77^{\dagger}$	$r = .83^{\dagger}$	—

† $p < 0.01$; * $p < 0.001$

Data in Figure 1 indicate that the regularity with which students practice Transcendental Meditation was positively related to physical health, cognitive health, emotional health, school performance, and personal well-being. The association of regularity of meditation to the first four variables was the subject of earlier research by these authors in Perú (Fergusson et al., 2021b; 2022b). In those studies, regularity of practice was positively, albeit rather weakly, correlated to physical health (average $r = 0.28$; $p < 0.01$), cognitive health (average $r = 0.37$; $p < 0.01$), emotional health (average $r = 0.34$; $p < 0.01$), and school performance (average $r = 0.34$; $p < 0.01$).

Figure 1

Proto-theoretical Model of Correlations for Regularity of Meditation to Health, School Performance, and Personal Well-being at Three Perúvian Schools



* $p < 0.001$

In this present study, these associations were much stronger. But what cannot be determined from these data is whether regularity of practice is a reliable predictor of these outcomes. To help answer RQ4, results presented in Table 8 indicate when regularity of meditation was used as a predictor variable (*y*) in multiple linear regression, whether increases in physical health, cognitive health, emotional health, school performance, and personal well-being outcomes (*x*) were statistically likely. Data in Table 8 indicate they were at a reasonably high level of confidence.

Only the regularity with which students practice Transcendental Meditation predicted higher levels of physical health, cognitive health, emotional health, school performance and personal well-being. School, gender, age, and grade levels did not do so. For example, the school a student attended ($t = 1.39$, $p = 0.21$) and their grade level ($t = –1.78$, $p = 0.11$) did not predict physical health, and neither school ($t = 2.03$, $p = 0.20$) nor grade level ($t = –2.01$, $p = 0.17$) predicted personal well-being, even when weighted for gender.

Table 8

Multiple Linear Regression Results for Regularity of Meditation at Three Perúvian Schools as a Predictor of Health, School Performance, and Personal Well-being

Measure	R^2	Estimate	SE	*t*	*p*
Physical Health					
Intercept	0.27	62.51	3.41	18.32	—
Regularity of Meditation		9.14	0.95	9.57	<0.001
Cognitive Health					
Intercept	0.20	54.0	2.69	20.0	—
Regularity of Meditation		6.02	0.75	7.98	<0.001
Emotional Health					
Intercept	0.25	61.8	3.18	19.4	—
Regularity of Meditation		8.11	0.89	9.11	<0.001
School Performance					
Intercept	0.31	57.6	3.16	18.2	—
Regularity of Meditation		9.28	0.88	10.5	<0.001
Personal Well-being					
Intercept	0.08	60.9	2.24	27.1	—
Regularity of Meditation		2.96	0.67	4.71	<0.001

Discussion

To determine how self-reported scores of physical health, cognitive health, emotional health, school performance, and personal well-being by Perúvian students who practice Transcendental Meditation compare with those of normative students who also meditate and other children who do not, we have presented Table 2. From these data, we conclude there are some differences between the three schools and normative data. For example, student scores of physical health, cognitive health, emotional health, and school performance from two schools—I.E. Sol Radiante and I.E. La Merced—were statistically the same but generally higher than other meditating students for health and school performance when compared to students from Gotitas de Roció and normative schools, but student scores from Gotitas de Roció were essentially the same as students from the other schools. The average scores for these variables of the three Perúvian Schools were generally higher than the normative Perúvian schools.

Nevertheless, students at the three Perúvian Schools personally rated their experiences of practicing Transcendental Meditation as positive: 83% agreed or definitely agreed it improved their physical health, 89% agreed or definitely agreed it improved their cognitive health, 86% agreed or definitely agreed it improved their emotional health, and 82% agreed or definitely agreed it improved their school performance. These outcomes are on average 12% lower than normative Perúvian schools for physical health (83% vs. 95%) but are on average 17% higher than normative Perúvian schools for cognitive health (89% vs. 67%), emotional health (86% vs. 73%), and school performance (82% vs. 74%). Furthermore, these findings are largely consistent with prior international research which suggests practice of Transcendental Meditation has a salutary effect on stress, quality of sleep, anxiety, depression, intellectual ability, and academic performance (e.g., Avvenuti et al., 2020; Azizoddin et al., 2021; Klimes-Dougan et al., 2020; Nestor, Lawson, & Fischer, 2023; Vela Valenzuela et al., 2022), all of which have been directly or indirectly measured by the Test de Autoevaluación de Meditación Transcendental.

The personal well-being comparison of Indigenous students in our study to students in other settings is generally lower by 11% (compared to students in Australia, Brazil, Chile and Spain). Comparison to students in Bullock et al.'s (2021) study, who were sampled from a rural Perúvian village school (reached by boat in the Amazon forest in a remote part of the Loreto region) is perhaps most valid given the similarity of educational setting. In that comparison, both cohorts self-reported essentially the same levels of personal well-being (79.2% in our study vs. 77.7% in the rural village school). From this, we conclude the present study does not provide enough conclusive evidence to support the proposition that children and adolescents who meditate have elevated levels of personal well-being. Scores for personal well-being from the three Perúvian schools were mostly the same as other schools in Perú and somewhat lower than schools elsewhere in the world, thereby answering RQ1.

Being cross-sectional, this finding does not account for pre-Transcendental Meditation scores of physical health, cognitive health, emotional health, school performance, or personal well-being by Perúvian students at I.E. Sol Radiante, I.E. La Merced, and Gotitas de Roció and hence there is no way of knowing if the present levels represent change. Our earlier research with girls of a similar age in Perú (Fergusson et al., 2023c) did indicate that after three months of meditation practice, personal well-being increased from 42.8% to 55.1% ($F = 11.08$, $p = .03$), a statistically significant difference when compared to two similar non-meditating groups.

Prior research by Pérez-Belmonte et al. (2021) with adults found PWI scores correlate positively with compassion and satisfaction ($r = 0.39$; $p < 0.001$) and negatively with burnout ($r = –0.27$; $p < 0.001$). Bullock et al. (2021) also found Perúvian students with higher levels of resilience, for example, higher levels of social engagement ($r = 0.40$; $p < 0.001$) and sense of cultural citizenship ($r = 0.37$; $p < 0.001$), were more likely to score higher on the PWI. Similar positive associations were observed in this study, with scores on the PWI correlating with physical health, cognitive health, emotional health, and school performance, thereby answering RQ2 in the affirmative.

The regularity with which Perúvian school students practice Transcendental Meditation was correlated to physical health, cognitive health, emotional health, school performance, and personal well-being, thereby answering RQ3 in the affirmative. The strength and direction of the linear regression used to answer RQ4 and presented in Table 8 suggest practice of Transcendental Meditation (the independent variable in the regression model) predicts these outcomes (i.e., of the five dependent variables in the regression model) and is not merely associated with them. We conclude this finding provides further evidence that the practice of

Transcendental Meditation by children and adolescents in Perú may positively influence health, school performance, and personal well-being outcomes.

Study Limitations

We have concluded that the findings from this study answer research questions at a reasonably high level of confidence, but the use of convenience sampled participants is relevant. And while convenience sampling is of value in hard-to-reach educational settings such as those in our study, subject bias (or participant reactivity, where participants change their behaviour to meet the expectations or outcomes of research) was possible, possibly affecting external validity. However, we took five steps to minimize the potential impact of subject bias on results: (1) both test instruments were administered anonymously; (2) prior to testing, participants were informed their responses would be kept confidential; (3) the earlier research to gather normative Perúvian schools' data effectively served as a pilot test to the present study; (4) study objectives were clearly communicated to both students and administrators prior to data collection; and in addition to the aforementioned steps, (5) sample size likely reduced non-representativeness because a larger sample generally provides a better chance of capturing the full range of legitimate (i.e., unbiased) student responses within any given population, thereby leading to more accurate results.

We cannot be sure that other students in Perú would have the same levels of physical health, cognitive health, emotional health, school performance, and personal well-being when practicing Transcendental Meditation as those reported here, but our goal is not not generalizability; we are concerned, like others before us, to examine under-researched Indigenous communities and unique, high-altitude Andean educational settings and hence non-probabilistic sampling is appropriate. Interestingly, similar to this study, none of the six studies presented for comparative purposes in Table 6 used random selection. For example, Bullock et al. (2021), Tomyn and Cummins (2011), Casas, Sarriera et al. (2012), and Alfaro et al. (2016) used undeclared sampling techniques, which may have involved participation, and only Schutz et al. (2022) and Casas, Bello et al. (2012) used volunteers; none used random selection. Nevertheless, the potential for subject bias necessarily limits the reach and veracity of our findings. We therefore do not attempt to generalize these results to Perú more widely or to other regional or international educational settings and have used them for confirmatory and predictive purposes only, not for their probative value. Thus, the extent to which the evidence provided by these data could rationally help determine whether the probability of regularly practicing Transcendental Meditation by Perúvian students results in greater health and well-being has yet to be fully determined.

The use of a cross-sectional design has benefits and impediments. For example, Taris et al. (2021) point out that such designs are suited to testing "relationships of interest…at a given point in time" (p. 1) but are disadvantaged by their inability to test causal relations. They go on to say that cross-sectional designs therefore typically explore antecedents (i.e., predictors), consequences (or outcomes), and moderating variables at a single point in time, as occurred in our study. In our case, due to the linear regression findings presented in Table 8, the practice of Transcendental Meditation can be thought of as the antecedent, with health, school performance, and personal well-being as consequences. This can be inferred by the model presented in Figure

1. Further, school, gender, age and grade levels can be thought of as potential moderating variables.

It is also reasonable to ask if assumptions driving the proto-theoretical model in Figure 1 are stable across different educational settings and over time. But there is no way of knowing if this stability will show in longitudinal research, nor indeed if the localized elements and time-specific associations of the model are correct. Further conceptual research, based on emergent empirical data in both Perú and elsewhere over time, will be required to crystallize these assumptions and confirm the model. These two issues associated with cross-sectional research—i.e., the relationship between practice of Transcendental Meditation as a predictor (y) of health, school performance, and personal well-being (x) on the one hand, and stability of this relationship (if it exists) over time, on the other hand—are at the heart of this study.

But the observed associations have precedent. Indeed, prior randomized research has indicated practice of Transcendental Meditation is a reliable predictor of reduced stress and improved mental and physical health. For example, while Joshi et al. (2022) reported practice of Transcendental Meditation by 80 health workers "did not significantly decrease acute distress [over a three-month period] compared with usual treatment," it "significantly reduced chronic stress, particularly burnout, suggesting that [Transcendental Meditation] could be an effective strategy to prevent or mitigate chronic stress, and potentially burnout" (p. 1). Similarly, across 18 studies (N = 1,207), Transcendental Meditation improved both systolic and diastolic blood pressure compared with comparison groups (Schneider et al., 2022). These and other results have been more fully examined and explained by Fergusson (2022).

Conclusion

This study suggests implementation of Transcendental Meditation in primary and secondary schools may have a salutary impact on health, school performance and personal well-being. While definitive causal evidence for an increase in these variables was not within the scope of the present study, the positive association of meditation practice with each educational variable was identified, and the predictive value of meditation was also noted. Moreover, the practice was reported to be easy to teach, easy to learn, easy to practice, and acceptable to school administrators, at least in Perú (a majority Catholic country). Prior research by these authors also indicates that the introduction of Transcendental Meditation into a school's curriculum has the support of parents (Fergusson et al., 2021a). Finally, and most importantly in conclusion, multiple linear regression indicated practice of Transcendental Meditation by school children and adolescents is a reliable predictor of health, school performance, and personal well-being, thereby answering RQ4, suggesting further controlled, longitudinal research is warranted in Perú.

Along with the collective findings of our previous research in Perú, three final observations are important: 1) self-reported data from this study indicate an average of 85% of primary and secondary school students agreed or definitely agreed the practice of Transcendental Meditation was beneficial to their health and school performance; 2) clear statistical associations between practice of Transcendental Meditation and a range of psychophysiological benefits deemed important to education and observed in this study confirm, and indeed strengthen, our earlier findings in other settings; and 3) regularity of the practice was a predictor of these benefits. When considering programmatic innovation, the present study therefore provides futher real-world empirical evidence that Transcendental Meditation as an adjunct to traditional pedagogical theory and practice may be of benefit to school administrators who wish to improve learning, curricula, and other fundamental aspects of the contemporary educational experience.

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