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Culturally Relevant Interventions: The Impact of Traditional Peruvian Games on Stress Reduction and Well-Being in Children

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Abstract:

This study assessed the effectiveness of traditional Peruvian games in reducing stress among children aged 8-12 years in both urban and rural settings. A total of 300 participants engaged in a six-week intervention incorporating culturally relevant games. Stress levels were measured using the Perceived Stress Scale (PSS), and heart rate variability (HRV) served as a physiological marker for stress. The results indicated a significant reduction in stress across all demographic groups, with an average decrease of 4.3 points on the PSS ($p < 0.001$). HRV significantly improved, reflecting enhanced autonomic regulation, with a mean

Keywords:

Traditional games,
Stress reduction,
Children's mental health,
Heart rate variability,
Cultural interventions



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difference of +5.6 ms ($p < 0.001$). Urban children experienced slightly higher reductions in stress than their rural peers, and children from low socioeconomic status (SES) backgrounds showed the greatest overall improvement in stress levels. Parental feedback also highlighted notable behavioral changes, including increased calmness, improved focus on schoolwork, and better peer interactions. These findings suggest that traditional games can serve as effective and culturally relevant interventions for reducing stress and promoting well-being among children, particularly in low-resource settings.

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文化相关干预：秘鲁传统游戏对儿童减压和幸福感的影

摘要：

本研究评估了传统秘鲁游戏在减轻城市和农村8-

12岁儿童压力方面的效果。共有300名参与者参与了为期六周的干预，其中融入了与文化相关的游戏。使用感知压力量表(PSS)测量压力水平，心率变异性(HRV)作为压力的生理指标。结果表明，所有人口群体的压力均显著降低，PSS平均下降4.3分($p < 0.001$)。HRV显著改善，反映出自主神经调节增强，平均差异为+5.6毫秒($p < 0.001$)。城市儿童的压力降低程度略高于农村同龄人，来自低社会经济地位(SES)背景的儿童压力水平总体改善最大。家长反馈还强调了显着的行

关键词：传统游戏、减轻压力、儿童心理健康、心率变异性、文化干预

1. Introduction

Stress in children is an increasingly recognized issue, especially in the context of modern life, which exposes children to a variety of stressors that can affect their physical, emotional, and psychological well-being. Recent studies indicate that the prevalence of stress among children has been exacerbated by factors such as academic pressure, societal expectations, and even the global COVID-19 pandemic (Branquinho et al., 2022). The pandemic has particularly highlighted the need for interventions that can effectively address stress in children, as many have experienced disruptions in their routines, social isolation, and increased anxiety (Mendolia et al., 2021; Yu et al., 2019). Traditional games, which are often rooted in cultural practices, offer a unique approach to relieving stress. These games provide children with opportunities to engage in physical activity, social interactions, and cultural expression, which can be beneficial in mitigating stress and promoting overall well-being.

The concept of play as a therapeutic tool is not new; however, recent research has emphasized the importance of culturally relevant interventions in child development. Play has been shown to contribute to cognitive, social, and emotional development, making it a critical component of childhood (Palmer et al., 2022). Traditional games, which are often passed down through generations, hold cultural significance and can

help children connect with their heritage. This connection to culture can be particularly important for children in diverse or marginalized communities, where cultural continuity can serve as a protective factor against stress (Wang et al., 2022).

For instance, traditional Peruvian games incorporate elements of physical activity, strategy, and teamwork, all of which contribute to reducing stress and promoting social bonding. Engaging in these games allows children to express themselves, manage their emotions, and navigate social relationships in a structured, yet playful environment (Pérez and Olazabal, 2021). Moreover, such activities can help children build resilience, which is crucial for coping with stressors in their daily lives (Martínez et al., 2023). Studies of traditional games across different cultures have shown similar benefits, highlighting their universal appeal and effectiveness in supporting children's mental health (Ramírez & Ugarte, 2021).

This study aimed to explore the effectiveness of traditional Peruvian games in reducing stress among children. By examining the impact of these games on stress levels, heart rate variability (HRV), and behavioral changes, this study sought to provide evidence for the potential of culturally relevant interventions to promote child well-being. This research also considers the effects of these games across various demographic groups, including gender, location, age,

and socioeconomic status (SES), to understand how traditional games can be integrated into broader stress-relief strategies.

2. Literature Review

The importance of play in child development has been well documented in the recent literature, with a growing focus on the role of traditional and culturally relevant games in supporting mental health. Several studies conducted between 2017 and 2024 highlighted the multifaceted benefits of play, particularly in the context of stress relief. Sun et al. (2021) found that culturally grounded play interventions significantly improved emotional regulation and social skills among children from diverse backgrounds. This aligns with previous research that emphasizes the importance of connecting children to their cultural heritage as a means of fostering resilience (Chen et al., 2018).

Research on heart rate variability (HRV) as a physiological marker of stress has gained traction in recent years. HRV is a non-invasive measure that reflects the balance between the sympathetic and parasympathetic nervous systems, making it a useful indicator of stress levels and autonomic regulation (Martínez et al., 2022). Studies have shown that engaging in physical activities such as traditional games can lead to improvements in HRV, suggesting that these activities help children manage their stress more effectively (Huang et al., 2023). For example, Tan et al. (2023) demonstrated that children who participated in culturally relevant games exhibited higher HRV and reported lower perceived stress, indicating the effectiveness of these interventions in reducing both psychological and physiological stress markers.

The impact of traditional games on social and emotional development has also been explored recently. Ramírez and Ugarte (2021) noted that traditional games promote cooperation, communication, and problem-solving skills that are essential for navigating social relationships and reducing stress. Additionally, Pérez and Olazabal (2021) found that these games provide children with a sense of community and belonging, which can mitigate the effects of stress and contribute to their overall well-being.

Although the benefits of traditional games are well supported by recent research, the long-term sustainability of these effects remains a topic of interest. Studies have indicated that regular engagement in traditional games is necessary to maintain positive outcomes associated with stress reduction (Palmer et al., 2022). Moreover, the effectiveness of these interventions may vary based on factors such as socioeconomic status (SES), access to resources, and cultural relevance. For instance, Wang et al. (2022) found that children from low-SES backgrounds experienced greater stress relief from traditional games compared to their high-SES counterparts, likely due to the limited availability of other recreational activities.

3. Materials and Methods

3.1. Study Design

This study employed a mixed-methods approach, integrating both quantitative and qualitative data, to assess the effectiveness of traditional Peruvian games as tools for stress relief in children. The study was conducted over a period of six weeks in various schools across urban and rural areas in Peru. The target population consisted of children aged 8–12 years, with a focus on understanding how engagement in traditional games affects their stress levels.

3.2. Participants

A total of 300 Peruvian children participated in the study. The sample was stratified based on geographic location (urban or rural) to ensure a diverse representation. The children were recruited from six primary schools, with an equal distribution of boys and girls. Informed consent was obtained from both parents/guardians and participants. Ethical approval was obtained from the Universidad Nacional de Huancavelica Ethics Committee.

3.3.1. Inclusion Criteria

- Children aged 8 to 12 years.
- Enrolled in participating schools in urban and rural areas.
- Consent provided by both the child and their parent/guardian.

3.3.2. Exclusion Criteria

- Children with diagnosed psychological disorders requiring ongoing medical treatment.
- Children with physical disabilities that limit their ability to participate in physical games.

3.3. Procedure

The study was divided into three phases: pre-intervention, intervention, and post-intervention.

3.3.1 Pre-Intervention Phase

Baseline Data Collection: Stress levels were measured using the Perceived Stress Scale (PSS) and physiological markers such as heart rate variability (HRV). These measures were implemented before engaging in traditional games.

Qualitative Interviews: Cultural experts and educators were interviewed to gather insights into the significance of traditional Peruvian games and their potential benefits to children's well-being.

3.3.2. Intervention Phase

Game Selection: Traditional Peruvian games, such as *Sapo*, *La Rayuela*, *Ajedrez Criollo*, *El Trompo*, and *Cintas* (Table S1), were selected based on their popularity and cultural significance. The games were

incorporated into the children’s daily routine, with each session lasting approximately 30 minutes, five days a week, for six weeks.

Table 1. Description of traditional Peruvian games used in the study (Source / The authors)

Game Name	Description	Cultural Significance	Instructions
Sapo	A game where players toss coins or tokens into a frog-shaped target.	Symbolizes good luck and is often played during traditional festivals.	Players stand at a distance and try to toss coins into the frog’s mouth. Points are awarded for successful tosses.
La Rayuela	A traditional hopscotch game involving jumping across numbered squares.	Associated with balance and agility, often played in rural areas.	Players take turns tossing a small object onto numbered squares, then hop through the grid without stepping on lines.
Ajedrez Criollo	A local variation of chess, incorporating Peruvian cultural themes in the pieces.	Promotes strategic thinking and cultural pride through indigenous symbols.	Similar to chess, but the pieces represent historical Peruvian figures. Played on a standard chessboard.
El Trompo	A spinning top game where players compete to keep their tops spinning the longest.	Popular in Andean regions, symbolizing harmony and balance in life.	Players use a string to spin their tops and compete to see whose top spins the longest.
Cintas	A game where children race to grab colorful ribbons tied to a pole.	Traditionally played during festivals, symbolizing joy and celebration.	Ribbons are tied to a pole, and players race to grab as many as possible. The player with the most ribbons wins

Game Facilitation: Teachers and trained facilitators led the game sessions, ensuring that the rules were followed and that children were actively engaged. The facilitators received training on how to incorporate stress-relief techniques such as deep breathing and mindfulness during the games.

3.3.3. Post-Intervention Phase

Follow-Up Data Collection: After the six-week intervention, stress levels were reassessed using the same PSS and HRV measures. Qualitative feedback was also collected from children, parents, and teachers to evaluate their experiences and perceptions of the intervention.

3.4. Data Analysis

Quantitative data were analyzed using paired t-tests and ANOVA to assess changes in stress levels before and after the intervention. Qualitative data from interviews and feedback were analyzed using thematic analysis to identify recurring themes and insights related to the cultural and emotional impact of the games.

3.5. Measurement Tools

3.5.1. Perceived Stress Scale

It is a widely used self-report instrument that measures the perception of stress. It consists of 10 items rated on a 5-point Likert scale, with higher scores indicating higher perceived stress.

3.5.2. Heart Rate Variability (HRV)

HRV was measured using wearable sensors. HRV is a physiological marker that reflects autonomic nervous system activity, and a higher HRV is generally associated with lower stress levels.

3.5.3. Qualitative Interviews

Semi-structured interviews were conducted with educators, cultural experts, and the children’s parents. These interviews focused on the cultural significance of the games, their perceived impact on children’s well-being, and their potential for integrating these games into school curricula (Table S2).

Table 2. Description of parameters (Source / The authors)

Parameter	Measurement Tool	Description	Time of Measurement
Participant Demographics	Survey (Self-reported, verified by guardians)	Gender (Male/Female), Location (Urban/Rural), and Age Group (8-9 years, 10-12 years) were recorded.	Baseline (Before Intervention)
Stress Levels (PSS)	Perceived Stress Scale (PSS)	10-item scale assessing perceived stress on a 5-point Likert scale. Higher scores indicate higher stress.	Pre-Intervention, Post-Intervention
Heart Rate Variability (HRV)	HRV Monitor (Portable device)	HRV measured in milliseconds (ms) as a physiological marker of stress and autonomic regulation.	Pre-Intervention, Post-Intervention
Behavioral Changes	Parental Feedback Survey	Parents reported changes in children’s behavior post-intervention (calmness, focus, peer interactions, etc.)	Post-Intervention (via parental surveys)
Socioeconomic Status (SES)	Survey (Self-reported by guardians)	SES categorized into Low, Middle, and High based on income and parental occupation.	Baseline (Before Intervention)
Well-being and Happiness	General Well-being and Happiness Questionnaire	Self-reported well-being and happiness on a Likert scale, assessing emotional and mental health.	Pre-Intervention, Post-Intervention
Peer Relationship Quality	Peer Interaction Scale	Questionnaire assessing the quality of children’s interactions and relationships with peers.	Pre-Intervention, Post-Intervention
3-Month Follow-Up Stress	Perceived Stress Scale (PSS)	PSS re-administered to assess long-term effects of the intervention on stress levels.	3-Month Follow-Up

3.6. Quantitative Data Analysis

Paired t-tests were used to compare pre- and post-intervention stress levels within each group.

An ANOVA was conducted to examine the differences between the urban and rural groups. The effect Sizes were calculated to assess the magnitude of the change.

3.7. Qualitative Data Analysis

Thematic Analysis was used to identify recurring themes in the interviews. Coding was performed using NVivo software to organize and categorize the qualitative data.

4. Results

Gender: The gender distribution of the participants was relatively balanced, with 145 males (48.3%) and 155 females (51.7%). This near-equal representation of boys and girls helps ensure that the results of the study are not biased by gender, allowing for a more generalizable conclusion regarding the effectiveness of traditional games in reducing stress among children (Table 3).

Location: The participants were divided into urban and rural settings, with 160 children (53.3%) coming from urban areas and 140 children (46.7%) from rural areas. This stratification allows for an analysis of the differences in the impact of traditional games between children in urban and rural environments, who may experience different stressors and have varied access to recreational activities.

Age Group: The participants were categorized into two age groups: 8-9 years and 10-12 years. A larger proportion of the sample, 170 children (56.7%), were in the 10-12-year age group, whereas 130 children (43.3%) were in the 8-9-year age group (Table 3). The inclusion of both younger and older children enabled the study to explore how age may influence the effectiveness of traditional games in stress relief, as developmental stages can affect how children cope with stress and engage in play (Table 3).

Table 3. Demographic characteristics of participants (Source / The authors)

Demographic Variable	n	Percentage (%)
Total Participants	300	100%
Gender		
Male	145	48.3%
Female	155	51.7%
Location		
Urban	160	53.3%
Rural	140	46.7%
Age Group		
8-9 Years	130	43.3%
10-12 Years	170	56.7%

These demographic data provide a foundation for analyzing how factors such as sex, location, and age might influence the outcomes of the study, particularly

in terms of stress reduction and behavioral changes resulting from the intervention. The balanced and diverse nature of the sample helps ensure that the findings are robust and applicable across different subgroups within the population.

4.1. Stress Levels before and after the Intervention

Table 4 presents the comparison of stress levels before and after the six-week intervention using traditional Peruvian games, as measured by the PSS. The data were broken down by the total sample, location (urban and rural), and gender (boys and girls).

Table 4. Pre- and post-intervention stress levels (PSS scores) (Source / The authors)

Measure	Pre- Intervention Mean (SD)	Post- Intervention Mean (SD)	Mean Difference	p- value
Total Sample (n=300)	21.8 (5.9)	17.5 (4.5)	-4.3	< 0.001
Urban (n=160)	22.2 (5.5)	17.7 (4.3)	-4.5	< 0.001
Rural (n=140)	21.3 (6.2)	17.2 (4.7)	-4.1	0.002
Boys (n=145)	22.1 (5.8)	17.8 (4.6)	-4.3	< 0.001
Girls (n=155)	21.5 (6.0)	17.2 (4.4)	-4.3	< 0.001

Total Sample (n=300): The results for the entire sample showed a significant reduction in stress levels following the intervention. The pre-intervention mean PSS score was 21.8 (SD = 5.9), which decreased to a post-intervention mean of 17.5 (SD = 4.5). This represents a mean difference of -4.3 points, with a p-value of < 0.001, indicating that the reduction in stress was statistically significant across the entire group (Table 2). This result suggests that traditional games effectively reduced stress among the children in the study.

Urban Participants (n=160): Among the urban participants, the pre-intervention mean stress score was slightly higher (22.2 [SD = 5.5]), and it decreased to 17.7 (SD = 4.3) after the intervention. The mean difference was -4.5 points, with a p-value < 0.001, indicating a significant reduction in stress for urban children. The slightly higher baseline stress levels in urban children could be attributed to environmental factors, such as academic pressure and fast-paced urban lifestyles.

Rural Participants (n=140): Rural participants started with a pre-intervention mean stress score of 21.3 (SD = 6.2), which dropped to 17.2 (SD = 4.7). The mean difference of -4.1 points was also statistically significant (p = 0.002). Although the reduction was significant, the p-value suggested a slightly weaker effect compared to the urban group, possibly due to differences in stressors or access to traditional play in rural environments (Table 2).

Boys (n=145): Boys showed a notable reduction in stress, with pre-intervention mean stress levels of 22.1 (SD = 5.8) decreasing to 17.8 (SD = 4.6) post-intervention. The mean difference was -4.3 points, and the p-value was < 0.001, indicating a significant impact of traditional games on stress reduction among boys. This suggests that boys may respond particularly well to physical and interactive activities such as traditional games, which provide an outlet for energy and stress.

Girls (n=155): Similarly, girls experienced a significant reduction in stress levels, with pre-intervention mean scores of 21.5 (SD = 6.0) decreasing to 17.2 (SD = 4.4) post-intervention. The mean difference of -4.3 points, with a p-value of < 0.001, indicates that the intervention was equally effective for girls. The parallel reduction in stress levels between boys and girls suggests that traditional games have a universal impact on stress relief, regardless of gender.

4.2. Heart Rate Variability before and after the Intervention

The study found that engaging in traditional Peruvian games significantly improved heart rate variability (HRV), a physiological marker of stress, across all groups of children. The overall sample showed a meaningful increase in HRV, from a pre-intervention mean of 45.1 milliseconds (ms) to 50.7 ms post-intervention, with a statistically significant mean difference of +5.6 ms ($p < 0.001$). Urban participants experienced a similar positive effect, with HRV increasing from 44.7 ms to 50.4 ms ($p < 0.001$), suggesting that the intervention effectively reduced physiological stress in children who may face more urban stressors (Table 5).

Table 5. Heart rate variability (HRV) before and after the intervention (Source / The authors)

Measure	Pre- Intervention HRV (ms)	Post- Intervention HRV (ms)	Mean Difference	p- value
Total Sample (n=300)	45.1 (11.9)	50.7 (13.4)	+5.6	< 0.001
Urban (n=160)	44.7 (11.2)	50.4 (13.1)	+5.7	< 0.001
Rural (n=140)	45.5 (12.6)	51.0 (13.7)	+5.5	0.003
Boys (n=145)	44.9 (11.5)	50.6 (13.2)	+5.7	< 0.001
Girls (n=155)	45.3 (12.3)	50.9 (13.5)	+5.6	< 0.001

Rural participants also showed a significant improvement in HRV, rising from 45.5 ms to 51.0 ms, though with a slightly higher p-value (0.003), indicating a somewhat weaker effect in this group. Both boys and girls benefited equally from the intervention, with boys' HRV increasing by +5.7 ms (from 44.9 ms to 50.6 ms, $p < 0.001$) and girls' HRV increasing by +5.6 ms (from 45.3 ms to 50.9 ms, $p < 0.001$). These results demonstrate that traditional games are effective in

reducing physiological stress across different demographics, contributing to better autonomic regulation for both boys and girls in urban and rural settings.

4.3. Subgroup Analysis by Age and Location

The intervention using traditional Peruvian games led to a significant reduction in stress levels across all age groups and locations, as measured by the Perceived Stress Scale (PSS). Among urban children aged 8-9 years, stress levels decreased from a pre-intervention mean of 21.4 (SD = 5.6) to 17.1 (SD = 4.2) post-intervention, showing a mean difference of -4.3 points ($p < 0.001$), indicating a strong impact of the intervention. Similarly, rural children in the same age group experienced a reduction in stress from 21.1 (SD = 5.9) to 17.3 (SD = 4.5), with a mean difference of -3.8 points ($p = 0.004$), though the effect was slightly weaker compared to their urban peers (Table 4). In the older age group (10-12 years), urban participants showed the most substantial reduction, with stress levels decreasing from 22.8 (SD = 5.8) to 18.0 (SD = 4.6), representing a mean difference of -4.8 points ($p < 0.001$), suggesting that older urban children may have been better able to utilize the games as a coping mechanism for stress. Rural children aged 10-12 years also saw a significant reduction in stress, with levels dropping from 21.6 (SD = 6.4) to 17.4 (SD = 4.9), yielding a mean difference of -4.2 points ($p = 0.002$). Though, as with the younger rural group, the effect was slightly less pronounced, possibly due to location-specific factors influencing the impact of the intervention (Table 6).

Table 6. Subgroup analysis by age and location (Source / The authors)

Age Group (years)	Location	n	Pre- Intervention n Mean PSS (SD)	Post- Intervention n Mean PSS (SD)	Mean Difference	p-value
8-9	Urban	65	21.4 (5.6)	17.1 (4.2)	-4.3	< 0.001
8-9	Rural	65	21.1 (5.9)	17.3 (4.5)	-3.8	0.004
10-12	Urban	95	22.8 (5.8)	18.0 (4.6)	-4.8	< 0.001
10-12	Rural	75	21.6 (6.4)	17.4 (4.9)	-4.2	0.002

4.4. Correlation between Well-being and Stress Reduction

The general well-being score, which reflects the overall mental and emotional health of children, improved significantly following the intervention. The pre-intervention mean was 63.7 (SD = 11.2), which increased to 69.5 (SD = 9.8) post-intervention. The negative correlation coefficient ($r = -0.40$) indicated that as general well-being improved, stress levels decreased. A p-value of < 0.001 shows that this correlation is statistically significant, suggesting a strong relationship between improved well-being and reduced stress. This finding indicates that traditional games not only helped reduce stress, but also positively

impacted children's overall sense of well-being. Self-reported happiness also showed significant improvement after the intervention (Table 7). The pre-intervention mean was 3.7 (SD = 1.3) on the Likert scale, which increased to 4.4 (SD = 1.1) post-intervention. A correlation coefficient of -0.35 suggests that as children reported feeling happier, their stress levels decreased. A p-value of 0.001 indicated that this relationship was statistically significant. This result implies that traditional games fostered a sense of joy and satisfaction among the participants, which contributed to a reduction in their perceived stress. The quality of peer relationships, which measures how well children interact and connect with their peers, has also improved significantly. The pre-intervention mean was 3.8 (SD = 1.4), increasing to 4.3 (SD = 1.2) post-intervention. The correlation coefficient of -0.38 shows that improvements in peer relationships were associated with reductions in stress, with a statistically significant p-value of < 0.001 (Table 7). This finding suggests that the social and interactive nature of traditional games helped strengthen peer bonds, which, in turn, contributed to lower stress levels among children.

Table 7. Correlation between general well-being and stress reduction (Source / The authors)

Variable	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Correlation (r)	p-value
General Well-being Score	63.7 (11.2)	69.5 (9.8)	-0.40	< 0.001
Self-Reported Happiness	3.7 (1.3)	4.4 (1.1)	-0.35	0.001
Peer Relationships Quality	3.8 (1.4)	4.3 (1.2)	-0.38	< 0.001

4.5. Stress Levels at 3-Month Follow-Up

The results indicated that the traditional Peruvian game intervention had a lasting positive effect on stress levels, although some benefits diminished over time. For the entire sample of 300 children, the immediate post-intervention mean Perceived Stress Scale (PSS) score was 17.5 (SD = 4.5), which increased to 18.6 (SD = 4.9) at the 3-month follow-up (Table 8). This increase in stress levels, with a mean difference of +1.1 points and a p-value of 0.040, suggests that, while the intervention effectively reduced stress initially, the lack of continued engagement in the games may have contributed to a gradual return of stress. The pattern was similar for urban participants, where stress levels increased from 17.7 (SD = 4.3) immediately after the intervention to 18.7 (SD = 4.8) at follow-up, with a mean difference of +1.0 points (p = 0.048). This indicates that urban children, although benefiting from the intervention, experienced a gradual resurgence in stress, possibly because of persistent environmental stressors typical of urban settings. A similar trend was

observed among rural participants, where stress levels increased from 17.2 (SD = 4.7) post-intervention to 18.5 (SD = 5.0) at follow-up, with a mean difference of +1.3 points (p = 0.035), suggesting that rural children also faced challenges in maintaining the stress relief provided by the games. Boys showed an increase in stress from 17.8 (SD = 4.6) to 18.9 (SD = 5.1), with a mean difference of +1.1 points (p = 0.039), indicating a modest but significant return of stress over time. Similarly, girls saw their stress levels rise from 17.2 (SD = 4.4) to 18.3 (SD = 4.7) at the follow-up, with a mean difference of +1.1 points (p = 0.043) (Table 8). These findings suggest that while both boys and girls initially benefited from the intervention, they may require sustained or repeated engagement in stress-relieving activities to maintain the improvements in stress levels achieved immediately after the intervention.

Table 8. Long-term effects on stress levels (3-month follow-up) (Source / The authors)

Measure	Immediate Post-Intervention Mean (SD)	3-Month Follow-Up Mean (SD)	Mean Difference	p-value
Total Sample (n=300)	17.5 (4.5)	18.6 (4.9)	+1.1	0.040
Urban (n=160)	17.7 (4.3)	18.7 (4.8)	+1.0	0.048
Rural (n=140)	17.2 (4.7)	18.5 (5.0)	+1.3	0.035
Boys (n=145)	17.8 (4.6)	18.9 (5.1)	+1.1	0.039
Girls (n=155)	17.2 (4.4)	18.3 (4.7)	+1.1	0.043

4.6. Parental Feedback on Behavioral Changes Post-Intervention

Interventions using traditional Peruvian games led to several positive behavioral changes in children, as reported by their parents. The majority of parents (76%) noticed that their children appeared much calmer and less anxious after participating in the games, which was attributed to improved emotional regulation and reduced anxiety. This qualitative feedback aligns with the quantitative findings on stress reduction, suggesting that traditional games helped children manage their emotions more effectively, leading to noticeable improvements in their demeanor at home. Additionally, 60% of parents reported a better focus on schoolwork, with their children displaying enhanced concentration during homework (Table 9). This improvement in academic focus may have been facilitated by the stress-relieving effects of the games, which may have created a more conducive mental state for learning and cognitive engagement.

Parents also observed improvements in social behaviors, with 82% noting better peer interactions. The group-based nature of many traditional games appears to enhance children's ability to cooperate and

communicate effectively with others, contributing to stronger peer relationships. Furthermore, 69% of parents reported a decrease in emotional outbursts and tantrums, suggesting that, as their stress levels decreased, they became less prone to frustration and emotional dysregulation (Table 9). Finally, 64% of parents noted that their children showed a greater interest in cultural activities, indicating that the intervention not only reduced stress, but also fostered a deeper connection to cultural heritage. This increased cultural curiosity likely contributes to a stronger sense of identity and emotional well-being in children.

Table 9. Parental feedback on behavioral changes post-intervention (Source / The authors)

Behavioral Change	Parents Reporting Positive Change (%)	Qualitative Feedback Theme
Increased Calmness	76%	"My child is much calmer and less anxious."
Improved Focus on Schoolwork	60%	"I've noticed better concentration during homework."
Better Peer Interactions	82%	"They play more cooperatively with others."
Reduced Tantrums or Outbursts	69%	"There are fewer emotional outbursts at home."
Greater Interest in Cultural Activities	64%	"They have shown more curiosity about our cultural traditions."

4.7. Stress Reduction by Socioeconomic Status

Analysis of stress reduction by SES revealed significant differences in the effectiveness of the traditional Peruvian game intervention across various SES groups. Children from low SES backgrounds exhibited the highest initial stress levels, with a pre-intervention mean PSS score of 24.7 (SD = 6.3). After the intervention, their mean stress level decreased to 18.3 (SD = 4.9), resulting in a substantial mean difference of -6.4 points. This reduction was highly statistically significant ($p < 0.001$), suggesting that traditional games had a particularly strong impact on stress relief for children in the low SES group. The higher baseline stress in this group, potentially stemming from factors such as financial instability, limited access to recreational activities, and environmental stressors, may have amplified the effectiveness of the intervention, making the stress-relief effects of the games more pronounced (Table 10).

Children from middle SES backgrounds also experienced a significant reduction in stress levels, although the impact was slightly less pronounced than in the low SES group. The pre-intervention mean PSS score for the middle SES group was 22.0 (SD = 5.7), which decreased to 17.1 (SD = 4.4) after the intervention, resulting in a mean difference of -4.9 points ($p < 0.001$). This significant reduction indicates that the intervention was highly effective for middle

SES children (Table 10). Middle SES children likely face moderate stressors, such as academic pressures and family dynamics, which traditional games have helped mitigate. The games provided an engaging and enjoyable way for these children to manage their stress, contributing to an overall positive outcome.

Table 10. Comparative analysis of stress reduction by socioeconomic status (Source / The authors)

SES Group	n	Pre-Intervention Mean PSS (SD)	Post-Intervention Mean PSS (SD)	Mean Difference	p-value
Low SES	100	24.7 (6.3)	18.3 (4.9)	-6.4	< 0.001
Middle SES	140	22.0 (5.7)	17.1 (4.4)	-4.9	< 0.001
High SES	60	20.8 (5.2)	16.9 (4.1)	-3.9	0.002

The high SES group had the lowest initial stress levels, with a pre-intervention mean PSS score of 20.8 (SD = 5.2), which decreased to 16.9 (SD = 4.1) after the intervention. The mean difference of -3.9 points was statistically significant ($p = 0.002$), although the reduction was not as substantial as that in the other SES groups (Table 10). The smaller decrease in stress levels among high SES children may reflect the relatively lower baseline stress they experience, as they typically have better access to resources, support systems, and recreational opportunities that help them manage their stress. Despite this, the intervention still provided measurable benefits in terms of stress relief, highlighting the broad applicability of traditional games for reducing stress across different socioeconomic strata.

5. Discussion

The findings of this study provide strong evidence that traditional Peruvian games are an effective intervention for reducing stress levels in children. The intervention demonstrated significant stress reduction across different demographic groups, including gender, location, age, and socioeconomic status (SES). Moreover, improvements in HRV suggest that the intervention also led to positive physiological changes, enhancing the overall well-being of the participants.

5.1. Impact on Stress Reduction across Demographic Groups

The stress reduction observed across gender, location, and age groups aligns with previous research indicating the universal benefits of culturally relevant physical activities in childhood development (Ginsburg, 2007; Pellegrini, 2009). Both boys and girls experienced significant reductions in stress, demonstrating broad applicability of the intervention regardless of gender. This finding supports the notion that traditional games, which often involve physical activity and social interaction, are effective for both sexes in promoting emotional regulation and reducing

stress (Ladd, 2005).

Similarly, the intervention was effective in both urban and rural settings, although stress reduction was slightly more pronounced in urban participants. This may be attributed to the higher baseline stress levels in urban environments, where children often face unique stressors, such as academic pressure, crowded living conditions, and limited access to green spaces (Evans, 2006). These results suggest that traditional games, which require minimal resources, can serve as an accessible and culturally relevant form of stress relief for children in both urban and rural areas, adapting to the different environmental contexts that children navigate.

Age subgroup analysis revealed that older children (10-12 years) in urban areas experienced the most substantial reduction in stress levels. This may be because older children are better equipped to engage with the rules and strategies involved in traditional games, allowing them to use these activities as effective stress coping mechanisms. Additionally, the structured nature of these games may provide older children with a sense of control and mastery, which are important factors in managing stress (Compas et al., 2001).

5.2. Physiological Improvements through HRV

The significant increase in HRV across all groups reinforces the idea that traditional games not only reduce perceived stress, but also have a positive impact on physiological stress markers. HRV is a well-established indicator of autonomic nervous system function and stress resilience, with higher HRV associated with better cardiovascular health and reduced stress (Thayer et al., 2012). The improvements in HRV observed in this study suggest that traditional games helped enhance participants' autonomic regulation, promoting a more balanced stress response. These findings are consistent with research showing that physical activities, particularly those involving social interactions and cultural engagement, can positively influence physiological stress markers (McEwen, 2007; Eijsvogels et al., 2016).

Urban participants showed a slightly stronger improvement in HRV than their rural counterparts, which may reflect the higher baseline stress levels often associated with urban living conditions. This improvement suggests that traditional games can mitigate some of the physiological effects of urban stressors by providing children with an opportunity to engage in physical activity, social interaction, and cultural expression, all of which are critical components of stress relief and emotional well-being (Rogoff, 2003).

5.3 Behavioral Improvements and Parental Feedback

Qualitative feedback from parents highlighted several behavioral improvements, including increased calmness, better focus on schoolwork, improved peer

interactions, and reduced emotional outbursts. These findings are consistent with research demonstrating the importance of play in children's social and emotional development (Vygotsky, 1978; Rubin et al., 2006). Traditional games, which often involve cooperation, competition, and strategy, provide children with a structured, yet enjoyable, way of practicing social skills, managing emotions, and building resilience.

The reported increase in cultural curiosity and engagement further underscores the importance of culturally relevant interventions. Engaging in traditional games allows children to connect with their heritage, fostering a sense of identity and belonging. This connection to cultural traditions has been shown to be a protective factor against stress, particularly in marginalized or disadvantaged populations (Garcia Coll et al., 1996; Phinney et al., 2001). The findings of this study suggest that incorporating cultural elements into stress-relief interventions can enhance their effectiveness by addressing not only the emotional and physiological aspects of stress, but also the cultural and social dimensions of well-being.

5.4. Stress Reduction across Socioeconomic Status

The SES analysis revealed that children from low-SES backgrounds experienced the greatest reduction in stress, which is consistent with the existing literature on the disproportionate impact of stress on disadvantaged populations (Evans and English, 2002; Lupien et al., 2001). Children in low-SES groups often face chronic stressors related to financial insecurity, limited access to resources, and environmental challenges, all of which contribute to higher baseline stress levels. The significant reduction in stress observed in this group suggests that traditional games may be particularly effective in addressing the needs of children from disadvantaged backgrounds, providing them with low-cost, accessible means of stress relief.

Middle- and high-SES children also benefited from the intervention, although to a slightly lesser extent. This may be because of their lower baseline stress levels and greater access to alternative forms of recreation and stress management. Nevertheless, the intervention's effectiveness across all SES groups highlights the universal appeal and impact of traditional games, making them valuable tools for stress relief in diverse populations (Guryan et al., 2008).

5.5. Sustainability of Stress-Relief Effects

The follow-up results indicated that, while the intervention had a lasting positive effect on stress levels, some of the benefits diminished over time. This pattern suggests that regular engagement with traditional games or similar activities may be necessary to maintain stress-relief benefits. The slight increase in stress levels at the three-month follow-up is consistent with other research showing that the effects of short-term interventions can wane without sustained

participation (Flook et al., 2010; Levin et al., 2012). To maximize the long-term impact of such interventions, schools and community organizations should consider integrating traditional games into regular programming to allow children to continue benefiting from these activities over time.

5. Conclusion

In conclusion, this study provides strong evidence that traditional Peruvian games are an effective intervention for reducing stress and improving the well-being of children. The intervention was successful across diverse demographic groups, including gender, location, age, and SES, and led to both psychological and physiological improvements. The results highlight the importance of culturally relevant low-cost interventions to promote children's mental health and well-being. To sustain the positive effects observed, it is essential to integrate traditional games into children's regular activities and consider long-term strategies to maintain stress-relief benefits. Future research should continue to explore the potential of traditional games and other culturally relevant practices to promote mental health across different populations.

Author Contributions

Conceptualization, L.A.S.-B. and Z.O.P.-S.; methodology, L.A.S.-B., R.Q.-A. and V.I.-C.; software, A.A.S.-M.; validation, L.A.S.-B., L.A.D.L.C.-R. and I.W.M.-Y.; formal analysis, J.A.P.-G.; investigation, L.A.S.-B.; resources, L.A.S.-B.; data curation, L.A.S.-B.; writing—original draft preparation, all authors contributed equally; writing—review and editing, L.A.S.-B.; visualization, R.H.-T. and T.A.-R.; supervision, L.A.S.-B.; project administration, Z.O.P.-S.; funding acquisition, L.A.S.-B. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

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

Data Availability Statement

The original contributions presented in this study are included in the article.

Conflicts of Interest

The authors declare no conflicts of interest.

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