

increase in range of motion. Data on the effectiveness of percussive massage are satisfactory but incipient. There is a wide variety with respect to the methods and population used. Systematic studies are needed to investigate the effectiveness of percussive massage using portable devices as a recovery technique in recreational runners.

Objectives: To evaluate the effectiveness of percussive massage on muscle pain in recreational runners using a portable device. Secondary objectives are to investigate muscle fatigue, general perceived effect, and performance after running.

Methods: This is a randomized clinical trial with a follow-up period of 72 hours. Athletes who run at least 6.5 km continuously and aged between 18 and 60 years will be included. Those who presented any medical condition not compatible with the study procedures, severe metabolic or cardiorespiratory disorders, musculoskeletal disorders in the lower limbs in the last 6 months, abrasions on the thigh, cramps during the evaluations and/or any change in sensitivity will be excluded. Immediately after the end of the race, the first evaluation session (pre-intervention) will be held, and participants will be evaluated for the level of muscle soreness (VAS), muscle fatigue (VAS), general perceived effect and performance (single-legged vertical jump). At the end of this process, percussive massage will be performed in the experimental group with a gun on the anterior part of the thigh, with a frequency of 55 Hz, for 10 minutes. In the control group, light and oscillatory pressure will be applied to the skin, simulating joint mobilization in the hip and knee, for 5 minutes each. Assessments of pain, fatigue and perceived general effect will be performed after the race, post-intervention, and 24h, 48h and 72h after the end of the intervention. The performance evaluation will be carried out in the pre-intervention, post-intervention, and 48 hours. The sample size was calculated using the R software. 86 participants will be needed to carry out the study.

Keywords: Muscle pain, Massage, Run

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MEASUREMENT PROPERTIES OF THE EQ-5D-Y-3L AND EQ-5D-Y-5L IN CHILDREN AND ADOLESCENTS WITH DISABLING MUSCULOSKELETAL PAIN

Caique de Melo do Espírito Santo¹, Verônica Souza Santos¹, Aureliano Paolo Finch², Janine Verstraete³, Gisela Cristiane Miyamoto¹, Tiê Parma Yamato¹

¹ Master's and Doctoral Programs in Physical Therapy, Universidade Cidade de São Paulo (UNICID), São Paulo, São Paulo, Brazil

² EuroQol Research Foundation, Rotterdam, the Netherlands

³ Department of Pediatrics and Child Health, Division of Pulmonology, University of Cape Town, South Africa

Background: The EQ-5D-Y-3L and the EQ-5D-Y-5L are friendly-child versions of the EQ-5D instruments that measure health-related quality of life in children and adolescents (kids) aged 8-15 years old. However, both instruments' measurement properties have not yet been tested in Brazilian kids yet.

Objectives: This study aimed to test the EQ-5D-Y-3L and EQ-5D-Y-5L measurement properties in Brazilian kids with disabling musculoskeletal pain.

Methods: This is a measurement proprieties study with two periods of measures was conducted in 181 Brazilian kids with disabling musculoskeletal pain (i.e., who reported pain in the back, neck, arm, or

legs that lead to school absenteeism and/or interference with normal and/or recreational activities) from public and private schools in Sao Paulo state. Kids answered the self-reported versions of the EQ-5D-Y-3L and the EQ-5D-Y-5L. We tested test-retest reliability using the Kappa coefficient for the descriptive system and intraclass correlation coefficients (ICC) for EQ-VAS. We tested construct validity (classified as sufficient if at least 75% of the results were in accordance with our pre-specified hypothesis) using the Pediatric Quality of Life Inventory questionnaire version 4.0 (PedsQL) and the Child Health Utility 9D (CHU9D). We also tested the ceiling and floor effects of the instruments using the dimensions' descriptive system and health profile and the feasibility by the missing responses.

Results: Most kids with musculoskeletal pain were female (61%) with a mean age of 12 years old (standard deviation: 3). In the descriptive system, reliability ranged from 0.32 to 0.47 for the EQ-5D-Y-3L and 0.20 to 0.49 for the EQ-5D-Y-5L. There was substantial reliability for the EQ-VAS (ICC: 0.80; 95% CI: 0.71, 0.86). Construct validity was sufficient for the EQ-5D-Y-3L and the EQ-5D-Y-5L compared to the PedsQL, sufficient for the EQ-5D-Y-5L and insufficient for the EQ-5D-Y-3L compared to the CHU9D (89%, 100%, 81%, and 47% in accordance with the hypothesis, respectively). There was as lower ceiling effect of the EQ-5D-Y-5L compared to the EQ-5D-Y-3L for all the dimensions of the descriptive system, except for the 'having pain or discomfort', while the health profile (11111) was 18.2% for the EQ-5D-Y-3L and 16% for the EQ-5D-Y-5L. The missing response rate ranged from 1.3% for the EQ-5D-Y-3L and 4% for the EQ-5D-Y-5L.

Conclusion: The descriptive system of the EQ-5D-Y-3L and the EQ-5D-Y-5L presented inadequate reliability and the EQ-VAS presented substantial reliability, but both instruments presented sufficient construct validity, except the EQ-5D-Y-3L compared to the CHU9D. Furthermore, the EQ-5D-Y-5L had lower ceiling effects compared to the EQ-5D-Y-3L and both instruments had good feasibility.

Implications: This study tested the measurement properties of the EQ-5D-Y-3L and the EQ-5D-Y-5L in Brazilian kids with disabling musculoskeletal pain. The results of this study could help clinicians to measure health-related quality of life in the youth population. Furthermore, the EQ-5D-Y-3L may facilitate the calculation of the quality-adjusted life of years in economic evaluations conducted in Brazil in the future.

Keywords: Health-related quality of life, Musculoskeletal pain, Children and adolescents

Conflict of interest: The authors declare no conflict of interest.

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OVERVIEW OF THE ECONOMIC BURDEN OF MUSCULOSKELETAL PAIN IN CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW WITH META-ANALYSIS

Caique de Melo do Espírito Santo¹, Verônica Souza Santos¹, Steven J. Kamper², Christopher M. Williams³, Gisela Cristiane Miyamoto¹, Tiê Parma Yamato¹

¹ Master's and Doctoral Programs in Physical Therapy, Universidade Cidade de São Paulo (UNICID), São Paulo, São Paulo, Brazil

² Center for Pain, Health, and Lifestyle (CPHL), New Lambton Heights, Australia; School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia; Nepean Blue Mountains Local Health District, NSW, Australia

³ School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia; University Centre for Rural Health, Lismore, NSW Australia; Research and Knowledge Translation Directorate, Mid North Coast Local Health District, NSW, Australia

Background: Some studies suggest a high economic burden among children and adolescents with musculoskeletal pain. However, there is no summary in the literature to understand the scenario of the economic burden of musculoskeletal pain in this population.

Objectives: This study aimed to synthesize the economic burden of musculoskeletal pain in children and adolescents.

Methods: We conducted electronic searches on MEDLINE, EMBASE, CINAHL, EconLit, NHS-EED, and HTA databases from inception to July/2022. We included cost-of-illness studies that estimated healthcare, patient/family, lost productivity, and/or societal costs in children and adolescents (up to 24 years old) with musculoskeletal pain. The primary outcome was cost, and the results were grouped by the same cost categories (i.e., healthcare, patient/family, lost productivity, societal), conditions, time horizon, and cost range for musculoskeletal pain. All costs were inflated to the same reference year (2021) and converted to American Dollars (\$). The risk of bias the included studies was assessed using a checklist based on the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement.

Results: We included 45 cost-of-illness studies (n=665,623). Thirty-eight studies (84.4%) were conducted in high-income countries, six (13.3%) in upper-middle-income countries, and one (2.2%) in lower-middle-income countries. Regarding the risk of bias assessment, 75.5% (n=34 studies) clearly presented the unit costs, and 69% (n=31 studies) presented the expenditure data transparently. In contrast, more than half of the studies did not include productivity costs or sensitivity analysis. The annual healthcare costs ranged from \$143 to \$41,379 per child/adolescent (n=22 studies). The annual patient/family costs ranged from \$287 to \$27,972 per child/adolescent (n=9 studies). The annual lost productivity costs ranged from \$124 to \$4,671 per child/adolescent (n=7 studies). The annual societal costs ranged from \$1,095 to \$69,351 per child/adolescent (n=9 studies). Children and adolescents with juvenile idiopathic arthritis and musculoskeletal pain had higher annual incremental healthcare costs than children and adolescents without these conditions (mean difference: \$3,800, 95% confidence interval [CI]: 50 to 7,550; mean difference: \$740, 95% CI: 470 to 1,010, respectively).

Conclusion: The annual economic burden of musculoskeletal pain per child and adolescent ranged from \$124 to \$69,351.

Implications: This systematic review summarizes the evidence of the economic burden of musculoskeletal pain in children and adolescents. The results of this study showed that the musculoskeletal pain in children and adolescents seems to represent an important part of the economic burden in children's health. However, our estimates span a large range for all cost categories, making it difficult to interpret the economic burden in this population.

Keywords: Musculoskeletal pain, Systematic review, Economic burden

Conflict of interest: The authors declare no conflict of interest.

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CO-DESIGN OF AN INTERVENTION TO INCREASE LEISURE PARTICIPATION FOR ADOLESCENTS WITH CEREBRAL PALSY GMFCS LEVELS IV AND V

Caline Cristine de Araújo Ferreira Jesus¹,
Ângela Cristina Dornelas da Silva², Beatriz Helena Brugnaro³,
Sandreane Maria dos Santos Moura⁴, Karolinne Souza Monteiro¹,
Egmar Longo¹

¹ Postgraduate Program in Rehabilitation Sciences, Faculty of Health Sciences of Trairi, Federal University of Rio Grande do Norte (UFRN), Santa Cruz, Rio Grande do Norte, Brazil

² Department of Occupational Therapy, Federal University of Paraíba (UFPB), João Pessoa, Paraíba

³ Department of Physiotherapy, Federal University of São Carlos (UFSCar), São Carlos, São Paulo, Brazil

⁴ Mother participating in the study

Background: Adolescents with cerebral palsy (CP) experience restrictions in leisure activities participation, which can impact their socialization, self-determination, and quality of life. Patient and Public Involvement (PPI) is a crucial strategy for successful interventions where the target audience participates in the research stages. Strategies such as co-design, where healthcare professionals, patients, and families collaboratively discuss preferences, priorities, and necessary ingredients, can be crucial for intervention success.

Objectives: To co-design an intervention aimed at improving leisure activities participation of adolescents with CP in partnership with adolescents, families, and rehabilitation professionals.

Methods: The study was based on Participatory Action Research and was conducted through remote discussion groups with 5 adolescents aged 12-17 years with CP, 3 classified as level IV and 2 as level V on the Gross Motor Function Classification System, their families, 3 physiotherapists, and 2 occupational therapists. The Brazilian version of the Involvement Matrix (IM) was used to manage the participants' involvement in co-designing the intervention. The IM allows research participants to know different involvement roles in the research (Listener, Co-thinker, Advisor, Partner, and Decision-maker). The Participation and Environment Measure for Children and Youth (PEM-CY), community section, was used to assess the adolescents' participation profile.

Results: The preparation phase included 6 group meetings. In the first meeting, the IM was presented, and participants chose their roles for the study. Three chose the role of Decision-maker (1 professional, 1 adolescent with CP, and 1 mother), and 12 chose the role of Partner (4 professionals, 4 adolescents, and 4 mothers). Partners contributed suggestions, while decision-makers planned the participation groups. The second and third meetings included adolescents/families and rehabilitation professionals separately, where the concept of participation was discussed. The results of the PEM-CY were discussed in the fourth and fifth meetings. The last meeting of this phase included all participants, who discussed barriers and facilitators of participation and identified the necessary ingredients for the intervention. In this meeting, a model of intervention to increase the participation of adolescents with disabilities was presented as a strategy to facilitate the co-construction of the intervention proposal. The Co-design phase included three meetings with all participants; in the first two, co-construction of the intervention was conducted, and in the last, the co-constructed intervention was presented, and the intervention proposal was validated by all participants.

Conclusion: This study presents an innovative proposal that uses PPI for co-designing an intervention aimed at improving participation. The use of the IM optimized the participation of all involved parties who, through a collaborative process, were able to elaborate the intervention proposal.