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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

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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.

Implications: The next step will be to test the feasibility of the intervention, co-designed with the target audience, which can lead to better results as it considers the real needs of the studied population.
Keywords: Patient and Public Involvement, Cerebral Palsy, Leisure

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HEART RATE VARIABILITY AND FUNCTIONAL CAPACITY OF INDIVIDUALS WITH TYPE 2 DIABETES AFFECTED BY COVID-19 IN THE LONG TERM

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Background: COVID-19 can worsen the clinical and functional condition of individuals with chronic diseases such as type 2 diabetes (DM2). There is a lack of knowledge regarding the long-term autonomic and functional impairments of individuals with T2DM affected by COVID-19.
Objectives: To assess whether individuals with DM2 affected by COVID-19 for one year or more have reduced heart rate variability (HRV) and functional capacity compared to those without a history of this disease.
Methods: This cross-sectional case-control study. The sample consisted of individuals with DM 2, with a history of COVID-19 (DMCoV Group), and without a history of COVID-19 (DM Group). All participants had their level of physical activity assessed using the International Physical Activity Questionnaire (short version). Heart rate (HR) and the following HRV measurements were evaluated at rest: standard deviation of normal R-R intervals (iNN) (SDNN); root mean square differences between successive iNN (RMSSD); percentage of successive iNN with difference >50ms (pNN50); low (LF) and high frequency (HF) spectral components in absolute (ms^2) and normalized (u.n) units. Functional capacity was evaluated based on the distance covered in the Incremental Shuttle Walking Test (ISWT) in meters. Data distribution was assessed using the Shapiro-Wilk test. Variables with normal distribution are expressed as mean ± standard deviation and the others as median [interquartile range]. Categorical variables were compared using the chi-square test, and numerical variables using the unpaired t-test or the Mann-Whitney test. For all tests, a significance level of 5% was adopted.
Results: Twenty-three individuals of both sexes participated in the study, nine from the DMCov group and fourteen from the DM group (61.78±10.39 years vs. 55.29±9.69 years, P=0.142; 33.3% women vs. 50% women, P=0.669). There was no significant difference in the level of physical activity between the DMCov and DM groups (P=0.235): very active (33.3% vs. 35.7%), active (22.2% vs. 50.0%), irregularly active (22.2% vs. 14.2%) and sedentary (22.2% vs. 0.0%). HR (71.9±10.5 bpm vs. 72.6±11.5 bpm; P=0.876), HRV measurements (SDNN(ms): 39.0±20.8 vs. 25.7± 13.5; P=0.076. RMSSD(ms): 20.7[9.3-57.8] vs. 13.2[9.1-26.7]; P=0.403. pNN50(%): 2 ,2[0.5-27.0] vs. 0.4[0.0-2.7]; P=0.159. LF(ms^2): 346.0[65.0-614.0] vs. 199 ,0[29.5-343.5]; P=0.277. HF(ms^2): 125.0[26.5-705.0] vs. 82.0[26.8-253.8]; P= 0.439 LF(un): 64.2±16.8 vs. 59.4±17.4 P=0.518 HF(un): 35.6±16.8 vs. 40.2±16.7; P=0.528) and functional capacity (272.5± 112.7 meters vs. 373.9±105.6 meters; P=0.051) showed no significant difference when comparing the groups DMCov and DM.
Conclusion: COVID-19 did not impair long-term cardiac autonomic modulation in individuals with T2DM. On the other hand, the fact that individuals with a history of COVID-19 walked an average of a hundred meters less on the ISWT compared to those without this history suggests impairment of functional capacity caused by COVID-19.
Implications: The findings of this study are preliminary and point to the need for future investigations involving a larger sample size and including other measures of modulation and cardiac autonomic function to confirm the results found.
Keywords: Diabetes Mellitus, COVID-19, Autonomic Nervous System

Conflict of interest: The authors declare no conflict of interest.
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UNPLANNED EXTUBATION: CHARACTERISTICS OF NEWBORN INFANTS HOSPITALIZED IN A NEONATAL INTENSIVE CARE UNIT

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Background: Unplanned extubation is an adverse event associated with endotracheal intubation and the use of invasive mechanical ventilation. Extubation failure and the need for reintubation are considered procedures that increase neonatal morbidity and mortality.
Objectives: To analyze the characteristics of newborns who had an unplanned extubation event during their stay in a neonatal intensive care unit (NICU).
Methods: The data from this study belong to a multicenter study called “Predictive factors for extubation failure in newborns admitted to a NICU: a multicenter study”. Data were collected from hospitalization records from July 2017 to 2019. Newborns who used invasive mechanical ventilation through an orotracheal tube for at least 24 hours were included. Data collection was carried out in six NICUs in five Brazilian cities: Manaus-AM (North), Natal-RN (Northeast), Brasília-DF (Central-West), Belo Horizonte-MG (Southeast) and Florianópolis and São José-SC (South). The information extracted from the medical records was transcribed into *Microsoft*