**UNIVERSIDADE FEDERAL DE MINAS GERAIS**

**Escola de Educação Física, Fisioterapia e Terapia Ocupacional**

**Programa de Pós-graduação em Ciências da Reabilitação**

Luana Cristina da Silva

# UM PROGRAMA DE ESPORTES MODIFICADOS ASSOCIADO A UMA INTERVENÇÃO FOCADA NO CONTEXTO PARA CRIANÇAS COM PARALISIA CEREBRAL: um ensaio clínico randomizado de viabilidade

Belo Horizonte

2024

Luana Cristina da Silva

# UM PROGRAMA DE ESPORTES MODIFICADOS ASSOCIADO A UMA INTERVENÇÃO FOCADA NO CONTEXTO PARA CRIANÇAS COM PARALISIA CEREBRAL: um ensaio clínico randomizado de viabilidade

Dissertação apresentada ao Programa de Pós-Graduação em Ciências da Reabilitação como requisito parcial para obtenção do título de Mestre em Ciências da Reabilitação pela Universidade Federal de Minas Gerais.

Orientador: Prof. Dr. Hércules Ribeiro Leite
Coorientadores: Dra. Deisiane Souto e Prof. Dr. Rafael Coelho Magalhães

Belo Horizonte

2024

S586p 2024

Silva, Luana Cristina da

Um programa de esportes modificados associado a uma intervenção focada no contexto para crianças com paralisia cerebral: um ensaio clínico de viabilidade. [manuscrito] / Luana Cristina da Silva – 2024.

97 f.: il.

Orientador: Hércules Ribeiro Leite
Coorientador: Rafael Coelho Magalhães
Coorientadora: Deisiane Souto

Dissertação (mestrado) – Universidade Federal de Minas Gerais, Escola de Educação Física, Fisioterapia e Terapia Ocupacional.

Bibliografia: f. 81-83

1. Esportes para deficientes físicos – Teses. 2. Paralisia cerebral – Teses. 3. Paralisia cerebral nas crianças – Reabilitação – Teses. I. Leite, Hércules Ribeiro. II. Magalhães, Rafael Coelho. III. Souto, Deisiane. IV. Universidade Federal de Minas Gerais. Escola de Educação Física, Fisioterapia e Terapia Ocupacional. V. Título.

CDU: 615.8

**Ficha catalográfica elaborada pela bibliotecária Sheila Margareth Teixeira Adão, CRB 6: n° 2106, da Biblioteca da Escola de Educação Física, Fisioterapia e Terapia Ocupacional da UFMG.**

**UNIVERSIDADE FEDERAL DE MINAS GERAIS**

**PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS DA REABILITAÇÃO**

UFMG

# ATA DA DEFESA DA DISSERTAÇÃO DA ALUNA
# **LUANA CRISTINA DA SILVA**

Realizou-se, no dia 20 de agosto de 2024, às 08:00 horas, no Miniauditório da EEFFTO, da Universidade Federal de Minas Gerais, a defesa de dissertação, intitulada *UM PROGRAMA DE ESPORTES MODIFICADOS ASSOCIADO A UMA INTERVENÇÃO FOCADA NO CONTEXTO PARA CRIANÇAS COM PARALISIA CEREBRAL: Um ensaio clínico randomizado de viabilidade*, apresentada por LUANA CRISTINA DA SILVA, número de registro 2022689890, graduada no curso de FISIOTERAPIA, como requisito parcial para a obtenção do grau de Mestre em CIÊNCIAS DA REABILITAÇÃO, à seguinte Comissão Examinadora: Prof(a). Hercules Ribeiro Leite - Orientador (UFMG), Prof(a). Deisiane Oliveira Souto (Universidade Brasil), Prof(a). Rafael Coelho Magalhães (UFMG), Prof(a). Daniela Virginia Vaz (UFMG), Prof(a). Fernanda Viotti Parreira (UFMG).

A Comissão considerou a dissertação:

(X) Aprovada

( ) Reprovada

Finalizados os trabalhos, lavrei a presente ata que, lida e aprovada, vai assinada por mim e pelos membros da Comissão.
Belo Horizonte, 20 de agosto de 2024.

Prof(a). Hercules Ribeiro Leite ( Doutor )

Prof(a). Deisiane Oliveira Souto ( Doutora )

Prof(a). Rafael Coelho Magalhães ( Doutor )

Prof(a). Daniela Virginia Vaz ( Doutor )

Prof(a). Fernanda Viotti Parreira ( Doutora )

UNIVERSIDADE FEDERAL DE MINAS GERAIS

PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS DA REABILITAÇÃO

UFMG

# FOLHA DE APROVAÇÃO

**UM PROGRAMA DE ESPORTES MODIFICADOS ASSOCIADO A UMA INTERVENÇÃO FOCADA NO CONTEXTO PARA CRIANÇAS COM PARALISIA CEREBRAL: Um ensaio clínico randomizado de viabilidade**

**LUANA CRISTINA DA SILVA**

Dissertação submetida à Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em CIÊNCIAS DA REABILITAÇÃO, como requisito para obtenção do grau de Mestre em CIÊNCIAS DA REABILITAÇÃO, área de concentração DESEMPENHO FUNCIONAL HUMANO.

Aprovada em 20 de agosto de 2024, pela banca constituída pelos membros:

Prof(a). Hercules Ribeiro Leite - Orientador
UFMG

Prof(a). Deisiane Oliveira Souto
Universidade Brasil

Prof(a). Rafael Coelho Magalhães
UFMG

Prof(a). Daniela Virginia Vaz
UFMG

Prof(a). Fernanda Viotti Parreira
UFMG

Belo Horizonte, 20 de agosto de 2024.

## AGRADECIMENTOS

O caminho até aqui foi longo! Mesmo que um dia eu tenha sonhado chegar onde estou, a realização sempre bate à porta como uma surpresa. Muita coisa se passou até aqui, que para sempre ficarão guardadas em meu coração ou marcadas na minha história. Minha única certeza é a de que não teria chegado até aqui se não fossem as pessoas incríveis que cruzaram meu caminho durante essa trajetória. Antes de mais nada, agradeço a Deus pela oportunidade de estar aqui, viver, amar e me confortar. Agradeço a minha mãe Lourdes (em memória) e mãe dos meus maiores bens, Jenifer (em memória). Vocês são grandes mulheres e sempre deixarão saudades.

Em meio às maiores turbulências vividas, encontrei sossego e conforto em pessoas incríveis. Giovanna, minha dupla desde o início da jornada acadêmica e irmã de vida: sem você eu não teria aguentado! Obrigada por ter pegado na minha mão e nunca mais largado. Larissa, viver a vida ao seu lado é meu presente diário. Letícia, Mariane e Rafaela, as profissionais mais incríveis que eu conheço, tenho um orgulho tremendo de vocês, obrigada por sempre estarem comigo! À minha família, muito do que sou veio de vocês, obrigada a todos e em especial tia Andréia, tia Sônia e Ângela, admiro vocês muito! Aos seres mais iluminados, que dão um banho de empatia, comunicação não violenta, inteligência e amor por onde passam Ana Sofia, Caio, Miguel, Ana Júlia, Maria Helena, Emanuele e Alice, amo vocês daqui até o infinito.

Agradeço muito a Universidade Federal de Minas Gerais e às políticas públicas, porque sem essas eu literalmente não estaria onde estou. Clamo para que uma educação de qualidade chegue a todos! Educação muda vidas! Aos meus eternos mestres, que tanto me ensinam e apoiam nas minhas trajetórias professores(as) Larissa, Rafael, Deisiane e Ana Cristina. Como é bom aprender com vocês. Obrigada por tudo! Um agradecimento mais que especial ao professor Hércules por sempre confiar em mim, me dar oportunidades únicas e ainda por cima ser um grande parceiro. Foi uma sorte imensa ter esbarrado com você nessa vida! Eu te admiro demais, você é grande e de um coração lindo! Espero estar com você por muitos anos pela frente. Impossível não agradecer a Liliane e a Fernanda Lanza por cada minuto que vocês me doam com tanto carinho. Vocês são incríveis!

Por último e com grande importância, agradeço a melhor equipe: Ricardo nosso “doutorando referência”, Mariane e Rafaela, João, Palloma, Paulo, Flávia, Arthur, Acsa, Julia, Ana Carolina, Emily e Ana Clara, vocês são demais. O Sports Stars só é um projeto incrível porque vocês fizeram parte disso. Obrigada por toda entrega!

## RESUMO

A efetividade de diferentes modelos de intervenção para melhorar a participação de crianças com Paralisia Cerebral vem sendo comprovada na literatura. Entre eles, podemos citar as intervenções de esportes modificados, que promovem a participação por meio da melhora de fatores intrínsecos ao indivíduo, e a terapia focada no contexto, que se concentra nos fatores extrínsecos relacionados ao contexto em que a participação ocorre. Considerando que ambas promovem a participação por mecanismos de ação distintos, surge o questionamento de se a combinação dos dois modelos pode gerar melhores resultados. Por isso, o objetivo do presente estudo foi investigar a viabilidade de realizar um ensaio clínico aleatorizado (ECA) para avaliar a efetividade de uma intervenção de esportes modificados (Sports Stars Brasil) combinada com uma terapia focada no contexto (Caminhos e Recursos para Engajamento na Participação - PREP), assim como os efeitos preliminares dessa combinação. Este é um ensaio clínico de viabilidade. Nove participantes foram aleatoriamente alocados no grupo Sports Stars Brasil + PREP, e nove no grupo Sports Stars Brasil. As medidas de viabilidade incluíram: vontade de participar num ECA; aceitabilidade da alocação aleatória; aceitabilidade dos procedimentos de triagem; viabilidade de cegamento do avaliador; contaminação entre os grupos, adesão e satisfação com o tratamento; comunicação dos terapeutas; ocorrência de eventos adversos e recursos para implementação. Os desfechos secundários foram obtidos usando a Medida Canadense de Desempenho Ocupacional (COPM), a Medida de Participação e Ambiente - Crianças e Jovens (PEM-CY), a Escala de Empoderamento Familiar (FES), o Questionário de Alfabetização Física (PLP-Quest) e o acelerômetro. Esses instrumentos foram utilizados na avaliação pré e pós intervenção, e no follow up de 12 semanas. Estatísticas descritivas e testes apropriados foram utilizados para a análise dos dados. A análise de viabilidade revelou, em ambos os grupos, níveis adequados de satisfação, credibilidade e aceitabilidade das intervenções; entretanto a taxa de recrutamento e de contaminação entre os grupos não foram adequadas. Em relação aos desfechos secundários, diferenças estatisticamente significativas foram encontradas a favor do grupo Sports Stars Brasil + PREP na COPM, na FES, e no envolvimento na escola avaliada pela PEM-CY. Pode-se concluir, então, que é viável implementar um ensaio clínico mais robusto para investigar a efetividade da combinação dessas intervenções, embora com algumas adaptações nos procedimentos. Além disso, a combinação tem potencial de melhorar desfechos relevantes.



**Palavras chave:** Paralisia Cerebral, Intervenção de Esportes Modificados, Terapia Focada no Contexto, Viabilidade.

## ABSTRACT

The effectiveness of different intervention models to improve the participation of children with Cerebral Palsy has been demonstrated in the literature. Among them, we can mention modified sports interventions, which promote participation by improving factors intrinsic to the individual, and context-focused therapy, which concentrates on extrinsic factors related to the context in which participation occurs. Considering that both promote participation through distinct mechanisms of action, the question arises whether the combination of the two models can lead to better results. Therefore, the aim of the present study was to investigate the feasibility of conducting a randomized controlled trial (RCT) to evaluate the effectiveness of a modified sports intervention (Sports Stars Brazil) combined with a context-focused therapy (Pathways and Resources for Engagement and Participation - PREP), as well as the preliminary effects of this combination. This is a feasibility clinical trial. Nine participants were randomly allocated to the Sports Stars Brazil + PREP group, and nine to the Sports Stars Brazil group. Feasibility measures included: willingness to participate in an RCT; acceptability of random allocation; acceptability of screening procedures; feasibility of assessor blinding; contamination between groups; adherence and satisfaction with the treatment; communication among therapists; occurrence of adverse events and resources for implementation. Secondary outcomes were obtained using the Canadian Occupational Performance Measure (COPM), the Participation and Environment Measure for Children and Youth (PEM-CY), the Family Empowerment Scale (FES), the Physical Literacy Questionnaire (PLP-Quest), and an accelerometer. These instruments were used in pre- and post-intervention assessments, and at a 12-week follow-up. Descriptive statistics and appropriate tests were used for data analysis. Feasibility analysis revealed adequate levels of satisfaction, credibility, and acceptability of the interventions in both groups; however, the recruitment rate and contamination between groups were not adequate. Regarding secondary outcomes, statistically significant differences were found in favor of the Sports Stars Brazil + PREP group on the COPM, in the FES, as well as in school involvement assessed by the PEM-CY. It can be concluded that it is feasible to implement a more robust clinical trial to investigate the effectiveness of combining these interventions, although some procedural adjustments are necessary. Moreover, the combination has the potential to improve relevant outcomes.



**Keywords:** Cerebral Palsy, Modified Sports Intervention, Context-Focused Therapy, Feasibility.

## LISTA DE ILUSTRAÇÕES

## LISTA DE TABELAS

## LISTA DE ABREVIATURAS E SIGLAS

| | |
|---|---|
| ANOVA | Analysis of variance |
| CAAE | Certificado de Apresentação de Apreciação Ética |
| CAPES | Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior |
| CFCS | Communication Function Classification System |
| CI | Confidence Interval |
| CIF-CJ | Classificação Internacional de Funcionalidade Incapacidade e Saúde-Crianças e jovens |
| CNPq | Conselho Nacional de Desenvolvimento Científico e Tecnológico |
| CONSORT | Consolidated Standards of Reporting Trials |
| COPM | Canadian Occupational Performance Measure |
| CP | Cerebral Palsy |
| ECA | Ensaio Clínico Aleatorizado |
| FAPEMIG | Fundação de Amparo à Pesquisa do Estado de Minas Gerais |
| FES | Family Empowerment Scale |
| fCRP | Família de constructos relacionados a participação |
| fPRC | Family of participation-related constructs |
| GC | Georgina Clutterbuck |
| GMFCS | Gross Motor Function Classification System |
| ICC | Intraclass Coefficient Correlation |
| ICF | International Classification of Functioning, Disability and Health |
| IQR | Interquartile range |
| LPA | Light physical activity |
| MACS | Manual Ability Classification System |
| MCID | Minimum clinically important difference |
| n | Número |
| PC | Paralisia Cerebral |
| MVPA | moderate-to-vigorous physical activity |
| PEM-CY | Participation and Environment Measure for Children and Youth |
| PLP-Quest | Physical Literacy Profile Questionnaire |
| PREP | Pathways and Resources for Engagement and Participation Intervention |
| RCT | Randomized Controlled Trial |
| ROM | Range of motion |

| | |
|---|---|
| SD | Standart deviation |
| SPSS | Statistical Package for the Social Sciences |
| SSB | Sports Stars Brazil |
| UFMG | Universidade Federal de Minas Gerais |
| USA | United States of America |

**SUMÁRIO**

## PREFÁCIO

Esta dissertação foi estruturada de acordo com as orientações da regulamentação para elaboração de Dissertações e Teses do Programa de Pós-graduação em Ciências de Reabilitação da Escola de Educação Física, Fisioterapia e Terapia Ocupacional na Universidade Federal de Minas Gerais (Resolução N° 004/2018). Este documento é dividido em quatro partes. A introdução compõe a primeira parte, que contém uma revisão bibliográfica acerca do tema de estudo, assim como sua justificativa, os objetivos e as hipóteses racionalizadas acerca dos resultados esperados. Na segunda parte é apresentado o artigo-1, um dos produtos do presente trabalho, que foi publicado no periódico *British Medical Journal* (ISSN: 1756-1833) em 2023. A terceira parte é composta pelo artigo-2 que contempla os objetivos do presente estudo. Este produto foi submetido ao periódico *Physical and Occupational Therapy in Pediatrics* (ISSN: 0194-2638) em julho de 2024, e até o momento da elaboração dessa dissertação ainda não houve retorno do editor da revista. A quarta parte contém as considerações finais acerca dos resultados obtidos. Por fim, há um minicurrículo da autora desta dissertação.

## 1. INTRODUÇÃO

A Paralisia Cerebral (PC) é a uma das principais causas de deficiência física na infância e estima-se que haja uma prevalência entre 1,6 e 2,9 a cada 1.000 nascidos vivos em países desenvolvidos; e de 2,3 a 3,7 a cada 1.000 nascidos vivos em países em desenvolvimento (Mcintyre *et al.,* 2022). A PC apresenta como sinal clínico primário alterações de postura e movimento, que impactam na função motora do indivíduo (Rosenbaum *et al.,* 2007). Trata-se de um distúrbio não progressivo que afeta o sistema nervoso central em desenvolvimento, com lesões que podem ocorrer no período pré-natal, durante ou após o parto. Indivíduos com PC podem apresentar comorbidades, incluindo alterações nas funções cognitivas, de comunicação, de comportamento, sensoriais e perceptuais, epilepsia e distúrbios musculoesqueléticos secundários (Rosenbaum *et al.,* 2007). Essas alterações relacionadas à PC, impactam diretamente na restrição da participação social frequentemente observadas nessa população, incluindo a participação em atividade física. Entretanto, fatores contextuais como atitudes de familiares, professores e colegas, ausência de acessibilidade e de profissionais capacitados, ausência de transporte adequado entre outros também influenciam esse desfecho negativo (Anaby *et al.,* 2013; Abid *et al,* 2022; Shields; Synnot, 2016; Wright *et al.,* 2019; Longo *et al.,* 2020). A participação em atividades físicas está associada a melhores desfechos em saúde e promove o desenvolvimento de habilidades sociais, cognitivas e psicológicas (Eime *et al.,* 2013; Poitras *et al.,* 2016). Portanto, aumentar o nível de participação em atividade física deve ser um objetivo central para profissionais envolvidos na pesquisa e reabilitação de crianças com PC, bem como para aqueles responsáveis pelo desenvolvimento de políticas públicas em saúde.

As diretrizes para a prática de atividade física por crianças com PC recomendam a realização de pelo menos 60 minutos diários de atividade física de moderada a alta intensidade, por no mínimo 5 dias por semana, e a limitação de atividades sedentárias a, no máximo, 2 horas por dia (Verschuren *et al*., 2017). Atividade física foi inicialmente definida como a movimentação corporal gerada pela musculatura esquelética, que requer gasto energético (Caspersen, Powell, Christenson, 1985). Entretanto, uma definição mais contemporânea foi proposta por Piggin (2020), que conceitua atividade física como "*pessoas se movendo, agindo e realizando dentro de espaços e contextos culturalmente específicos, por meio da influência de um conjunto único de interesses, emoções, ideias, instruções e relacionamentos*". Esse conceito proposto por Piggin (2020) é mais amplo e se relaciona melhor com a participação em atividade física, enquanto a definição de Caspersen *et al*. (1985) considera, principalmente os fatores

fisiológicos relacionados à prática de atividade física. Para alcançar as recomendações mencionadas, a participação em atividade física de lazer surge como uma adequada alternativa. Atividade física de lazer descreve um grupo de atividades a qual um indivíduo participa durante o tempo livre, com base em interesses e necessidades pessoais (Howley, 2001). Esse perfil de atividade pode ser categorizado em atividades estruturadas ou não estruturadas.

Atividades estruturadas são aquelas lideradas por um profissional e incluem treinos organizados (Coutinho *et al*., 2016). Essas atividades podem incluir jogos pedagógicos a fim de melhorar o desempenho e envolve a prática de atividades divertidas e competições organizadas. As atividades estruturadas permitem a observação do desempenho dos pares e maior engajamento em atividades que podem levar ao aprendizado (exemplos típicos incluem aula de futebol, natação, dança) (Coutinho *et al*., 2016). As atividades não estruturadas englobam atividades informais, que podem ser realizados em ambientes variados (parques, praças, rua, entre outros), e com pessoas do interesse da criança (irmãos, primos, amigos, entre outros). Essas atividades não são pedagogicamente planejadas e são caracterizadas pelo seu valor extrínseco no desenvolvimento de habilidades. Podem envolver uma variedade de brincadeiras (andar de bicicleta, praticar corrida, jogar basquete, futebol, queimada, entre outros) que são espontaneamente criadas pelas crianças e adaptadas de acordo com o contexto (onde está ocorrendo a brincadeira, quem está participando, o horário) (Coutinho *et al*., 2016; Côté, Erickson, Abernethy, 2013). Estudos indicam que indivíduos com PC tendem a apresentar menores níveis de participação em ambos os perfis de atividade do que seus pares com desenvolvimento típico (Shikako-Thomas, 2008; Longo; Badia; Orgaz, 2013).

Diversos fatores têm sido identificados como barreiras significativas à participação em atividade física por jovens com deficiência, incluindo aqueles com PC, conforme relatado por eles mesmos e por seus cuidadores. Entre essas barreiras, destacam-se as limitações corporais (dor, cansaço, limitações físicas, desalinhamentos posturais), fatores auto restritivos (baixa autoestima, autoconfiança, motivação), estrutura arquitetônica, transporte, atitudes de familiares, professores e colegas de turma; intervenções médicas, e ausência de programas comunitários apropriados e inclusivos (Shields; Synnot, 2016; Wright *et al*., 2019; Longo *et al*., 2020). Uma revisão recente sintetizou os resultados de estudos quantitativos que investigaram os determinantes da participação em atividade física de crianças e adolescentes com PC. No contexto desta revisão, participação em atividade física foi definida como "*experiências com demanda física, esportes, jogos, ou brincadeiras recreativas que resultam*

*em gasto energético e percepção de envolvimento na comunidade*", ou seja, incluíram atividades estruturadas e não estruturadas (Abid *et al*., 2022). Entre os achados dessa revisão, foi possível observar que fatores individuais estão relacionados aos níveis de participação em atividade física. Esses fatores incluem função motora, dor, displasia de quadril, função de comunicação, visual, psicológica e questões nutricionais; idade; capacidade funcional; atitudes, como a participação em clubes esportivos; autoeficácia como a percepção de autoconfiança; preferência por atividade físicas e satisfação com a participação em atividade física (Abid *et al*., 2022).

Fatores ambientais também impactam diretamente na participação em atividade física. Entre esses fatores estão transporte, assistência em atividades de autocuidado, país de residência, nível de desenvolvimento dos bairros de residência, atitude dos familiares, professores e amigos, suporte da comunidade, engajamento da família em atividade física, ambientes adaptados (casa, escola e comunidade), e presença de programas comunitários apropriados e inclusivos (Shields; Synnot, 2016; Wright *et al*., 2019; Longo *et al*., 2020; Abid *et al*., 2022). Do ponto de vista de profissionais que atuam na reabilitação ou que promovem a prática de atividade física, as principais barreiras são a restrição de tempo dos pais/cuidadores e crianças, quem escolheu a atividade física (criança com PC ou os familiares), ausência de acessibilidade e inclusão (ausência de modificação das atividades de acordo com a capacidade das crianças), limitações práticas (local da atividade, restrição financeira, transporte), experiência prévia de atividade física e severidade da deficiência (Shields; Synnot, 2016; Wright *et al*., 2019). Como observado, várias são as possibilidades de fatores pessoais e ambientais que impactam na participação, direta e subjetivamente, variando de acordo com a realidade de cada indivíduo. Portanto, é imperativo o desenvolvimento de modelos de intervenção que reconheçam a diversidade de barreiras e facilitadores que afetam a participação e que levem em conta as múltiplas dimensões que influenciam a capacidade e a motivação para a prática de atividades físicas.

Nas últimas décadas, muitos estudos têm sido desenvolvidos com o intuito de compreender os fatores que impactam e que são impactados pela participação, e consensos acerca da conceituação deste construto complexo. Um avanço significativo nesse campo foi a proposta de Imms *et al*. (2016) que propuseram o *framework* intitulado família de Constructos Relacionados à Participação (fCRP). Este framework tem sido amplamente utilizado como embasamento conceitual para os estudos relacionados a participação de crianças com deficiência. O fCRP é um modelo teórico que organiza e integra diversos constructos

relacionados à participação, proporcionando uma estrutura clara para a investigação científica e a prática. O fCRP determina que a participação apresenta dois componentes essenciais, a se saber: *attendance* e *involvement* (Imms *et al*., 2017). *Attendance* está relacionado ao "estar presente" e pode ser mensurado pela frequência de participação e/ou a variedade e diversidade dessa participação. Já *involment* se relaciona à experiência de participação quando se está presente e pode incluir componentes de engajamento, conexão social, motivação, persistência e nível de afeto. Em complemento ao framework, os fatores que impactam ou são impactados pela participação são divididos em dois grupos: os fatores intrínsecos e os fatores extrínsecos (Imms *et al*., 2017).

Os fatores intrínsecos são relacionados ao indivíduo e se expressam como competência em atividades, senso de si e preferências, enquanto os fatores extrínsecos ao indivíduo são aqueles relacionados ao contexto e ao ambiente. A competência em atividades se refere a quanto um indivíduo consegue desempenhar uma atividade em relação ao nível ou modo de execução esperado. Nesse sentido, esse fator considera a habilidade do indivíduo enquanto realiza uma tarefa. O senso de si considera aspectos de autodeterminação, autoestima, autoconfiança e as experiências de satisfação com a participação, ou seja, é a percepção do indivíduo acerca de si. As preferências são significativas, importantes ou que recebem prioridade sobre outras atividades da vida de um indivíduo. O desenvolvimento desses fatores é influenciado pela experiência de participação passada e influenciam a participação futura (Imms *et al.,* 2017). Em relação aos fatores extrínsecos, o contexto se refere as pessoas, locais, objetos, atividades e momento na qual a participação acontece, enquanto ambiente se refere aos elementos físicos (por ex.: clima, terreno, estrutura física) e sociais (por ex.: comunidade, cultura, práticas, atitudes e processos institucionais) no qual a pessoa vive (Imms *et al*., 2017). Estes fatores não são sinônimos de participação, entretanto estão estreitamente relacionados a este desfecho. O desenvolvimento de intervenções que visam promover a participação deve considerar a interação dinâmica entre esses fatores e a participação.

Um modelo de intervenção que tem apresentado evidências de melhora nos desfechos de participação em atividades físicas recreativas é a intervenção de esportes modificados (Clutterbuck; Auld; Johnston, 2020; Sousa Junior *et al*., 2022A). Esse tipo de intervenção tem como alvo a melhora da performance de habilidades motoras (Sousa Junior *et al*., 2024). O ingrediente ativo essencial dos esportes modificados é o treino de habilidades motoras relacionadas aos esportes, combinado com a introdução esportiva por meio dos jogos

modificados (Sousa Junior *et al*., 2024). Outros ingredientes que podem ser implementados são a realização do treino em grupo, a inclusão do treino de habilidades sociais, psicológicas e cognitivas e o treino em ambientes de prática esportiva de vida real (Sousa Junior *et al*., 2024). Quando esses ingredientes adicionais são implementados, a criança melhora também os componentes da alfabetização física (físico, social, psicológico e cognitivo) que são habilidades que o indivíduo desenvolve para promover o engajamento em atividades físicas ao longo da vida (Sousa Junior *et al*., 2024). O desenvolvimento dessas habilidades prepara a criança para a participação em atividades físicas esportivas ou recreativas. Considerando o fCRP, essa intervenção impacta na participação ao melhorar a competência em atividades. Uma recente revisão sistemática mostrou que esse modelo de intervenção é efetivo para melhorar os desfechos de participação em atividades físicas recreativas para crianças com PC em curto e médio prazo (Sousa Junior *et al.*, 2022A). Entre os estudos incluídos nessa revisão, o único protocolo de intervenção de esportes modificado utilizado foi o programa *Sports Stars*.

Desenvolvido na Austrália, o *Sports Stars* é uma intervenção desenvolvida para crianças com PC que visa facilitar a transição dos atendimentos fisioterapêuticos individuais para a prática esportiva na comunidade (Clutterbuck *et al*., 2024). Durante as sessões, são realizados treinos de habilidades motoras fundamentais relacionados a esportes culturalmente relevantes da região, assim como a introdução esportiva por meio do treino de esportes modificados. No protocolo foram incluídas quatro modalidades: futebol, *netball*, *t-ball* e *cricket* (Clutterbuck; Auld; Johnston, 2018). O protocolo foi planejado a fim de avaliar e estimular a progressão nos domínios físico, social, cognitivo e psicológico da alfabetização física. Essa avaliação é realizada por uma escala de 5 pontos, que vai de -2 a +2, sendo -2 o nível mais fácil (por ex. -2: “anda rapidamente entre cones espaçados com uma distância grande” no domínio físico ou “interação pobre ou inapropriada com os colegas” no domínio social) e +2 a mais difícil (por ex.: +2: “corre rapidamente entre cones espaçados com uma distância curta, sem derrubá-los” no domínio físico ou “competitivo e encorajador” no domínio social). As sessões do programa foram conduzidas por fisioterapeutas em parques comunitários e ocorriam semanalmente ao longo de um período de oito semanas (Clutterbuck; Auld; Johnston, 2018). Cada sessão é estruturada em: 10 minutos de recepção dos pais, 5 minutos de aquecimento, 10 minutos de treino de habilidades de locomoção, 20 minutos do treino de habilidades de controle de objetos, 10 minutos do treino de esportes modificados e 5 minutos de desaquecimento (Clutterbuck; Auld; Johnston, 2018). A efetividade do programa *Sports Stars* foi investigada

com crianças com PC australianas e os resultados apontaram melhora no alcance de metas de participação em atividades esportivas e recreativas, no nível de habilidades motoras avançadas, e na alfabetização física, conforme relato dos pais (Clutterbuck; Auld; Johnston, 2020A, Clutterbuck; Auld; Johnston, 2020B).

O protocolo *Sports Stars* foi adaptado para o contexto brasileiro. Foram realizadas modificações nas modalidades esportivas a fim de incluir esportes culturalmente relevantes no Brasil, sendo eles o futebol, handebol, basquete e atletismo. Também foram realizadas modificações na divisão de tempo dos treinos de habilidades, sendo 15 minutos para o treino de locomoção e 15 minutos para o treino de controle de objetos (Sousa Junior *et al*., 2022B). Essa modificação reflete a maior demanda por habilidades de locomoção nas modalidades escolhidas para o protocolo brasileiro. Além disso, no protocolo brasileiro as sessões são lideradas por fisioterapeutas em parceria com profissionais de educação física (Sousa Junior *et al*., 2022B). Esse programa adaptado, denominado *Sports Stars* Brasil, foi implementado em crianças brasileiras e os resultados, segundo a percepção dos pais, indicam um impacto positivo da intervenção em todos os domínios das *F-words* (*Fitness*, *Functioning*, *Family*, *Friends*, *Fun* e *Future*) (Sousa Junior *et al*., 2023). As F-words se baseiam nos domínios da Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF) da Organização Mundial de Saúde (OMS), e são altamente recomendadas como norteadoras da reabilitação pediátrica (Rosenbaum; Gorter, 2011).

Como observado, o *Sports Stars* promove a participação, primariamente, por meio da melhora de fatores intrínsecos ao indivíduo, não focando nos fatores extrínsecos relacionados a participação. Entretanto, como citado previamente, fatores ambientais são barreiras significativas à participação, sendo necessário a implementação de intervenções capazes de modifica-los. As intervenções focadas no contexto visam modificar as características da tarefa e/ou ambiente, ao invés de tentar modificar as deficiências da criança (Darrah *et al*., 2011). Este modelo de intervenção é fundamentado na teoria dos sistemas dinâmicos, que postula que o comportamento motor emerge da interação espontânea das características da criança, a demanda da tarefa e as influências ambientais (Thelen, 1995; Darrah *et al*., 2011). Os princípios da teoria centrada na família também são integrados neste modelo de terapia, uma vez que utiliza da parceria colaborativa entre os terapeutas e familiares (Bamm; Rosenbaum, 2008). O estudo realizado por Novak *et al*. (2019) aponta que as intervenções focadas no contexto são adequadas para serem implementadas na reabilitação de crianças com PC, quando os desfechos são relacionados a autocuidado e mobilidade. Entretanto, esse modelo de

intervenção também vem sendo proposto como uma adequada alternativa para melhorar desfechos de participação de crianças com deficiência (Law *et al*., 2015; Law, *et al.*, 2016; Anaby *et al*., 2018).

Na última década, foi desenvolvido um protocolo de intervenção focada no contexto com o objetivo de melhorar desfechos de participação de crianças com deficiência, intitulado *Pathways and Resources for Engagement and Participation* (PREP). O PREP foi desenvolvido por terapeutas ocupacionais no Canadá e incorpora em seus procedimentos a abordagem de *coaching*, que auxilia o cliente a identificar e implementar modificações ambientais (Law *et al*., 2015). Nessa abordagem, os terapeutas utilizam linguagem e perguntas específicas a fim de estimular os pais a refletirem sobre a participação de seus filhos e estruturar soluções para enfrentar os problemas identificados (Law *et al*., 2015). Estudos foram desenvolvidos para investigar os efeitos do PREP, revelando impactos positivos significativos. Os resultados indicaram melhora nos níveis de participação (melhora da frequência, engajamento, aumento no número de atividades, e no número de facilitados e diminuição de barreiras), alcance de metas de participação, bem como, melhora em sua respectiva performance e satisfação (Hsieh, Ryan, Anaby, 2023). Para implementação do protocolo PREP, é recomendado que os terapeutas realizem o treinamento disponível na plataforma da *CanChild* (https://www.prepintervention.ca/), e sigam o manual para adequada compreensão da intervenção e implementação (Law, *et al*., 2016). O manual de aplicação foi traduzido para o português brasileiro e está disponível no site da *Canchild* (https://www.canchild.ca/en/shop/25-prep). Na tradução para o português brasileiro, as autoras indicam que a intervenção pode ser aplicada por profissionais da equipe multiprofissional, incluindo fisioterapeutas.

O processo de implementação do PREP é estruturado em cinco etapas: 1) o estabelecimento de metas, 2) o mapeamento do plano, 3) a implementação do plano,4) a medida dos processos e desfechos, e 5) verificação do seguimento (Law *et al*., 2015; Law, *et al*., 2016; Anaby *et al*., 2018). Na primeira etapa, o terapeuta, a criança e a família se reúnem a fim de identificar metas de participação, utilizando a Medida Canadense de Desempenho Ocupacional (COPM) (Law; Baptiste; Carswell, 2015). Após determinar as metas, é realizada a pontuação do desempenho e da satisfação em relação a cada meta em uma escala *likert* que vai de 1 (não desempenha/nada satisfeito) a 10 (desempenha completamente/completamente satisfeito). Além disso, é encorajado que os profissionais utilizem a Medida de Participação e do Ambiente - Crianças e Jovens (PEM-CY), a fim de identificar atividades a qual a criança pode

apresentar restrição e tenha interesse em realizar, assim como identificar possíveis barreiras e facilitadores à participação (Coster *et al.,* 2011). Na segunda etapa, para cada meta de participação elencada, o terapeuta, a criança e a família desenvolvem um plano baseado em modificações ambientais para alcançar a meta. Nessa etapa, os mesmos discutem acerca dos pontos fortes e experiências relacionadas à meta, identificam os principais aspectos do ambiente e da atividade, e a equipe de participação, ou seja, as pessoas que estarão envolvidas no plano de participação.

A terceira etapa envolve a implementação das modificações ambientais e das estratégias planejadas. Durante esta fase, o terapeuta trabalha em estreita colaboração com a família e outros membros da equipe de participação para garantir que as mudanças sejam efetivamente aplicadas e ajustadas conforme necessário. Durante essa etapa, a família deve pontuar o desempenho e a satisfação da meta trabalhada, a fim de acompanhar o progresso do processo semanalmente. Na quarta etapa, são avaliadas as medidas feitas no processo e reavaliadas as medidas de desfecho da intervenção. Nesse período, são avaliadas as medidas do processo, utilizando as pontuações semanais da COPM feitas na etapa 3, e medidas de desfecho, obtidas na reavaliação utilizando a pontuação da COPM e a PEM-CY pós-intervenção. Por fim, a quinta e última etapa envolve a verificação do seguimento, onde o terapeuta, a criança e a discutem sobre o processo, e se a família é capaz de generalizar as habilidades aprendidas para outras demandas de participação. O tempo de intervenção é de 20 semanas, considerando a escolha de 3 metas de participação (Law *et al*., 2015; Law, *et al*., 2016). Inicialmente há a determinação das metas em um período de 4 semanas antes de iniciar a intervenção. Após isso, são estipuladas 4 semanas de intervenção para cada meta, completando 16 semanas. Após 4 semanas da finalização da intervenção, é realizada uma sessão de acompanhamento. Entretanto, o tempo de intervenção pode ser ajustado de acordo com a necessidade da criança e família, e do terapeuta.

O *Sports Stars* Brasil e o PREP são intervenções distintas que visam promover a participação através de mecanismos de ação e alvos diferentes. Enquanto o Sports Stars Brasil foca nos fatores pessoais e intrínsecos, o PREP concentra-se nos fatores ambientais e extrínsecos. Considerando a complexidade do desfecho participação e as evidências de que ambas as intervenções são capazes de promover melhorias, surge a questão da viabilidade e eficácia da implementação conjunta dessas intervenções.

### 1.1.Questões de pesquisa

2. É viável implementar as duas intervenções associadas em um mesmo período de tempo?
3. A associação do PREP ao *Sports Stars* Brasil promove melhores resultados de participação em crianças com PC do que o *Sports Stars* Brasil isolado?
4. É viável realizar um Ensaio Clínico mais robusto a fim de investigar a superioridade da associação entre as intervenções para crianças com PC?

### 1.2. Objetivos gerais

Investigar a viabilidade de implementar um Ensaio Clínico Aleatorizado futuro com o intuito de investigar a efetividade da combinação do protocolo *Sports Stars* Brasil com o PREP; assim como obter resultados preliminares da implementação das intervenções combinadas.

### 1.3.Objetivos específicos

- Investigar a viabilidade de realizar um ECA que compare a associação das intervenções PREP e *Sports Stars* Brasil com o *Sports Stars* Brasil isoladamente, para crianças com PC;
- Obter dados preliminares da combinação do PREP e do *Sports Stars* Brasil nos desfechos de metas de participação em atividade física, participação na escola e na comunidade, empoderamento familiar, alfabetização física e nível de atividade física.

## 2. ARTIGO- 1

**Periódico:** *British Medical Journal* (ISSN: 1756-1833)

**Fator de impacto:** 2.4 (Índice de Citação: 4.4)

**Title:** Pratictioner-led, peer-group sports intervention combined with a context-focused intervention for children with cerebral palsy: a protocol of feasibility radomised clinical trial.

Open access Protocol

BMJ Open

# Practitioner-led, peer-group sports intervention combined with a context-focused intervention for children with cerebral palsy: a protocol of a feasibility randomised clinical trial

Deisiane Oliveira Souto [1], Luana Cristina da Silva,[1] Ricardo Rodrigues de Sousa Junior [1], Georgina Clutterbuck [2], Dana Anaby [3], Egmar Longo [4], Rafael Coelho Magalhães [5], Ana Cristina Resende Camargos [1], Hércules Ribeiro Leite [1]

**To cite:** Souto DO, da Silva LC, de Sousa Junior RR, *et al*. Practitioner-led, peer-group sports intervention combined with a context-focused intervention for children with cerebral palsy: a protocol of a feasibility randomised clinical trial. *BMJ Open* 2023;**13**:e068486. doi:10.1136/bmjopen-2022-068486

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2022-068486).

Received 19 September 2022
Accepted 16 January 2023



For numbered affiliations see end of article.

**Correspondence to**
Dr Deisiane Oliveira Souto; deisiane.souto@gmail.com

## ABSTRACT

**Background** There is a need to investigate relevant, acceptable and feasible approaches that promote participation in leisure-time physical activity for children with cerebral palsy (CP). The aim of this study is to assess the feasibility of a randomised controlled trial comparing a peer-group intervention focused on improving physical literacy (Sports Stars) with the combination of Sports Stars and a context-focused intervention (Pathways and Resources for Engagement and Participation, PREP) for ambulant children with CP in Brazil.

**Methods** In this feasibility trial, 18 ambulant children (aged 6–12 years) with CP will be randomised into two groups (nine per group): (1) Sports Stars and (2) Sports Stars plus PREP. The Sports Stars group will receive 8 weekly group sessions, focusing on developing the physical, social, cognitive and psychological skills required to participate in popular Brazilian sports. The combined Sports Stars and PREP group will receive Sports Stars in addition to eight individual PREP sessions focused on overcoming environmental barriers to participation. The primary outcome will include feasibility measures: willingness to participate in an RCT, eligibility and recruitment rates, maintenance of evaluator blinding, acceptability of screening procedures and random allocation, feasibility of evaluating outcomes, contamination between the groups, intervention adherence, treatment satisfaction, understanding of the intervention and implementation resources. Additional instruments will be applied to obtain data related to leisure-time physical activity participation goals, overall participation (home, school and community), physical literacy, level of physical activity and family empowerment. Outcomes will be assessed before, after and 12 weeks after intervention.

**Ethics and dissemination** This feasibility trial has been approved by ethical Federal University of Minas Gerais' Ethics Review Committee (CAAE: 33238520.5.0000.5149). All potential subjects will provide written informed consent. The results of this study will be published in peer-reviewed journals and be presented at academic conferences.

### STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study strengths include the randomisation and allocation blinding of the evaluator and participants to the intervention groups.
⇒ Quantitative and qualitative analyses will provide a comprehensive picture of feasibility.
⇒ This study is not powered to show differences and draw conclusions about effectiveness or superiority of the Pathways and Resources for Engagement and Participation or Sports Stars interventions.
⇒ Due to the intervention characteristics of this study, it is not possible to blind participants or intervention therapists.

**Trial registration numbers** RBR-4m3b4b6, U1111-1256-4998.

## INTRODUCTION

Since the publication of the International Classification of Functioning, Disability and Health (ICF) in 2001, participation has been increasingly considered the most important outcome for children and adolescents with disabilities.[1] Participation is a complex and multidimensional concept, which includes both attendance (diversity and frequency), and involvement (the experience of being 'in the moment'). There are also a number of associated participation-related constructs (PRCs) such as activity competence, that influence, but are distinct from, participation.[2]

Individuals with cerebral palsy (CP) are more likely to experience low levels of participation in leisure-time physical activity participation (ie, sport and physical recreation) than their typically developing peers.[3] Participation restrictions in physical activities are


**Figure 1** Sports participation model for children with disabilities copied and adapted from Clutterbuck *et al*.[7]

found not only due to body structure and function impairments and activity limitations in the physical, cognitive, psychological and social domains of physical literacy[4] but also due to contextual barriers at the personal and environmental levels of the ICF. Examples of environmental factors that impact participation include the availability and physical accessibility of sports programmes (environmental), as well as attitudinal factors (personal).[5] Interventions aiming to promote leisure-time physical activity participation should address restrictions across these domains.

Leisure-time physical activity participation has the potential to promote well-being and reduce health costs.[6] Clutterbuck *et al*[7] proposed the SPORTS Participation Framework (figure 1) to support clinicians' and researchers' understanding of the different stages of physical activity participation and to identify appropriate interventions to promote participation in sports and recreation for children with disability. The SPORTS Participation Framework contains six stages that represent the typical pathway that children may progress through as they participate in leisure-time physical activity.[7] The first two stages ('S' and 'P'), represent health-focused interventions (individual and group interventions, respectively) that address barriers to participation in sports or physical recreation. For example, building physical literacy skills (eg, gross motor function, team work, confidence and knowledge of sports rules). 'S' and 'P' stage interventions are important as they facilitate children's transition to participation in community sports and physical recreation programmes in the following 'ORTS' stages, that is, engaging in 'real-world' leisure-time physical activity.[7]

Representing the 'P' stage, Sports Stars is a practitioner-led, peer-group modified sports intervention that aims to prepare children/adolescents with disability for the transition from usual health-focussed care (eg, individual physical therapy) to leisure-time physical activity participation.[8] Sports Stars is designed to target the development of physical literacy, that is, the physical, social, cognitive and psychological skills needed to participate in sport.[9] Activities included in the Sports Stars intervention include sports-specific gross motor activity training in a context designed to improve confidence, motivation, teamwork and social skills necessary for ongoing physical activity participation.[8] Sports Stars has been investigated in Australia and showed improvements in activity and participation goals in ambulant children with CP.[8] According to parents' and therapists' perspectives, Sports Stars also improved participants' overall physical literacy, including physical, social, psychological and cognitive competencies.[10]

Although Sports Stars has emerged as a promising therapeutic strategy to improve sports participation of individuals with CP, it does not address environmental barriers that might continue to hinder participation in leisure-time physical activity.[11] Studies suggest that inadequate community facilities, few availabilities of sports programmes for different age groups, lack of equipment, limited transportation, physical inaccessibility, geographical location, financial constraints, lack of information available for families and attitudinal factors are significant barriers for children with CP to participate in sports and physical recreation.[5] Identifying and minimising these barriers, as well as building family support have been shown to be promising intervention strategies to improve the participation of individuals with CP.[12] Thus, it is possible that Sports Stars would be more effective if combined with an intervention which addressed these environmental barriers.

Context-focused interventions aiming to produce environmental and behavioural changes have emerged in the last decade.[13–15] One example is Pathways and Resources for Engagement and Participation (PREP).[15] PREP is a client-centred, individually tailored intervention that aims to promote participation by removing environmental barriers.[15 16] Anaby *et al*[15] showed that PREP was effective in improving participation of adolescents with physical disabilities (among them, adolescents with CP) in community-based activities, in addition to body functions and structure and activity (motor, cognition, affective and activity performance) improvements.[15 16] PREP has been shown to have a positive impact on family empowerment, likely due to the active involvement of the family during the implementation of the intervention.[17]

PREP and Sports Stars are both effective in promoting participation in individuals with CP.[8 15] However, they do this through different mechanisms. PREP focuses on eliminating environmental barriers that hinder participation in the community[15] at the 'S' stage of the SPORTS Participation framework, while Sports Stars aims to develop children's physical literacy[8] at the 'P' stage. Individual interventions that combine these mechanisms have been shown to be effective for children with CP,[18] however, the cost-effective combination of group and individual interventions such as Sports Stars and PREP have not been evaluated. If effective, the implementation of the group-based Sports Stars intervention in conjunction with smaller doses of targeted individual intervention has the potential to reduce health costs at the individual and service level and increase capacity of

health services to provide this intervention to a greater number of participants, especially in low-resource settings.

This is particularly relevant in the context of low and middle income countries. In a recent study, Leite *et al*[19] showed that Brazilian children with physical disabilities have low rates of participation (attendance), despite high enjoyment when participating. Despite this, most interventions targeting participation outcomes have not been investigated in low-income and middle-income countries, such as Brazil.[3 20] Therefore, it is important that interventions aiming to improve physical activity participation for children with disabilities are evaluated in Brazil, particularly those with the potential to be sustainably upscaled in this context.

The effectiveness of Sports Stars is currently under investigation in a Brazilian context,[21] however, the PREP intervention has not been evaluated in Brazil, or for children younger than 12 years old. Therefore, a feasibility study evaluating the combination of these two interventions would be beneficial to investigate if a full clinical trial is warranted and if additional modifications are necessary before performing the full trial. The main aim of this protocol is to assess the feasibility of a randomised controlled trial (RCT) comparing Sports Stars to Sports Stars combined with PREP for ambulant children with CP in Brazil.

## OBJECTIVES

The objective of this study is to determine the feasibility of conducting an RCT to evaluate the effectiveness of PREP and Sports Stars to improve leisure-time physical activity for children with CP. This includes:

- Participants' willingness to participate in an RCT.
- Eligibility and recruitment rates.
- Maintenance of evaluator blinding.
- Acceptability of screening procedures and random allocation.
- Feasibility of evaluating outcomes.
- Possible contamination between the groups.
- Intervention adherence.
- Treatment satisfaction.
- Difficulty in understanding the intervention being provided.
- Implementation resources.

## METHODS

### Study design

This protocol describes a two-arm, assessor-blinded, RCT. Participants will be randomly allocated to one of two groups: Sports Stars alone or Sports Stars plus PREP. Each group will participate in 8 weeks of intervention. Outcomes will be collected before, after and 12 weeks after the intervention. The study design is illustrated in figure 2.

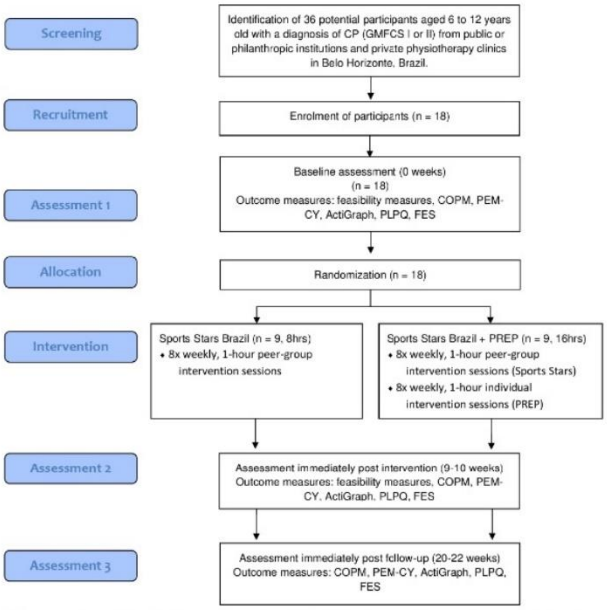



**Figure 2** Study flow chart. COPM, Canadian Occupational Performance Measure; FES, Family Empowerment Scale; GMFCS, Gross Motor Function Classification System; PEM-CY, Participation and Environment Measure for Children and Youth; PREP, Pathways and Resources for Engagement and Participation; PLPQ, Physical Literacy Profile Questionnaire.

### Participants and recruitment

Participants will be recruited by advertisement in social media and by convenience from public or philanthropic institutions and private clinics in Belo Horizonte, Brazil. The recruitment process for this study has not started. Children will be eligible if they meet the following inclusion criteria: (1) age 6–12 years old at the beginning of the intervention and (2) diagnosis of CP classified at Gross Motor Function Classification System (GMFCS)[22] levels I or II. Children will be excluded if: (1) they have severe cognitive and/or behavioural difficulties that make it impossible to communicate their preferences (as reported by their parents/caregivers); (2) have clinical conditions that prevent them from safely participating in physical activities and (3) have had postoperative orthopaedic and/or neurological surgery in the last 6 months or planned during the study period.

### Sample size

This study is designed to investigate the feasibility of conducting a future RCT to evaluate the effectiveness of Sports Stars and Sports Stars plus PREP, and to build decision-making processes to guide the execution of this larger study, particularly concerning recruitment and adherence. Therefore, the sample size was estimated based on the achievement of the primary feasibility outcomes. Secondary treatment effects were not taken into account in calculating sample size as, according to Consolidated Standards of Reporting Trials (CONSORT),[23] feasibility

studies should not prioritise hypothesis tests to assess the effectiveness or superiority of an intervention.[24]

The sample size was calculated using the equation below, based on criteria of unacceptable viability (red zone—'STOP') vs acceptable feasibility (green zone—'GO').[25]

$$n = \left( \frac{Z_{1-\alpha}\sqrt{R_{UL}(1-R_{UL})} + Z_{1-\beta}\sqrt{G_{LL}(1-G_{LL})}}{(G_{LL}-R_{UL})} \right)^2 + \frac{1}{|G_{LL}-R_{UL}|}$$

Where: RUL=upper limit of the red zone; RUL=lower limit of the green zone; Z1−α=probability of type I error; Z1−β=probability of type II error.

In this case, establishing that the adherence rate to the study protocol is ≥65% (green zone), failure rate ≤35% (red zone), alpha of 5% and power of 80%, the sample for the feasibility of the study would be 18 individuals in total, 9 in each group.

In terms of recruitment, experienced clinicians at the trial site have predicted that 50% of eligible patients will agree to participate and complete the research study. Therefore, we plan to identify at least 36 potential participants to reach our target sample (n=18).[24 26]

## Randomisation and blinding

Individual participants will be randomly allocated into one of two intervention groups (group A: Sports Stars or group B: Sports Stars+PREP) by an independent researcher, using a 1:1 allocation ratio.

Block randomisation (block size=18) will be performed using a computer-generated random sequence to ensure equal allocation to each group. Allocations will be concealed in 18 sealed, opaque envelopes numbered 1–18. As this is a group intervention, randomisation will occur at a single time point after enrolment of all participants and completion of baseline assessments. It is therefore unlikely that using the block randomisation method will increase the likelihood of identifying participant allocation.

All randomisation steps will be performed by an independent researcher not involved in recruitment or data collection, and without direct contact with those involved in this research. The independent investigator will oversee the randomisation process and participant allocation. Due to the intervention characteristics of this study, it is not possible to blind participants and intervention therapists to group allocation.

## Interventions

### Sports stars Brazil

The Sports Stars intervention will be conducted in groups of 6–8 participants. It will be conducted by a physiotherapist with a minimum of 3 years experience working with children with disabilities in a healthcare context and assisted by undergraduate physiotherapy students and physical education professionals. The Sports Stars protocol consists of 8weekly, 1-hour group intervention sessions. In each session, participants will receive intervention targeting physical literacy competencies relating to participation in popular sports in Brazil: soccer, handball, basketball and athletics. This protocol was based on the original Sports Stars intervention and was previously adapted for Brazilian children with CP.[8 21] Participants will receive gross motor activity training related to the reported sports (eg, running, jumping, ball skills) and, will be introduced to the sports in a modified game. The structure and main components of each Sports Stars session are detailed in figure 3. Tasks complexity in each physical literacy domain increases every week based on each child's level of ability. Standardised descriptors are used to guide this progression as detailed in the sample Sports Stars session plan (online supplemental material 1).

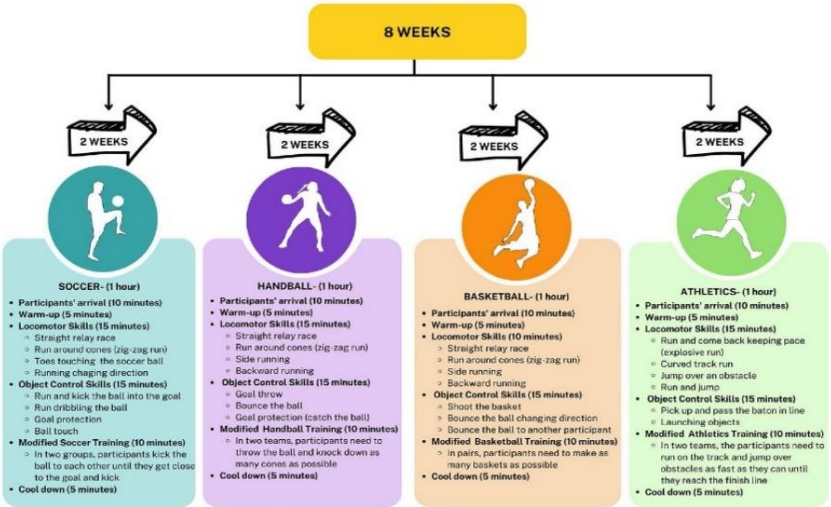



**Figure 3** Structure and main components of the sports stars intervention.

Sports Stars training: All intervention therapists will participate in Sports Stars training with the original creater of the intervention programme. This will include weekly online training over a period of 3 months (approximately 12 hours). Training will focus on the structure of a Sports Stars session, the physical, social, psychological and cognitive content of the Sports Stars intervention, per the Australian Physical Literacy Framework,[7 8] and modification and progression of sports activities included in the Sports Stars Brazil session plans. If necessary, the expert who developed the Sports Stars intervention (GC) will be further consulted.

### Sports Stars and PREP intervention group

Participants in this group will receive the Sports Stars protocol described above in addition to the PREP protocol. Interventions will be provided simultaneously over the same 8-week period. Both interventions will be conducted by a physiotherapist with a minimum of 3-year experience working with children with disabilities in a healthcare context. In addition to the 8 weekly, 1-hour, group Sports Stars intervention sessions, this group will receive 8 weekly, 1-hour, individual PREP sessions.

PREP sessions will focus on removing environmental barriers to achieve the two goals set at baseline assessment (4 weeks for each goal). Intervention will include involving or coaching the participant and their family to implement solution-based strategies for removing environmental barriers and building on existing supports.[15]

As stated on the manual of the PREP intervention, the Canadian Occupational Performance Measure (COPM) and Participation and Environment Measure for Children and Youth (PEM-CY) are used during the PREP intervention for goal setting and scoring and identification of environmental barriers and facilitators, respectively. As the goal setting/scoring will be performed previously by a blinded assessor at baseline, the full COPM and PEM-CY tools will not be repeated during the PREP intervention. The baseline assessments will be provided to the intervention therapists by an independent assessor to assist the PREP team to make and implement the intervention plan. Children's goals will be scored in terms of performance and satisfaction during PREP to further guide the intervention. The PREP intervention structure and steps are detailed in figure 4.

PREP training: PREP intervention therapists will complete the PREP e-learning module available on the Can Child website (https://www.canchild.ca/en/shop/25-prep-intervention-protocol). The PREP manual has been adapted and translated to Brazilian Portuguese by our research group and is now available on the website https://www.prepintervention.ca/. A sample of a PREP intervention Form is provided in online supplemental material 1. If necessary, the expert who developed PREP (DA) will be consulted.

## Data collection

### Participants characteristics

Personal data and demographic information of children and families will be collected before the study. This will include: (1) motor type (spastic, dyskinetic, ataxic or mixed), (2) distribution (unilateral or bilateral) and (3) gross motor, manual ability and communication classification (GMFCS,[22] Manual Ability Classification System[27] and Communication Function Classification System).[28]

## Measures

Primary and secondary outcome measures will be performed at three time points: baseline, immediately postintervention and 12-week follow-up.

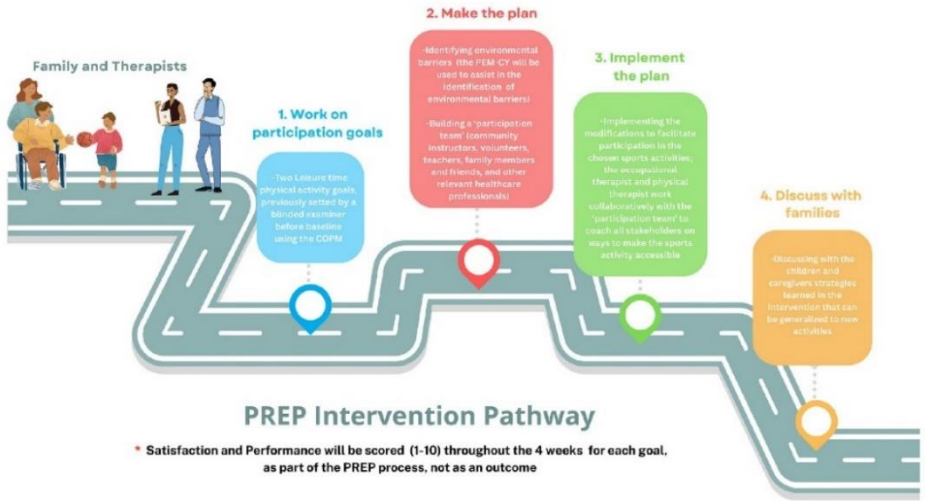



**Figure 4** Structure and steps of PREP intervention. COPM, Canadian Occupational Performance of Measure; PEM-CY, Participation and Environment Measure - Children and Youth; PREP, Pathways and Resources for Engagement and Participation.

### Primary outcome measure

#### *Feasibility*

This protocol was designed to analyse the feasibility of combining Sports Stars and PREP with the aim of improving participation in leisure-time physical activity for ambulant children with CP. The definition of a feasibility study encompasses the question: 'Can this study be done?'. The Standard Protocol Items for Randomised Interventional Trials[29] and the CONSORT statement extension to pilot and feasibility randomised trials were followed in the planning of the study and reporting of the protocol. The results will later be reported following the CONSORT guidelines.[30]

Feasibility measures will include (1) willingness to participate in an RCT, (2) eligibility and recruitment rates, (3) feasibility of assessor blinding, (4) acceptability of screening procedures and random allocation, (5) possible contamination between the groups, (6) feasibility of evaluating outcomes (7) intervention adherence, (8) treatment satisfaction, (9) difficulty in understanding the intervention being provided and (10) implementation resources. All feasibility measures were adapted from studies by Sharma *et al*[31] and Feitosa *et al*.[32] Questionnaires will be completed by participants' parents/caregivers postintervention and are described in detail in online supplemental material 2.

#### *Criteria for feasibility*

The results of this feasibility trial will identify if the study as presented is feasible, which will guide recommendations for a full trial to evaluate intervention effectiveness. The decision will be one of the following: (1) do not continue to a full trial if any preplanned changes may not help improve the feasibility; (2) modify the design further before conducting a full trial; (3) continue with the full trial applying the same procedures used in the feasibility trial with no changes; however, include close monitoring to ensure that study procedures are closely followed and (4) continue with the full trial applying the same procedures used in the feasibility trial with no changes. Close monitoring is not necessary.[31 33] The full criteria for the outcome of feasibility are presented in table 1. Given the nature of some feasibility measures (acceptability of random allocation, acceptability of screening procedures, treatment satisfaction, difficulty in understanding the intervention being provided and implementation resources), they will not have cut-off criteria to determine the feasibility of performing a complete RCT and are therefore not presented in table 1. Instead, their results will be reported descriptively and will be used to determine the suitability of a full RCT combined with the others specific criteria.

### Additional measures

Additional measures will be administered to obtain data related to (1) leisure-time physical activity participation goals; (2) overall participation at home, school and community; (3) level of physical activity; (4) physical literacy and (5) family empowerment. These measures are included primarily to evaluate their feasibility for a future RCT, not to evaluate the effectiveness of the interventions.

#### *Canadian Occupational Performance Measure*

The COPM is a frequently used measure of individual, client-centred outcomes which focuses on the goals and priorities of the child and family in paediatric rehabilitation.[34] A modified COPM approach has been used previously to set goals in specific areas, for example, targeting activity or participation outcomes.[8 18 35] The standard COPM includes discussion about self-care, productivity and leisure. In this study, a modified COPM approach will be used to target the leisure domain, specificially leisure-time physical activity participation.

Children in both groups will participate in goal setting at baseline (before randomisation) to identify two important, relevant and meaningful leisure-time physical activity participation goals that they would like to work towards regardless of intervention. These goals must relate to leisure-time physical activity (ie, sport or physical recreation), and must be involve participation per the ICF (ie, involvement in a life situation). Goals will be classified as attendance goals (ie, goals relating to the diversity, frequency or duration of participation), or involvement goals (ie, goals relating to being 'in the moment' during attendance), per the family of PRC.[2] During goal setting, families will be supported to reframe goals not fitting the criteria of (1) focusing on leisure-time physical activity or (2) targeting participation (ie, attendance or involvement).

To develop and rate these goals, parents or caregivers of children will complete the modified full COPM interview with a blinded assessor. After identifying the two leisure-time physical activity participation goals, parents/caregivers will rate their perception of children's performance and satisfaction on a 10-point scale. This rating process will be repeated post-treatment, and at 12-week follow-up for children in both groups. The COPM is reliable and valid[36] and can detect changes in performance over time and after an intervention.[34] A change in score of two points or more is considered clinically significant.[36]

Children's leisure-time physical activity goals will be provided to the PREP team by an independent assessor to ensure consistency in intervention focus, and prevent confusion, which may occur if the COPM was repeated during the PREP intervention. Performance and satisfaction of the established goals will be rated during the PREP intervention per established protocols.[15]

#### *Participation and Environment Measure for Children and Youth*

The PEM-CY is an outcome measure generated by parents' perceptions, which evaluates components of participation and environment for children and adolescents with disabilities in three different settings: home, school and community.[37] For this study, the school (5 items) and community (10 items) sections will be used. Parents will

**Table 1** Criteria for feasibility

| Criteria | Full RCT is not feasible as planned. Protocol modifications will be required prior to an RCT if: | Action | Proceed to an RCT with no modifications to the viability test protocol. Closely monitor study procedures if: | Close monitoring will not be necessary if |
|---|---|---|---|---|
| Recruitment rates | ≤1 participant recruited per week. | Identify reasons for low recruitment rates. Strategies to increase recruitment might include changing the study location, increasing the no of study locations or improving advertising. | 2–3 participants recruited per week | ≥4 participants recruited per week. |
| Blinding of assessor | >70% correct guess assessor on group allocation. | Based on the responses or feedback provided by assessors, identify strategies to improve assessors concealment. | The assessor has a blinding rate of 70% to 90%. | The assessor has an incorrect guess rate for the group allocation <10%. |
| Contamination between the groups | Contamination between groups is ≥15%. | Identify and resolve the reasons for contamination between groups. | Contamination between groups is <15%. | There is no contamination between groups (0%). |
| Intervention adherence | After randomisation, <50% participate in the treatment session. | Causes for non-attendance to the treatment session should be identified in order to increase participation in the full study. | 50%–80% of participants participate in the treatment session. | ≥80% of participants participate in treatment sessions. |
| Feasibility of evaluating outcomes | >20% have missing data on secondary outcome measures. | Strategies such as reducing the no of outcome measures or identifying and using brief versions of results can be used. | 10%–20% have missing data on secondary outcome measures. | <10% have missing data on secondary outcome measures. |
| Attrition rate | Drop-out rate within 1 week of treatment is >30%. | Possible reasons for dropout should be identified. Define strategies to improve participation in follow-up. | Drop-out rate within 1 week of treatment is 15% to 30%. | Drop-out rate within 1 week of treatment is <15%. |

The following criteria for feasibility reproduces information already reported from Sharma *et al*.[31]
RCT, randomised controlled trial.

indicate the frequency of participation of their children (8-point scale from daily=7 to never=0), typical involvement during participation (5-point scale from 1 being minimally involved to 5 being very involved), as well as if they wish to see a change in the frequency of participation and/or involvement of the child (yes/no and five options for the type of change desired). The PEM-CY also assesses the extent to which environmental factors, support and resources in each setting are barriers and/or facilitators (16 items for the community and 17 items for school). Mean scores for participation frequency and involvement will be calculated. The PEM-CY has been adapted and validated in the Brazilian context.[38]

The PEM-CY collected at baseline will also be used to guide the PREP intervention. For children allocated to the Sports Stars plus PREP group, an independent assessor will pass the baseline PEM-CY information to PREP intervention therapist, in order to assist in identifying barriers and facilitators during the PREP intervention.

### *Physical activity levels*

Physical activity levels will be evaluated using free-living, tri-axial accelerometry, a valid and reliable method used for measuring habitual physical activity in children with CP.[39] The Actigraph wGT3X-BT (ActiGraph, LLC, Pensacola, Florida, USA will be the model used. This accelerometer provides the magnitude of trunk acceleration in three planes at a set frequency of 30 Hz. At baseline, post-treatment and follow-up, the ActiGraph device will be placed on the hip of each child (secured around

the waist above the iliac spines on the dominant side) and worn for seven consecutive days (five week days and two weekend days). The device will be used during usual activities of daily living in home, school and community environments; and removed during sleep and water activities. Parents or caregivers will record the device's on and off times in a daily log. Devices will be returned after day 7 for data extraction. Periods of non-wear will be automatically detected by the device.[39]

The following data will be analysed through the ActiLife V.6 software (ActiGraph, Pensacola, Florida, USA): total time spent in light physical activity (LPA), moderate-to-vigorous physical activity (MVPA) and sedentary behaviour. The cut-off points described by Baque *et al*[40] will be used in this study: sedentary time (0–100 counts/15 s), LPA (101–468 counts/15 s) and MVPA (≥469 counts/15 s).[40]

### *Physical Literacy Profile Questionnaire*

Physical literacy will be assessed using the Physical Literacy Profile Questionnaire (PLPQ). This instrument was developed using the Australian Physical Literacy Framework definition of physical literacy[9] to provide a proxy report of children's physical, cognitive, social and psychological performance in the context of physical activity participation. The PLPQ includes 24 items related to these four physical literacy domains. Parents will be asked to rate each item based on their child's competence. On a three point scale (0) does not perform, (1) performs partially and (2) performs completely). The maximum score is 48 points, which is converted to a percentage score. This instrument is under the process of analysis of its measurement properties by this research group. Preliminary data from our ongoing study with children, and young people with disabilities (6–21 years old, most children with CP at all GMFCS levels) showed that the PLPQ has appropriate face validity, good internal consistency and test–retest reliability for children with CP (α=0.93, ICC=0.86; 95% CI: 0.75 to 0.92) (data not yet published).

### *Family Empowerment Scale*

The Family Empowerment Scale (FES) is a self-administered questionnaire that was developed to measure the empowerment status of the family of parents whose children have some type of disability.[41] FES assesses four levels of empowerment: (A) militancy system, which assesses parents' values and beliefs in the light of public policy and services offered; (B) knowledge, which assesses parents' knowledge, as well as their relationship with the professionals involved in the care of their children; (C) competence, which verifies the parents' ability to solve problems and (D) self-efficacy, which assesses the parents' perception of the care proposals offered by health professionals. The FES is a 5-point Likert scale ('never', 'rarely', 'sometimes', 'often' or 'very often'), with a total of 34 items. FES is a reliable and valid measurement as demonstrated by previous studies.[42 43] It has been translated to Brazilian Portuguese and its reliability is under investigation by our research group.

## Data analysis

To assess feasibility, a descriptive data analysis will be implemented. The analysis plans for the main feasibility objectives are described in the feasibility item of this section. The baseline clinical and demographic characteristics of participants in both arms of the study will be compared descriptively. Descriptive statistics (mean and SD), and the proportion of participants who completed each measure, will be reported for each outcome at baseline, immediately and 12 weeks post-intervention. This will provide data to assist in determining the most appropriate outcome for a future trial.

Treatment effects for secondary outcome measures will be presented as means, SD and CIs. As this is a feasibility study, no statistical significance tests or hypotheses regarding the effectiveness of the treatment will be performed. The analysis will be based on intention to treat and will be exploratory. Cohen's criteria will be followed to value the effect sizes of the studied variables, though due to the pilot nature of the study, all the effect analyses must be considered exploratory only.[44] Cohen's d will be obtained by dividing effect sizes by pooled baseline SD and the following thresholds will be considered for interpretation of effect size: small (0.20–0.49), medium (0.50–0.79) and large (>0.80).[44] High scores indicate better outcomes and positive effect sizes suggest benefit from Sports Stars and PREP interventions. Minimal clinically important difference will be examined for outcomes when available. The number (and per cent) of participants in each group achieving clinically significant change will be explored descriptively. Based on this analysis, an appropriate primary outcome will be identified and will be used to estimate the sample size for a future RCT.

No imputation methods will be used to handle missing data, rather missing cases will be excluded from analysis. Analysis of covariance will be used to estimate effect size for each outcome variable immediately and 12 weeks post-intervention follow-up, adjusting for their baseline values. Statistical analyses will be conducted using IBM SPSS Statistics for Windows (V.22.0, IBM).

## Patient and public involvement

Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. More details have been provided throughout this section.

# ETHICS AND DISSEMINATION

This study will be assessor-blinded, two-arm, feasibility RCT and has been prospectively registered at Brazilian Clinical Trials (Registry: RBR-4m3b4b6). Full ethical approval has been obtained from the Federal University of Minas Gerais' Ethics Review Committee (CAAE: 33238520.5.0000.5149). Written consent will be obtained

from parents or caregivers of each participant. Written assent will be obtained from each child. Participants' information will be coded to preserve their identity.

On completion of the study, data will be analysed and tabulated and a final study report will be prepared. Members of the research team will write the final articles. Inclusion and order of authorship will be guided by contribution levels. Study results will be published in peer-reviewed academic journals, as well as presented at national and international conferences. Study results will be shared with participants using a lay summary.

## DISCUSSION

This study presents a clinical trial protocol aimed at evaluating the feasibility of a definitive controlled trial comparing Sports Stars versus Sports Stars plus PREP for ambulant children with CP in Brazil. In addition, it aims to explore outcomes such as participation, physical literacy, level of physical activity and family empowerment for a future trial. The findings of this study will inform the development of a future RCT to investigate the effectiveness and superiority of Sports Stars Brazil compared with Sports Stars plus PREP. This feasibility study will identify if modifications are required to the protocol prior to undertaking a full trial.

Limitations of this study include the absence of outcome measures with strong psychometric evidence for children with CP. The COPM is the only outcome with reported minimum clinically important difference (MCID). While the PEM-CY has been shown to be an important part of the PREP protocol, it has not shown strong evidence of responsiveness to intervention. Regarding the measurement of physical literacy, the PLPQ questionnaire is a parent-reported measure, and no other objective measure is available to evaluate this outcome. Finally, this feasibility study is not powered to detect a significant difference in outcome measures, however, is an important step towards designing a comprehensive RCT to test the efficacy of intervention programmes designed to increase participation of children with CP.

This study is an important step in evaluating pragmatic interventions aiming to improve leisure-time physical activity participation for children with disability in low-income and middle-income countries 45. The data of the full clinical trial will have potential clinical implications for the rehabilitation scenario in Brazil, similar cultures and other low-income and middle-income countries, giving empirical evidence about the combination of Sports Stars and PREP as a feasible and potentially effective intervention for promoting leisure-time physical activity participationfor children with CP.

**Author affiliations**
[1]Graduate Program in Rehabilitation Sciences, Physical Therapy Department, School of Physical Education, Physical Therapy and Occupational Therapy, Federal University of Minas Gerais, Minas Gerais, Brazil
[2]Western Sydney University, School of Health Sciences, Parramatta, New South Wales, Australia
[3]School of Physical and Occupational Therapy, McGill University Researcher, Montreal, Quebec, Canada
[4]Graduate Program in Rehabilitation Sciences and in Collective Health, Faculty of Health Sciences of Trairi, Federal University of Rio Grande do Norte (UFRN-FACISA), Santa Cruz, Rio Grande do Norte, Brazil
[5]Graduate Program in Occupational Studies, Occupational Therapy Department, School of Physical Education, Physical Therapy and Occupational Therapy, Federal University of Minas Gerais, Minas Gerais, Brazil

**Twitter** Deisiane Oliveira Souto @no, Georgina Clutterbuck @GeorginaPaedsPT, Egmar Longo @LongoEgmar and Hércules Ribeiro Leite @herculesleite5

**Acknowledgements** We thank the Universidade Federal de Minas Gerais (UFMG) and the Pró Reitoria de Pesquisa da UFMG for their institutional support.

**Contributors** DOS, LCdS, RRdSJ, GC, DA, EL, RCM, ACRC and HRL were responsible for the study concept, design and ethics applications. RRdSJ registered the trial with the Brazilian Register of Clinical Trials-REBEC and DOS drafted the manuscript which was reviewed by the authors. All authors read and approved the final manuscript.

**Funding** This work was supported by CNPq (Process 150010/2022-2), CAPES (Proex, PROCESS - 23038.002128/2022-08) and FAPEMIG (APQ-00754-20).

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Provenance and peer review** Not commissioned; externally peer reviewed.



**ORCID iDs**
Deisiane Oliveira Souto http://orcid.org/0000-0001-8730-643X
Ricardo Rodrigues de Sousa Junior http://orcid.org/0000-0001-7354-2132
Georgina Clutterbuck http://orcid.org/0000-0002-8097-7836
Dana Anaby http://orcid.org/0000-0003-2453-5643
Egmar Longo http://orcid.org/0000-0001-6263-1818
Rafael Coelho Magalhães http://orcid.org/0000-0002-8960-2256
Ana Cristina Resende Camargos http://orcid.org/0000-0003-2719-4231
Hércules Ribeiro Leite http://orcid.org/0000-0001-8977-8131

## REFERENCES

1 Phillips RL, Olds T, Boshoff K, *et al*. Measuring activity and participation in children and adolescents with disabilities: a literature review of available instruments. *Aust Occup Ther J* 2013;60:288–300.
2 Imms C, Adair B, Keen D, *et al*. " participation ": a systematic review of language, definitions, and constructs used in intervention research with children with disabilities. *Dev Med Child Neurol* 2016;58:29–38.
3 Michelsen SI, Flachs EM, Damsgaard MT, *et al*. European study of frequency of participation of adolescents with and without cerebral palsy. *Eur J Paediatr Neurol* 2014;18:282–94.
4 Carlon SL, Taylor NF, Dodd KJ, *et al*. Differences in habitual physical activity levels of young people with cerebral palsy and their typically developing Peers: a systematic review. *Disabil Rehabil* 2013;35:647–55.
5 Shields N, Synnot AJ, Barr M. Perceived barriers and facilitators to physical activity for children with disability: a systematic review. *Br J Sports Med* 2012;46:989–97.

6 Verschuren O, Peterson MD, Balemans ACJ, *et al*. Exercise and physical activity recommendations for people with cerebral palsy. *Dev Med Child Neurol* 2016;58:798–808.
7 Clutterbuck GL, Auld ML, Johnston LM. Sports stars study protocol: a randomised, controlled trial of the effectiveness of a physiotherapist-led modified sport intervention for ambulant school-aged children with cerebral palsy. *BMC Pediatr* 2018;18:258.
8 Clutterbuck GL, Auld ML, Johnston LM. Sports stars: a practitioner-led, peer-group sports intervention for ambulant children with cerebral palsy. activity and participation outcomes of a randomised controlled trial. *Disabil Rehabil* 2022;44:948–56.
9 Edwards LC, Bryant AS, Keegan RJ, *et al*. Definitions, foundations and associations of physical literacy: a systematic review. *Sports Med* 2017;47:113–26.
10 Clutterbuck GL, Auld ML, Johnston LM. Sports stars: a practitioner-led, peer-group sports intervention for ambulant, school-aged children with cerebral palsy. parent and physiotherapist perspectives. *Disabil Rehabil* 2022;44:957–66.
11 Kilgour G, Adair B, Stott NS, *et al*. Do physical activity interventions influence subsequent attendance and involvement in physical activities for children with cerebral palsy: a systematic review. *Disabil Rehabil* 2022;44:1682–98.
12 Hoehne C, Baranski B, Benmohammed L, *et al*. Changes in overall participation profile of youth with physical disabilities following the PreP intervention. *Int J Environ Res Public Health* 2020;17:3990.
13 Kramer JM, Roemer K, Liljenquist K, *et al*. Formative evaluation of project team (teens making environment and activity modifications). *Intellect Dev Disabil* 2014;52:258–72.
14 Reedman SE, Boyd RN, Elliott C, *et al*. Participate CP: a protocol of a randomised waitlist controlled trial of a motivational and behaviour change therapy intervention to increase physical activity through meaningful participation in children with cerebral palsy. *BMJ Open* 2017;7:e015918.
15 Anaby DR, Law M, Feldman D, *et al*. The effectiveness of the pathways and resources for engagement and participation (PreP) intervention: improving participation of adolescents with physical disabilities. *Dev Med Child Neurol* 2018;60:513–9.
16 Anaby D, Avery L, Gorter JW, *et al*. Improving body functions through participation in community activities among young people with physical disabilities. *Dev Med Child Neurol* 2020;62:640–6.
17 Anaby D, Mercerat C, Tremblay S. Enhancing youth participation using the PreP intervention: parents' perspectives. *Int J Environ Res Public Health* 2017;14:1005.
18 Reedman SE, Boyd RN, Trost SG, *et al*. Efficacy of participation-focused therapy on performance of physical activity participation goals and habitual physical activity in children with cerebral palsy: a randomized controlled trial. *Arch Phys Med Rehabil* 2019;100:676–86.
19 Leite HR, Souto DO, Ferreira FG, *et al*. Patterns and predictors of participation in leisure activities of brazilian children and adolescents with physical disabilities. *Dev Med Child Neurol* 2022:80–138.
20 Leite HR, Jindal P, Malek SA, *et al*. Research on children with cerebral palsy in low- and middle-income countries. *Pediatr Phys Ther* 2022;34:551–5.
21 R de Sousa Junior R, R Camargos AC, Clutterbuck GL, *et al*. Effectiveness of modified sports for children and adolescents with cerebral palsy: a pragmatic study protocol. *Pediatr Phys Ther* 2022;34:81–7.
22 McDowell B. The gross motor function classification system -- expanded and revised. *Dev Med Child Neurol* 2008;50:725.
23 Eldridge SM, Chan CL, Campbell MJ, *et al*. Consort 2010 statement: extension to randomised pilot and feasibility trials. *BMJ* 2016;355:i5239.
24 Billingham SAM, Whitehead AL, Julious SA. An audit of sample sizes for pilot and feasibility trials being undertaken in the united kingdom registered in the united kingdom clinical research network database. *BMC Med Res Methodol* 2013;13:104.
25 Lewis M, Bromley K, Sutton CJ, *et al*. Determining sample size for progression criteria for pragmatic pilot RCTs: the hypothesis test strikes back! *Pilot Feasibility Stud* 2021;7:40.
26 Fusari G, Gibbs E, Hoskin L, *et al*. Protocol for a feasibility study of ontrack: a digital system for upper limb rehabilitation after stroke. *BMJ Open* 2020;10:e034936.
27 Eliasson A-C, Krumlinde-Sundholm L, Rösblad B, *et al*. The manual ability classification system (MACS) for children with cerebral palsy: scale development and evidence of validity and reliability. *Dev Med Child Neurol* 2006;48:549–54.
28 Paulson A, Vargus-Adams J. Overview of four functional classification systems commonly used in cerebral palsy. *Children (Basel)* 2017;4:30.
29 Chan A-W, Tetzlaff JM, Altman DG, *et al*. Spirit 2013 statement: defining standard protocol items for clinical trials. *Ann Intern Med* 2013;158:200–7.
30 Schulz KF, Altman DG, Moher D, *et al*. Consort 2010 statement: updated guidelines for reporting parallel group randomised trials. *Trials* 2010;11:32.
31 Sharma S, Jensen MP, Moseley GL, *et al*. Pain education for patients with non-specific low back pain in Nepal: protocol of a feasibility randomised clinical trial (PEN-LBP trial). *BMJ Open* 2018;8:e022423.
32 Feitosa AM, Mancini MC, Silvério APM, *et al*. " help me to improve my own priorities! ": a feasibility study of an individualized intensive goal training for adolescents with cerebral palsy. *Phys Occup Ther Pediatr* 2021;41:601–19.
33 Abbott JH. The distinction between randomized clinical trials (RCTs) and preliminary feasibility and pilot studies: what they are and are not. *J Orthop Sports Phys Ther* 2014;44:555–8.
34 Law M, Baptiste S, McColl M, *et al*. The Canadian occupational performance measure: an outcome measure for occupational therapy. *Can J Occup Ther* 1990;57:82–7.
35 McColl MA, Paterson M, Davies D, *et al*. Validity and community utility of the Canadian occupational performance measure. *Can J Occup Ther* 2000;67:22–30.
36 Carswell A, McColl MA, Baptiste S, *et al*. The Canadian occupational performance measure: a research and clinical literature review. *Can J Occup Ther* 2004;71:210–22.
37 Coster W, Bedell G, Law M, *et al*. Psychometric evaluation of the participation and environment measure for children and youth. *Dev Med Child Neurol* 2011;53:1030–7.
38 Galvão P, Cazeiro M, De Campos C, *et al*. Medida da participação e do ambiente-crianças e jovens (PEM-CY): adaptação transcultural para o uso no brasil. *Revista de Terapia Ocupacional Da Universidade de São Paulo* 2018;29:237–45.
39 Lennon N, Thorpe D, Balemans AC, *et al*. The clinimetric properties of aerobic and anaerobic fitness measures in adults with cerebral palsy: a systematic review of the literature. *Res Dev Disabil* 2015;45–46:316–28.
40 Baque E, Sakzewski L, Trost SG, *et al*. Validity of accelerometry to measure physical activity intensity in children with an acquired brain injury. *Pediatr Phys Ther* 2017;29:322–9.
41 Koren PE, DeChillo N, Friesen BJ. Measuring empowerment in families whose children have emotional disabilities: a brief questionnaire. *Rehabilitation Psychology* 1992;37:305–21.
42 Huscroft-D'Angelo J, Hurley KD, Lambert M, *et al*. Investigating the factor structure and validity of the family empowerment scale for parents of children with emotional disturbance in middle school. *Children and Youth Services Review* 2018;86:14–20.
43 Kageyama M, Nakamura Y, Kobayashi S, *et al*. Validity and reliability of the family empowerment scale for caregivers of adults with mental health issues. *J Psychiatr Ment Health Nurs* 2016;23:521–31.
44 Cohen J. *Statistical power analysis for the behavioral sciences, no.1*. Lwrence Earlbaum Associates Publishers, 1988.

**Supplemental Material 1- Sample Sports Stars and PREP session plans**

| **Sports Stars Brazil- Sample Session Plan-Soccer**<br>Child's name: _____ Therapist: _____<br>Week #_____ Date: ____/____/____ | | | | |
|---|---|---|---|---|
| **Warm Up** | | **Involvement** 1 2 3 4 | | |
| ***Range of Motion***<br>***Upper extremities and trunk***<br>• Rolling shoulders<br>• Circle arms | | ***Lower Extremities and trunk***<br>• Standing toe touch<br>• Stork stand (quad stretch)<br>• Ankle circles | ***Increase Heart Rate***<br>• High knees<br>• Jump up down, left right<br>• Star jumps | |
| **Locomotor Activities** | | **Involvement** | 1 2 3 4 | |
| **Activity** | **Physical** | **Cognitive** | **Social** | **Psychologic** |
| **Relay Race** | **+2** Runs and pass the baton quickly with coordination | +2 Analyses alone the technique in order to increase speed when passing the baton | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | **+1** Runs and pass the baton quickly, but without coordination | -1 Applies feedback from the therapist to increase speed when passing the baton | -1 Developing positive team connections | -1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Runs and pass the baton slowly and without coordination | 0 Understands when to pass the baton | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **-1** Initiates running and coordination to pass the baton | -1 Remembers the rule to pass the baton | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Walks fast to pass the baton, has to stop to pass with coordination | -2 Learning about passing the baton | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Run weaving pylons** | **+2** Runs quickly between pylons (short distance) without touching or bumping them | +2 Analyses alone the technique in order to increase speed when weaving the pylons | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | **+1** Runs slowly between pylons (short distance) without touching or bumping them | +1 Applies feedback from the therapist to increase speed when weaving the pylons | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Runs slowly between pylons (long distance) without touching or bumping them | 0 Understands when to weave the pylons | 0 Interacts positively during pass | 0 Confident to try most parts of activity |





| | | | | |
|---|---|---|---|---|
| | **-1** Runs slowly between pylons (long distance) may touch or bump them | -1 Remembers the rule to weave the pylons without bumping or touching | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Walks fast between pylons (long distance) may touch or bump them | -2 Learning about weaving the pylons | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Alternating feet touching on the ball** | **+2** Jumps while alternating feet (without long foot contact), do not loose balance | +2 Analyses alone the technique in order to increase speed when alternating feet on the ball | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | **+1** Alternates feet on the ball quickly, do not loose balance | +1 Applies feedback from the therapist to increase speed when alternating feet on the ball | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Alternates feet on the ball slowly, do not loose balance | 0 Understands when to alternate the feet | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **-1** Alternates feet on the ball slowly, short breaks to keep balance | -1 Remembers the rule to alternate the feet on the ball | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Places one foot at the time without alternating to not loose balance | -2 Learning about alternating feet on the ball | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Changing Direction Colorful Squares** | **+2** Changes direction fast and with coordination, reaches the square | +2 Analyses alone the technique in order to increase speed and coordination when changing direction to reach the square | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | **-1** Changes direction fast but without coordination, reaches the square | +1 Applies feedback from the therapist to increase speed when changing direction to reach the square | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Changes direction slowly and without coordination, reaches the square | 0 Understands when to change the direction to reach the square | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **-1** Changes direction slowly and without coordination, does not reach the square | -1 Remembers the rule to change direction to reach the square | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Loses balance when trying to change direction | -2 Learning about changing direction to reach the square | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Object Control Activities** | | **Involvement** | 1 2 3 4 | |
| **Activity** | **Physical** | **Cognitive** | **Social** | **Psychological** |

| | | | | |
|---|---|---|---|---|
| **Run and kick to the goal** | **+2** Runs and kicks a ball, goal 5m distance | +2 Analyses alone the technique in order to run and kick | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | **+1** Runs and kicks a ball, goal 3m distance | +1 Applies feedback from the therapist to run and kick | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Runs and kicks a ball, goal 1.5m distance | 0 Understands when to run and kick | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **-1** Runs, stops and kicks a ball, goal 1.5m distance | -1 Remembers the rule to run and kick | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Walks fast, stops and kicks a ball, goal 1.5m distance | -2 Learning about running and kicking | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Run and dribble the ball** | **+2** Runs while dribbling a ball with both feet ~3m | +2 Analyses alone the technique in order to run and dribble | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | **+1** Runs while dribbling a ball with both feet ~1.5m | +1 Applies feedback from the therapist to run and dribble | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Walks fast while dribbling a ball with both feet ~3m | 0 Understands when to run and dribble | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **-1** Walks fast while dribbling a ball with both feet ~1.5m | -1 Remembers the rule to run and dribble | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Walks slow while dribbling a ball with both feet ~1.5m | -2 Learning about running and dribbling | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Goal Protection after a ball kick** | **+2** Catches a small ball with both hands, fast kick | +2 Analyses alone the technique in order to catch the ball with both hands | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |
| | +1 Hits a small ball with any part of the body, fast kick | +1 Applies feedback from the therapist to catch the ball with both hands | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Catches a small ball with both hands, slow kick | 0 Understands when to catch the ball | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **-1** Catches a big ball with both hands, slow kick | -1 Remembers the rule to catch the ball with both hands | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Hits a big ball with any part of the body, slow kick | -2 Learning about catching the ball | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Passing the ball** | **+2** Stops the ball and passes it fast and directly to a teammate, ~3m distance | +2 Analyses alone the technique in order to stop and pass the ball | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of activity |





| | | | | |
|---|---|---|---|---|
| | **+1** Stops the ball and passes it fast and directly to a teammate, ~1.5m distance | +1 Applies feedback from the therapist to stop and pass the ball | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of activity |
| | **0** Stops the ball and passes it slow and directly to a teammate, ~3m distance | 0 Understands when stop and pass the ball | 0 Interacts positively during pass | 0 Confident to try most parts of activity |
| | **+1** Stops the ball and passes it slow and directly to a teammate, ~3m distance | -1 Remembers the rule to stop and pass the ball | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of activity |
| | **-2** Stops the ball and passes it slow and does not reach the teammate | -2 Learning about stopping and passing the ball | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of activity |
| **Modified Sports** | | **Involvement** | **1 2 3 4** | |
| **Activity** | **Physical** | **Cognitive** | **Social** | **Psychologic** |
| **Soccer** | **+2** Different teams, goal protection included | +2 Analyses alone the technique in order to develop tactics for a better performance | +2 Competitive and encouraging | +2 Confident/ motivated to improve challenging parts of the sport |
| | **+1** Different teams, goal protection not included | +1 Applies feedback from the therapist to develop tactics for a better performance | +1 Developing positive team connections | +1 Confident/ motivated to attempt challenging parts of the sport |
| | **0** Same teams, goal protection included | 0 Understands how to participate in the sport | 0 Interacts positively during pass | 0 Confident to try most parts of the sport |
| | **-1** Same teams, goal protection not included | -1 Remembers the sport's rules | -1 Neutral interaction during baton pass | -1 Needs encouragement to try some parts of the sport |
| | **-2** Same team, passing the ball between teammates | -2 Learning about the sport's rules | -2 Inappropriate peer interactions | -2 Needs encouragement to try any part of the sport |
| **Cool Down** | | **Involvement** | **1 2 3 4** | |
| **"Animal Yoga" or "Simon Says": dynamic stretching, weight bearing and balance**<br>• Downward dog (Hamstring and calf stretch)<br>• Happy cat, angry cat (trunk ROM)<br>• Flamingo (SLS)<br>• Giraffe (side lunge adductor & lateral trunk stretch)<br>• Butterfly (short adductor stretch) | | | | |
| **Notes** | | | | |

| **PREP intervention Form**<br>**Child's name:** **Parent(s) name:** **Therapist name:**<br>**Week: (1) (2) (3) (4)** **Date:** | | | | |
|---|---|---|---|---|
| **Goal:**<br>**COPM- Date:** **COPM 2- Date:**<br>Performance: Performance:<br>Satisfaction: Satisfaction: | | | | |
| **Meetings attendance- Date:** **Participants:** | | | | |
| **Other meetings (text messages, emails, phone calls, video call)- Date/Technology:** | | | | |
| **Intervention time (meeting with parents, exchange of messages, implementation of strategies, among others):** | | | | |
| **Barrier /Support** | **Implemented Strategies** | **Strategies to Implement** | **Participation Team** | **Comments** |
| | | | | |
| | | | | |





**Supplemental Material 2- Feasibility questionnaires**

| **For parents and caregivers** | |
|---|---|
| Feasibility measure | **Questions** |
| Willingness to participate in an RCT* | *Would you (or would you recommend that others) participate in a study that investigates the effectiveness of the Sports Stars and PREP interventions?*<br>( )Yes ( ) No Why: _____ |
| Acceptability of random allocation | *Your child was allocated to the XX group of this study (Sports Stars or Sport Stars + PREP), did satisfied with this allocation?* (Asked after the intervention)<br>( ) Yes ( ) No ( ) No preference |
| Possible contamination between the groups | *Have you talked to other participants in this study about the intervention they are receiving?*<br>( ) Yes ( ) No<br>If so:<br>*Did your attitude towards the intervention change after talking to one of the participants in the other group?*<br>( ) Yes ( ) No<br>*Are any of the participants in the other group aware of the type of intervention you were receiving in this study?*<br>( ) Yes ( ) No |
| Treatment satisfaction | *Detailed in the next pages* |
| Difficulty in understanding the intervention being provided | *How easy or difficult do you think it was for your child to understand the instructions given by the therapists during the Sports Stars activities?*<br>( ) Very easy, ( ) Easy, ( ) Neither easy nor difficult ( ) Difficult ( ) Very difficult<br>*How easy or difficult was it for you and your child to understand the instructions given by the therapists during the PREP intervention?*<br>( )Very easy, ( ) Easy, ( ) Neither easy nor difficult ( ) Difficult ( ) Very difficult |
| **Considering that the recruitment strategy is convenience sampling, the rate of willingness to participate in an RCT will not be calculated. Instead, the reasons for non-participation will be reported.* | |

| | |
|---|---|
| | **For the research assistant** |
| **Feasibility measure** | **Questions** |
| **Eligibility and recruitment** | *How many participants were screened for this study?*<br>*How many of them were eligible?*<br>*How many consented to participate?*<br>*How many refused to participate? Why?* |
| **Acceptability of screening procedures** | *Were there any difficulties or challenges in screening and recruiting participants last week?*<br>( ) Yes ( ) No<br>In the case of affirmative answers:<br>*2) What were the difficulties and challenges?* |
| **Feasibility of evaluating outcomes** | *What percentage of data was missing at each assessment timepoint (baseline, post-intervention and follow-up)?* |
| | **For the blinded assessor** |
| **Feasibility of assessor blinding** | *Did you receive any information indicating to which group a participant was assigned?*<br>( ) Yes ( ) No<br>*If yes, how many participants did this occur for?* |
| | **Data collected from attendance records** |
| **Intervention adherence** | *What percentage of enrolled children completed the intervention?*<br>*How many individual's were absent during the 8-week intervention?*<br>*How many total absences occurred?*<br>*What were the reasons for absences?* |
| | **For the intervention therapist** |
| **Implementation resources** | *What resources were necessary to conduct Sports Stars?*<br>*What resources were necessary to conduct PREP?*<br>*Did you have difficulty accessing resources to provide either intervention?* |





**Satisfaction questionnaire for the Sports Stars group.**

| Satisfaction of children | Did not like | I liked it a little | Really enjoyed |
|---|---|---|---|
| What is your level of satisfaction about | | | |
| Intervention time (08:00am to 09:00am). | | | |
| The duration of the intervention (1 hour per session). | | | |
| The period of the intervention (8 weeks). | | | |
| The total amount of intervention (8 hours) | | | |
| The place where the interventions took place (for example: the location of the court, the size of the court, the cleanliness of the bathrooms, among others). | | | |
| The materials used during the activities (for example: balls, cones, disks, baskets, among others). | | | |
| The practice of modified sports (for example: the activities developed; the interaction and participation between your child, the other participants and the therapists, the objectives of the activities, the formation of teams, among others). | | | |
| The practice of activities to be done with other children (for example: doing the relay races, the activities in pairs of throwing and receiving a ball, and during the practice of the modified sport, among others). | | | |
| The therapists' interaction with you and your child (for example: the way they instruct you about the activities; the way they talk to your child before, during and after the interventions; among others). | | | |
| The way in which the therapist adapted the Sports Stars activities according to what your child was able to do (for example: when the therapist made the activity difficult if it was easy, or when he facilitated the activity when it was difficult, among others). | | | |
| The interaction between your child and the other children (for example: the communication between them and the other children during the intervention, the support between them during the activities). | | | |
| Your child's current skill level (in soccer, handball, basketball and athletics) when compared to before the intervention (for example: how far they can bounce a ball today compared to before the project, among others). | | | |

Adapted from Feitosa et al.[33]

**Satisfaction questionnaire for the Sports Stars + PREP group.**

| Satisfaction of children | Did not like | I liked it a little | Really enjoyed |
|---|---|---|---|
| What is your level of satisfaction about | | | |
| Intervention time (08:00am to 10:00am). | | | |
| The duration of the intervention (2 hours per session [PREP= 1 hour; Sports Stars = 1 hour]). | | | |
| The period of the intervention (8 weeks). | | | |
| The place where the interventions took place (for example: the location of the court, the size of the court, the cleanliness of the bathrooms, among others). | | | |
| The materials used during the activities (for example: balls, cones, disks, baskets, among others). | | | |
| The practice of modified sports (for example: the activities developed; the interaction and participation between your child, the other participants and the therapists, the objectives of the activities, the formation of teams, among others) | | | |
| The practice of activities to be done with other children (for example: doing the relay races, the activities in pairs of throwing and receiving a ball, and during the practice of the modified sport, among others). | | | |
| The therapists' interaction with you and your child (for example: the way they instruct you about the activities; the way they talk to your child before, during and after the interventions; among others). | | | |
| The way in which the therapist adapted the Sports Stars activities according to what your child was able to do (for example: when the therapist made the activity difficult if it was easy, or when they facilitated the activity when it was difficult, among others). | | | |
| The therapist's ability to guide/assist you in planning and implementing strategies to overcome environmental barriers that limit your child's participation (during the PREP intervention) | | | |
| The interaction between your child and the other children (for example: the communication between them and the other children during the intervention, the support between them during the activities). | | | |
| The child's current skill level (in soccer, handball, basketball and athletics) when compared to before the intervention (for example: how far they can bounce a ball today compared to before the project, among others). | | | |

Adapted from Feitosa et al.[33]

## 3. ARTIGO 2

**Periódico:** *Physical and Occupational Thepapy in Pediatrics* (ISSN: 0194-2638)

**Fator de impacto:** 1.5 (Índice de citação: 0.8)

**Title:** Modified sports intervention combined with a context-focused intervention for children with cerebral palsy: a feasibility randomised clinical trial

Luana Cristina da Silva[a], Acsa Soares Santos[a], Ana Carolina Andrade Ramos de Souza[a], Emily Martins Ribeiro[b], Julia Melo Rocha Xavier[a], Ricardo Rodrigues de Sousa Junior[a], Dana Anaby[c], Georgina Clutterbuck[d], Egmar Longo[e], Ana Cristina Resende Camargos[a], Rafael Coelho Magalhães[b], Deisiane Oliveira Souto[a], Hércules Ribeiro Leite[a]

[a]Physical Therapy Department, School of Physical Education, Physical Therapy and Occupational Therapy, Federal University of Minas Gerais, Brazil.

[b]Occupational Therapy Department, School of Physical Education, Physical Therapy and Occupational Therapy, Federal University of Minas Gerais, Brazil.

[c]School of Physical and Occupational Therapy, McGill University Researcher, Montreal, Canada.

[d]Western Sydney University, School of Health Sciences, New South Wales, Australia

[e]Faculty of Health Sciences of Trairi, Federal University of Rio Grande do Norte (UFRN-FACISA), Santa Cruz, Rio Grande do Norte, Brazil.

**ORCID ID:**

- Luana Cristina da Silva: https://orcid.org/0009-0008-6063-2604
- Acsa Soares Santos: https://orcid.org/0009-0006-2472-9877
- Ana Carolina Andrade Ramos de Souza: https://orcid.org/0000-0001-5213-5124
- Emily Martins Ribeiro: https://orcid.org/0000-0002-7515-7657
- Julia Melo Rocha Xavier: https://orcid.org/0009-0000-6719-7723
- Ricardo Rodrigues de Sousa Junior: http://orcid.org/0000-0001-7354-2132

- Dana Anaby: http://orcid.org/0000-0003-2453-5643
- Georgina Clutterbuck: http://orcid.org/0000-0002-8097-7836
- Egmar Longo: http://orcid.org/0000-0001-6263-1818
- Ana Cristina Resende Camargos: http://orcid.org/0000-0003-2719-4231
- Rafael Coelho Magalhães: http://orcid.org/0000-0002-8960-2256
- Deisiane Oliveira Souto: http://orcid.org/0000-0001-8730-643X
- Hércules Ribeiro Leite: http://orcid.org/0000-0001-8977-8131

*Corresponding author:*

Hércules Ribeiro Leite, Graduate Program in Rehabilitation Sciences, Department of Physiotherapy, School of Physical Education, Physiotherapy, and Occupational Therapy, Universidade Federal de Minas Gerais, Brazil, Av. Pres. Antônio Carlos, 6627 Campus – Pampulha, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: hercules@ufmg.br


*Disclosure statement.*

The authors report there are no competing interests to declare.

**Abstract**

**Aims:** To investigate the feasibility and preliminary effects of a modified sports intervention (Sports Stars) combined with a contextual-focused approach (Pathways and Resources for Engagement in Participation (PREP). **Methods:** This is a feasibility randomized clinical trial. The trial registration numbers are RBR-4m3b4b6 and U1111-1256-4998. Eighteen children with cerebral palsy (CP) were randomly allocated to either the Sports Stars Brazil + PREP group (n=9) or the Sports Stars Brazil group (n=9). The outcomes measured were feasibility measures, participation goals, participation profile, physical literacy, family empowerment, and physical activity level. Descriptive statistics and appropriate tests were used for data analysis. **Results:** The feasibility analysis revealed a high completion rate and adequate levels of satisfaction, credibility, and acceptability of the intervention in both groups. Statistically significant differences were found in favor of the Sports Stars Brazil +PREP group in performance (p=0.02) and satisfaction (p=0.04); family empowerment in post-intervention assessment (p=0.005); and involvement in school (p=0.04) during the follow-up period. No statistically significant differences were found for other secondary outcomes. **Conclusions:** A future robust clinical trial would be feasible with some adjustments. A contextual-focused intervention combined with a modified sports approach might have greater potential to improve outcomes related to participation.

**Keywords:** Cerebral Palsy, Participation, Context-focused Intervention, Modified Sports, Feasibility.

Children with cerebral palsy (CP) exhibit lower patterns of participation in sport and physical recreation activities (Souto et al., 2023; Vila-Nova et al., 2020). This is true even for ambulant children with CP, who are less active than their typically developing peers, and do not meet recommendations for physical activity participation (Molina-Cantero et al., 2024). Although children at Gross Motor Function Classification System (GMFCS) levels I and II do not use walking aids as their primary form of mobility, these children do experience limitations in advanced gross motor activities and participate less in physical activities than their peers (Carlon et al., 2013; Darko, et al., 2022). It is likely that both individual and environmental factors impacting participation in sport and physical recreation activities for children with CP (Abid et al., 2022). Therefore, it is imperative to implement interventions that promote participation by addressing both individual and environmental factors in a way that is enjoyable and feasible for children, their families, and the professionals who support them.

Modified sports interventions like the Sports Stars program are based on learning by action (Clutterbuck et al., 2020a, 2020b; Sousa Junior et al., 2024). The essential active ingredient of modified sports is the training of sports-related motor skills, combined with the introduction of sports through modified games (Sousa Junior et al., 2024). Originally developed in Australia, Sports Stars has been adapted for Brazil (Clutterbuck et al., 2018; Sousa Junior et al., 2022). Using Imms' et al. (2016) contemporary model, the family of participation and participation-related constructs (fPRC), the program aims to enhance participation by improving intrinsic factors such as sense of self, preferences, and activity competences (Rodrigues et al., 2023). This program has improved participation goals for children with CP, as well as their physical literacy, and fundamental motor skills (Clutterbuck et al., 2020a, 2020b; Rodrigues et al., 2023).

Pathways and Resources for Engagement and Participation (PREP) is a client-centered, context-focused intervention aimed at promoting participation through

environmental modifications (Anaby et al., 2018). The therapist, family, and child collaborate through the intervention's five stages: (1) goal setting; (2) action plan mapping; (3) implementing the action plan; (4) measuring process and outcomes; and (5) discussing the continuity of participation. PREP considers the child's real context and involves all individuals related to the task. According to the fPRC model, this approach can impact participation by considering it an extrinsic factor (Imms et al., 2016). Studies have shown PREP to improve participation goals in leisure activities for individuals with physical disabilities (Hsieh et al., 2023).

Both interventions promote participation in physical activities, but focus on different targets. Sports Stars targets intrinsic factors, while PREP targets extrinsic factors. Considering their combined influence on children with CP, we hypothesize that implementing both together could yield better participation results. No study has yet evaluated this combination. A randomized controlled trial (RCT) would be the most robust mechanism to report on the effectiveness of this combined approach, however a feasibility study is needed to first establish the feasibility of a future, large-scale RCT, and the outcomes, including, but not limited to, participation, that should be measured.

Thus, the aims of this study were as follows: (1) Investigate the feasibility of conducting a future RCT to evaluate the effectiveness of Sports Stars Brazil plus PREP; and (2) evaluate the preliminary effects of Sports Stars Brazil plus PREP and Sports Stars Brazil on leisure-time physical activity participation goals, frequency and involvement in school and community, family empowerment, physical literacy, and physical activity level outcomes.

## Methods

### *Study Design*

This is a feasibility study of a single-blinded, two-arm randomized controlled trial. The study protocol was previously published (Souto et al., 2023). Data reporting followed the CONSORT statement for pilot and feasibility trials (Eldridge et al., 2016). Ethical approval was obtained from the Research Ethics Committee at the Federal University of Minas Gerais, Brazil (CAAE: 33238520.5.0000.5149). The trial registration numbers are RBR-4m3b4b6 and U1111-1256-4998. Children with CP and their caregivers signed informed assent and consent forms.

### *Participants*

Eighteen children with CP were recruited through social media, contacts with professionals from rehabilitation clinics and health institutes, and from a waitlist for a partner project with similar sample characteristics, entitled Sports Stars Brazil. Recruitment took place in Belo Horizonte, Brazil.

Children were eligible to participate if they were aged 6–12 years, diagnosed with CP, and classified as GMFCS levels I or II (McDowell et al., 2008). Children were excluded from this study if they had severe cognitive/behavioral difficulties or clinical conditions which impacted their ability to participate safely in the intervention, or recent/planned orthopedic/neurological surgeries which may impact participation or confound results.

### *Intervention procedures*

#### *Sports Stars Brazil intervention*

Both groups underwent the Sports Stars Brazil intervention, adapted from the Australian Sports Stars program for Brazilian children with CP. The protocol's effectiveness in this population has been studied (Clutterbuck et al., 2018; Sousa Junior et al., 2022). Sessions were led by a physiotherapist experienced in pediatric rehabilitation, supported by two physical education professionals and nine volunteers (undergraduate students in physical

therapy and physical education). Sessions took place on Saturday mornings at 8 or 9 am on a university campus court.

The lead interventionists were trained by the original creator of the program (GC) in 4 online sessions. They, in turn, trained the other interventionists, who were undergraduate students and physical education professionals, in in-person meetings. Before the study's implementation, all the interventionists had already applied the intervention in a previous study at the same university that aimed to investigate the effects of the Sports Stars program. The program consisted of 8 weekly, 1-hour group sessions targeting physical literacy through popular Brazilian sports like soccer, handball, basketball, and athletics. Participants trained in gross motor skills related to these sports and progressed to modified sports activities. Weekly sessions focused on enhancing physical, psychological, cognitive, and social skills, guided by standardized descriptors (Sousa Junior et al., 2022). Figure 1 illustrates the session structure and components.

**Figure 1:** Sports Stars Brazil program description

*Insert figure 1*

*Pathways and Resources for Engagement and Participation Intervention - PREP*

Interventions were administered exclusively to participants in the Sports Stars Brazil plus PREP group by a physiotherapist and an occupational therapist, both experienced with children with disabilities for 6 months. They were supported by volunteer interventionists, including two physical therapy and two occupational therapy undergraduate students, all trained via the PREP e-learning module and the adapted Portuguese version manual.

Participants attended eight weekly 1-hour group sessions of Sports Stars Brazil, followed immediately by eight weekly 1-hour individual PREP sessions. During Sports Stars Brazil sessions, parents/caregivers observed their child's activities, followed by meetings with

PREP interventionists. PREP sessions aimed to address environmental barriers to achieve baseline-assessed goals, with four weeks dedicated to each goal. Strategies included involving and coaching the participant and family in solution-based approaches (Anaby et al., 2018; Law et al., 2016).

The Canadian Occupational Performance Measure (COPM) and Participation and Environment Measure for Children and Youth (PEM-CY) guided the PREP intervention and measured outcomes (Coster et al., 2012; Galvão et al., 2018; Law, 2005). PEM-CY preceded COPM to aid goal-setting by identifying common participation activities in familiar environments of interest to the child. COPM established two leisure-time physical activity goals, crucial to PREP. A blinded assessor evaluated goals at baseline, post-intervention, and follow-up. Goal performance and satisfaction were assessed twice weekly during PREP to guide interventions and assess family perceptions of progress (Law et al., 2016). Figure 2 details the PREP intervention structure. A case study from a participant in the Sports Stars Brazil +PREP group is provided as supplemental material 4 to enhance clarity of both interventions together.

**Figure 2:** Pathways and Resources for Engagement and Participation intervention description

*Insert figure 2*

***Measures***

Clinical and demographic data were collected at the beginning of the study, including: (1) sex and age, (2) motor type (spastic, dyskinetic, ataxic, or mixed), (3) distribution (unilateral or bilateral), and (4) GMFCS, Manual Ability Classification System (MACS) (Eliasson et al., 2006), and Communication Function Classification System (CFCS) (Paulson & Vargus-Adams, 2017).

*Primary measure: Feasibility*

The primary outcome, focusing on feasibility, was assessed according to the study protocol (Souto et al., 2023). Study participation outcomes included willingness to participate in an RCT and acceptability of random allocation (Sharma et al., 2018). Feasibility outcomes related to recruitment procedures included acceptability of screening (Sharma et al., 2018). Outcome assessment feasibility encompassed assessor blinding and evaluation (Sharma et al., 2018). Treatment-related outcomes involved potential group contamination, intervention adherence, treatment satisfaction, comprehension of interventions, adverse events, and implementation resources (Feitosa et al., 2021; Sharma et al., 2018).

*Secondary measures*

The selection of secondary outcome measures considered their potential to serve as either primary or secondary outcomes in a full RCT. The tools employed included the COPM, PEM-CY, Family Empowerment Scale (FES), Physical Literacy Profile Questionnaire (PLP-Quest), and physical activity level assessed by accelerometer. All outcome measures were administered at three time points: baseline assessment, immediate post-intervention assessment, and three months of follow-up. All the assessments will be better described below.

***Canadian Occupational Performance Measure:*** The standard COPM addresses self-care, productivity, and leisure (Law et al., 2005). The assessor used the COPM approach to interview children and their caregivers, setting goals for leisure-time physical activities. Children in both groups identified two meaningful leisure-time physical activity goals related to sports, recreation, or leisure activities. After goal-setting with a blinded assessor, parents rated children’s performance and satisfaction on a scale of 1 to 10 (Law et al., 2005).

Interventionists assessed goal performance and satisfaction during PREP sessions, following guidelines in the PREP manual to aid intervention and monitor progress (Law et al., 2016).

***Participation and Environment Measure for Children and Youth:*** The PEM-CY, administered to parents/caregivers, assessed children's participation and environment in school and community settings using the Portuguese-translated version (Galvão et al., 2018). Mean scores for participation frequency and involvement were analyzed, with higher scores indicating greater engagement. Baseline PEM-CY data provided by an independent assessor to PREP interventionists assisted in identifying barriers and facilitators (Law et al., 2016). Brazilian PEM-CY calculators generated scores for both frequency and involvement using raw scores, demonstrating reliability and validity in assessing participation among children and youth with disabilities (Galvão et al., 2018; Silva et al., 2024).

***Physical Literacy Profile Questionnaire – PLP-Quest:*** Physical literacy was assessed using the Physical Literacy Profile Questionnaire (PLPQ-Quest), developed based on the Australian Physical Literacy Framework (2019). This questionnaire evaluates parents' perceptions of children's physical, cognitive, social, and psychological skills in relation to physical activity. Parents/caregivers completed the online questionnaire, rating each item on a three-point scale (0 to 2), with higher scores indicating greater physical literacy. Measurement properties analysis with children and youth (6–21 years old, primarily with CP at all GMFCS levels) demonstrated the PLPQ-Quest's content validity, construct validity, good internal consistency ($\alpha$=0.93), and test–retest reliability (ICC=0.92, CI95%: 0.87-0.96) (Fernandes et al., 2023).

***Family Empowerment Scale – FES:*** The Family Empowerment Scale (FES), self-administered by parents/caregivers, measured family empowerment across three subscales: family, service system, and community (Koren et al., 1992). Using a 5-point Likert scale ('never' to 'very often'), higher scores indicated greater family empowerment (Koren et al., 1992). The scale, translated into Brazilian Portuguese, was completed online. Evaluation of its

measurement properties among caregivers of children and youth with CP (aged 0–21 years) indicated adequate test-retest reliability (CCI=0.88, CI95%=0.79-0.93) and internal consistency (α=0.89) (data not yet published). Scores were calculated using the Brazilian Portuguese FES calculator.

***Physical activity levels:*** Physical activity levels were assessed using free-living tri-axial accelerometry, a valid method for children with CP (Lennon et al., 2015). The Actigraph wGT3X-BT model was used, worn continuously for 7 days during daily activities, excluding sleep and water activities. Non-wear periods were automatically detected. ActiLife V.6 software analyzed data, modified to account separately for GMFCS levels I and II (Trost et al., 2016). Measures included percent time in light physical activity (LPA), total time in moderate-to-vigorous physical activity (MVPA), and sedentary behavior. Cut-off points were defined as sedentary time <72 counts/15 s, LPA 685-724 counts/15 s for GMFCS level I and 72-685 counts/15 s for level II, and MVPA ≥685 counts/15 s for GMFCS level I and ≥724 counts/15 s for level II (Trost et al., 2016).

***Sample size***

The sample size calculation aimed to achieve primary feasibility outcomes using the equation: $n = \left(\frac{Z_{1-\alpha}\sqrt{R_{UL}(1-R_{UL})}+Z_{1-\beta}\sqrt{G_{LL}(1-G_{LL}}}{(G_{LL}-R_{UL})}\right) + \frac{1}{|G_{LL}-R_{UL}|}$. With an adherence rate to the protocol ≥65% (green zone) and ≤35% failure rate (red zone), and α of 5% and power of 80%, the feasibility study required a total of 18 participants, with 9 in each group (Billingham et al., 2013; Fusari et al., 2020).

***Randomization procedure***

Participants were randomly allocated by an independent researcher (Souto et al., 2023) using block randomization with a 1:1 allocation ratio. Allocation concealment involved 18 sealed envelopes, and randomization occurred after all participants were enrolled.

### *Blinding*

The research assessor remained blinded to participant group allocation throughout the study. However, participants and interventionists were aware of their group assignments due to the nature of the intervention.

### *Data analysis*

Baseline clinical and demographic characteristics were compared descriptively. Feasibility outcomes were reported descriptively, and exploratory analyses examined within-group and between-group differences in secondary outcomes. Data normality was assessed using the Shapiro-Wilk test. Repeated-measures ANOVA and Friedman tests analyzed within-group differences, followed by Bonferroni analyses. Between-group differences were assessed using independent t-tests for parametric data and Mann-Whitney tests for non-parametric data at post-intervention and follow-up, with a significance level of 0.05. Effect sizes were calculated following Cohen's criteria: small (d= 0.20–0.49), medium (d= 0.50–0.79), and large (d>0.80) (Cohen, 1988). Missing data were not imputed. Sample size calculations for a future RCT used G*Power Software, considering effect sizes from this study. Statistical analyses employed IBM SPSS Statistics (V.22.0, IBM).

## Results

### *Sample characteristics*

Data collection took place between September 2022 and October 2023, with recruitment concluding upon reaching the targeted sample size of 18 participants. Nine participants were

randomized to each intervention group. Clinical and demographic characteristics of the participants are detailed in Table 1. The participant flowchart is illustrated in Figure 3.

*Insert table 1*

**Figure 3:** Participants flowchart

*Insert figure 3*

**Legend:** COPM: Canadian Occupational Performance Measure; FES: Family Empowerment Scale; n: number; SSB: Sports Stars Brazil; PEM-CY: Participation and Environment Measure for Children and Youth; PLPQ-Quest: Physical Literacy Profile Questionnaire; PREP: Pathways and Resources for Engagement and Participation; RCT: Randomized Controlled Trial.

***Feasibility outcomes***

Initially, 26 children were eligible. Three declined to participate, and four were later excluded (reasons in the flowchart). One participant became ineligible due to orthopedic surgery during the study. Non-completion rates and missing data details are in Figure 3. In the Sports Stars Brazil +PREP group, seven attended ≥50% of sessions, compared to four in the Sports Stars Brazil group (supplementary material 1). Recruitment averaged less than one participant weekly from August 2022 to April 2023, totaling 26 potential participants over 36 weeks. The recruiting researcher faced screening and recruitment challenges, particularly in identifying children at eligible GMFCS levels and disseminating the project through peer networks (therapists, rehabilitation institutions, and clinics). The blinded assessor correctly guessed participants' group allocation 39% of the time.

Table 2 summarizes feasibility criteria responses. Both groups showed high contact rates between parents, high intervention credibility and acceptability, and minimal

understanding difficulties reported (one family). All parents/caregivers agreed with random allocation, with no reported injuries. Additional satisfaction details are in supplementary material 2. In the Sports Stars Brazil +PREP group, parents were satisfied with all aspects queried. In contrast, in the Sports Stars Brazil group, satisfaction was lower regarding intervention time and the child's skill level post-intervention (57.1%).

*Insert table 2*

To implement the PREP program, resources were allocated based on child/family goals. For the Sports Stars Brazil program, resources included: one therapist per child; one court with goals; one basketball, soccer, and handball per child; two removable basketball hoops; at least 10 cones and two small obstacles per child; and one throwing disc per child. The average PREP session length in the Sports Stars Brazil +PREP group was 48.47 minutes (ranging from 26.25 to 115.6 minutes), excluding the weeks when it was not possible to contact the participants.

***Secondary measures results***

Each child and family selected two participation goals, resulting in the determination of 36 goals (see supplementary material 3) at baseline, but there was missing data in post-intervention and follow-up assessments. Eighteen (100%) goals in the Sports Stars Brazil +PREP group were attendance-related, while 17 (94.5%) goals in the Sports Stars Brazil group also pertained to attendance. Only one goal (5.5%) in the Sports Stars Brazil group was related to involvement. In the Sports Stars Brazil +PREP group, two (11%) goals were not related to recreational or sports practice (e.g. *"take comic book classes"* or *"take music lessons"*), while in the Sports Stars Brazil group, one (5%) goal was not related to this group of activities. The results of the exploratory analysis of change after the intervention are presented in Table 3.

The Sports Stars Brazil +PREP group exhibited significantly greater improvements in performance (t= 2.53, p=0.02) and satisfaction (t= 2.19, p=0.04) in COPM, as well as FES (t= 3.45, p=0.005) in pos-intervention compared to Sports Stars Brazil group. The effect size was large for performance and satisfaction in COPM, and for FES pos-intervention (table 3). No significant differences between groups were found in other assessment tools at this point (see Table 3). The within-group analysis revealed that only FES outcome in the Sports Stars Brazil group (p=0.004) exhibited statistically significant differences. No statistically significant differences were found in the other outcomes in the within-group analysis (p>0.05).

*Insert table 3*

In the follow-up assessment, involvement in school assessed by PEM-CY (U=10.50, p=0.04) showed significant differences in favor to the Sports Stars Brazil +PREP. No other difference was found regarding the other outcomes at any point of the study. The values and effect size can be seen in details in Table 3.

The sample size calculations for a future RCT were as follows: 24 participants (12 per group) for COPM performance, 30 participants (15 per group) for satisfaction results, and 10 participants (5 per group) for FES considerations. For the calculation of the effect size, an alpha of 5% and a power of 90% were considered. Calculations focused on variables showing significant differences and effect sizes >0.8. Therefore, the required sample size for a future RCT ranges from 10 to 30 participants.

**Discussion**

The study aimed to assess the feasibility of an RCT comparing the PREP+ Sports Stars Brazil protocol with Sports Stars Brazil alone in enhancing participation in recreational and sports activities for children with CP. It also sought preliminary data on both protocols' effects on participation goals, school and community engagement, family empowerment, physical

literacy, and physical activity levels. Findings suggest feasibility for a future RCT with adjustments. Moreover, the PREP+ Sports Stars Brazil protocol demonstrates promise in enhancing participation goals, family empowerment, and school engagement.

### *Feasibility*

The study finds that conducting an RCT comparing the PREP protocol with Sports Stars Brazil alone is feasible, with necessary adaptations and close monitoring. Key areas needing attention include evaluator blinding, participant adherence, and attrition rates, while adaptations are needed in recruitment, variable evaluation, and procedures to minimize group contamination (Souto et al., 2023). Most parents/caregivers in both groups found the protocols effective in enhancing sports and recreational participation for children with CP, recommending them to others. These findings align with previous studies on the benefits of PREP and Sports Stars interventions (Clutterbuck et al., 2020a; Hsieh et al., 2023; Sousa Junior et al., 2023).

Parents in the Sports Stars Brazil + PREP group reported high satisfaction with the interventions. In contrast, satisfaction was lower in the Sports Stars Brazil group, particularly regarding intervention timing and perceived skill level changes after the program. Challenges included logistical issues with session timing conflicting with children's schedules and longer travel times for families, impacting attendance and skill development compared to previous findings (Clutterbuck et al., 2020a). Recruitment was slow, averaging less than one participant per week, due to difficulties in identifying eligible participants by GMFCS level and disseminating the project among relevant networks. Future strategies might involve multi-center interventions and training more therapists to broaden participation and reduce family burdens (Clutterbuck et al., 2018).

Direct contact between parents of both groups was unavoidable due to concurrent Sports Stars Brazil sessions. In future RCTs, scheduling separate times for each group's sessions could mitigate this issue, enhancing study integrity despite initial recruitment challenges and resource limitations. High post-intervention and follow-up assessment dropouts posed challenges, with remote evaluation methods and incentives suggested to mitigate attrition rates in future studies, particularly among diverse socioeconomic groups (Brueton et al., 2014).

***Preliminary effects***

Preliminary analyses were conducted for exploratory purposes, as the design of the present study lacks the power to determine the effectiveness or superiority of the proposed protocol. The Sports Stars Brazil + PREP group showed better results in participation goals immediately post-intervention. This can be attributed to PREP's focus on directly addressing factors that restrict participation in a specific goal. Given the significant impact of environmental factors on participation in recreational physical activity, implementing an ecological intervention that modifies environmental and task factors is scientifically supported (Abid et al., 2022; Hsieh et al., 2022). Additionally, involving the child and family throughout the intervention process is crucial, as it increases engagement and improves outcomes (Granlund & Imms, 2024).

At the 12-week follow-up, no significant difference was observed between the two groups regarding participation goals. There was an increase in performance and satisfaction scores in the Sports Stars Brazil group at the 12-week follow-up, while the Sports Stars Brazil + PREP group maintained their post-intervention scores. In the PREP intervention, therapists guide families to identify and address limiting participation factors, facilitating short-term goal achievement. The Sports Stars Brazil group, lacking this guidance, may require more

time to identify effective strategies independently. Although short-term goals were not achieved, families appeared to pursue them later.

Most participation goals listed by the Sports Stars Brazil group were unrelated to the specific activities covered by the program (e.g., basketball, athletics, soccer, and handball), including cycling, volleyball, and martial arts. After completing the Sports Stars Brazil protocol, parents/caregivers likely sought alternative activities that interested the child and family. Additionally, the general nature of goals set by evaluators may have influenced differences compared to prior study. This study, used more specific goals to achieve rehabilitation objectives, which are widely recommended to achieve rehabilitation objectives (Bexelius et al., 2018; Clutterbuck et al., 2020b). Due to the need for evaluator blinding and to determine more general goals to be better addressed during the PREP protocol, it was not possible to specify goals adequately.

Another difference showed after the intervention was in families' empowerment. One of the characteristics of the PREP intervention is to involve the entire family in the intervention process, from setting goals to planning and implementing strategies to deal with identified barriers (Anaby, 2018; Law et al., 2016). This leads families to actively reflect and identify the strengths of the child and areas for improvement, how they interact with identified barriers, and to plan strategies to deal with these barriers, which impacts family self-efficacy. Studies suggest that communication, involving clear communication, open emotional expression, and cooperative problem-solving, positively correlates with family empowerment (Han et al., 2018). The PREP intervention is based on direct and open communication between the therapist and the family, and the therapist practices active listening during the process. This provides an environment conducive for families to express themselves openly and safely. Additionally, since the core of the intervention is the collaborative search for solutions between the parties, improvement in empowerment levels can occur through the

facilitation of communication processes (Han et al., 2018). In addition to these results, a significant difference was observed in school involvement at follow-up. The change in involvement aligns with studies that have shown that PREP was able to improve the involvement of children with disabilities in different contexts, while there are no studies in the literature indicating that Sports Stars is capable of modifying this outcome (Hsieh et al., 2023).

### *Limitations and future implications*

One of the limitations of the present study was the establishment of less specific goals due to the need to maintain the evaluator's blinding. As we know, it is a step in the PREP protocol to determine goals that consider the context in which the task will occur. Therefore, we suggest that in a future study, the authors acknowledge that methodological limitation and the evaluator who will determine the goals for the intervention should not be blinded. Additionally, it is essential to ensure that the goals are related to sports or recreational activities. In a future randomized controlled trial (RCT), conducting a mixed linear model in the statistical analysis may be an appropriate alternative for assessing treatment effects, as it combines the analysis of fixed and random components and addresses missing data. Moreover, it is important to investigate changes in the outcomes of environmental barriers and facilitators provided by the PEM-CY, since the PREP intervention addresses these outcomes.

## Conclusion

With the results obtained, it is possible to assert that a more robust clinical trial utilizing the methods described here could be conducted in the future. However, some adjustments will be necessary, especially considering recruitment procedures, contamination between groups, and loss of assessment data. Furthermore, based on the preliminary results obtained, we can infer that the Sports Stars Brazil +PREP protocol has the potential to improve outcomes related to

participation goals in sports and recreational activities, family empowerment, and school engagement. However, it is important to note that due to the methodological characteristics of the present study, the data obtained cannot be generalized and is not suitable for drawing conclusions about the effectiveness of the combined interventions.

**Acknowledgments**

We thank the Universidade Federal de Minas Gerais (UFMG), Pró Reitoria de Pesquisa da UFMG, Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), and Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for their support. We acknowledge the use of ChatGPT for assisting with the translation from Portuguese to English.

**References**

Abid, M., Cherni, Y., Batcho, C. S., Traverse, E., Lavoie, M. D., & Mercier, C. (2022). Facilitators and barriers to participation in physical activities in children and adolescents living with cerebral palsy: a scoping review. *Disability and Rehabilitation*, 1–16. https://doi.org/10.1080/09638288.2022.2150327

Anaby, D. R., Law, M., Feldman, D., Majnemer, A., & Avery, L. (2018). The effectiveness of the Pathways and Resources for Engagement and Participation (PREP) intervention: improving participation of adolescents with physical disabilities. *Developmental Medicine & Child Neurology*, 60(5), 513–519. https://doi.org/10.1111/dmcn.13682

Bexelius, A., Carlberg, E. B., & Löwing, K. (2018). Quality of goal setting in pediatric rehabilitation-A SMART approach. *Child: Care, Health and Development*, 44(6), 850–856. https://doi.org/10.1111/cch.12609

Billingham, S. A., Whitehead, A. L., & Julious, S. A. (2013). An audit of sample sizes for pilot and feasibility trials being undertaken in the United Kingdom registered in the United Kingdom Clinical Research Network database. *BMC Medical Research Methodology*, 13(1). htt://doi.org/10.1186/1471-2288-13-104

Brueton, V., Stenning, S., Stevenson, F., Tierney, J., & Rait, G. (2017). Best practice guidance for the use of strategies to improve retention in randomised trials developed from two consensus workshops. *Journal of Clinical Epidemiology*. https://doi.org/10.1016/j.jclinepi.2017.05.010

Carlon, S. L., Taylor, N. F., Dodd, K. J., & Shields, N. (2012). Differences in habitual physical activity levels of young people with cerebral palsy and their typically developing peers: a systematic review. *Disability and Rehabilitation*, *35*(8), 647–655. https://doi.org/10.3109/09638288.2012.715721

Clutterbuck, G. L., Auld, M. L., & Johnston, L. M. (2018). SPORTS STARS study protocol: a randomised, controlled trial of the effectiveness of a physiotherapist-led modified sport intervention for ambulant school-aged children with cerebral palsy. *BMC Pediatrics*, 18(1). https://doi.org/10.1186/s12887-018-1190-z

Clutterbuck, G. L., Auld, M. L., & Johnston, L. M. (2020a). SPORTS STARS: a practitioner-led, peer-group sports intervention for ambulant, school-aged children with cerebral palsy. Parent and physiotherapist perspectives. *Disability and Rehabilitation*, 1–10. https://doi.org/10.1080/09638288.2020.1785558

Clutterbuck, G. L., Auld, M. L., & Johnston, L. M. (2020b). SPORTS STARS: a practitioner-led, peer-group sports intervention for ambulant children with cerebral palsy. Activity and participation outcomes of a randomised controlled trial. *Disability and Rehabilitation*, 1–9. https://doi.org/10.1080/09638288.2020.1783376

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). *Lawrence Erlbaum Associates*.

Coster, W., Bedell, G., Law, M., Khetani, M. A., Teplicky, R., Liljenquist, K., Gleason, K., & Kao, Y.-C. (2011). Psychometric evaluation of the participation and environment measure for children and youth. *Developmental Medicine and Child Neurology*, 53(11), 1030–1037. https://doi.org/10.1111/j.1469-8749.2011.04094.x

Darko Milaščević, F. Virginia Wright, Milošević, M., & Neubauer, D. (2022). Measuring advanced motor skills in children with cerebral palsy: development of normative data and percentile curves for the Challenge-20 assessment. *International Journal of Rehabilitation Research*, *45*(4), 329–335. https://doi.org/10.1097/mrr.0000000000000546

Eldridge, S. M., Chan, C. L., Campbell, M. J., Bond, C. M., Hopewell, S., Thabane, L., & Lancaster, G. A. (2016). CONSORT 2010 statement: extension to randomised pilot and feasibility trials. *BMJ*, 355, i5239. https://doi.org/10.1136/bmj.i5239

Eliasson, A.-C., Krumlinde-Sundholm, L., Rösblad, B., Beckung, E., Arner, M., Öhrvall, A.-M., & Rosenbaum, P. (2006). The Manual Ability Classification System (MACS) for children with cerebral palsy: scale development and evidence of validity and reliability. *Developmental Medicine & Child Neurology*, 48(07), 549. https://doi.org/10.1017/s0012162206001162

Feitosa, A. M., Mancini, M. C., Silvério, A. P. M., Gordon, A. M., & Brandão, M. B. (2021). "Help Me to Improve my Own Priorities!": A Feasibility Study of an Individualized Intensive Goal Training for Adolescents with Cerebral Palsy. *Physical & Occupational Therapy in Pediatrics*, 41(6), 601–619. https://doi.org/10.1080/01942638.2021.1891186

Fernandes, A. C., Souto, D. O., de Sousa Junior, R. R., Clutterbuck, G. L., Wright, F. V., de Souza, M. G., Ferreira, L. F. B., Cardoso Rodrigues, A. A., Camargos, A. C. R., & Leite, H. R. (2023). Sports Stars Brazil in children with autism spectrum disorder: A feasibility randomized controlled trial protocol. *PloS One*, 18(11), e0291488. https://doi.org/10.1371/journal.pone.0291488

Furtado, M. A. D. S., Longo, E., Campos, A. C. de, Silva, M. A. T. da, Silva, A. C. de C., Ayupe, K. M. A., Camargos, A. C. R., & Leite, H. R. (2024). Practices of Physical Therapists Who Assist People With Cerebral Palsy in Brazil: A National Survey. *Pediatric Physical Therapy: The Official Publication of the Section on Pediatrics of the American Physical Therapy Association*. https://doi.org/10.1097/PEP.0000000000001126

Fusari, G., Gibbs, E., Hoskin, L., Dickens, D., Leis, M., Taylor, E., Jones, F., & Darzi, A. (2020). Protocol for a feasibility study of OnTrack: a digital system for upper limb rehabilitation after stroke. *BMJ Open*, 10(3), e034936. https://doi.org/10.1136/bmjopen-2019-034936

Galvão, E. R. V. P., Cazeiro, A. P. M., De Campos, A. C., & Longo, E. (2018). Participation and environment measure for children and youth (PEM-CY): Cross-cultural adaptation for use in Brazil. *Revista de Terapia Ocupacional da Universidade de São Paulo*, 29(3), 237–245. https://doi.org/10.11606/issn.2238-6149.v29i3p237-2457

Granlund, M., & Imms, C. (2024). Participation as a means–implications for intervention reasoning. https://doi.org/10.3390/ijerph20053913

Han, K. S., Yang, Y., & Hong, Y. S. (2018). A structural model of family empowerment for families of children with special needs. *Journal of Clinical Nursing*, 27(5-6), e833–e844. https://doi.org/10.1111/jocn.14195

Hsieh, Y. H., Ryan, M., & Anaby, D. (2023). Towards multi-faceted outcomes of participation-based interventions: mapping the PREP's effects for children and youth with disabilities. *Disability and Rehabilitation*, 1-10. https://doi.org/10.1080/09638288.2023.2280084

Imms, C., Granlund, M., Wilson, P. H., Steenbergen, B., Rosenbaum, P. L., & Gordon, A. M. (2016). Participation, both a means and an end: a conceptual analysis of processes and outcomes in childhood disability. *Developmental Medicine & Child Neurology*, 59(1), 16–25. https://doi.org/10.1111/dmcn.13237

Koren, P. E., DeChillo, N., & Friesen, B. J. (1992). Measuring empowerment in families whose children have emotional disabilities: A brief questionnaire. *Rehabilitation Psychology*, 37(4), 305–321. https://doi.org/10.1037/h0079106

Law, M., Baptiste, S., Carswell, A., McColl, M. A., Polatajko, H., & Pollock, N. (2005). Canadian occupational performance measure (4th ed.). *CAOT Publications ACE*.

Law, M., Anaby, D., Teplicky, R., & Turner, L. (2016). Pathways and Resources for Engagement and Participation (PREP): a practice model for occupational therapists. https://www.canchild.ca/en/shop/25-prep.

Lennon, N., Thorpe, D., Balemans, A. C., Fragala-Pinkham, M., O'Neil, M., Bjornson, K., Boyd, R., & Dallmeijer, A. J. (2015). The clinimetric properties of aerobic and anaerobic fitness measures in adults with cerebral palsy: A systematic review of the literature. *Research in Developmental Disabilities*, 45-46, 316–328. https://doi.org/10.1016/j.ridd.2015.08.002

McDowell, B. (2008). The Gross Motor Function Classification System - Expanded and Revised. *Developmental Medicine & Child Neurology*, 50(10), 725–725. https://doi.org/10.1111/j.1469-8749.2008.03104.x

Molina-Cantero, A. J., Pousada García, T., Pacheco-da-Costa, S., Lebrato-Vázquez, C., Mendoza-Sagrera, A., Meriggi, P., & Gómez-González, I. M. (2024). Physical Activity in Cerebral Palsy: A Current State Study. *Healthcare (Basel, Switzerland)*, *12*(5), 535. https://doi.org/10.3390/healthcare12050535

Paulson, A., & Vargus-Adams, J. (2017). Overview of Four Functional Classification Systems Commonly Used in Cerebral Palsy. *Children*, 4(4), 30. https://doi.org/10.3390/children4040030

Sharma, S., Jensen, M. P., Moseley, G. L., & Abbott, J. H. (2018). Pain education for patients with non-specific low back pain in Nepal: protocol of a feasibility randomised clinical trial (PEN-LBP Trial). *BMJ Open*, 8(8), e022423. https://doi.org/10.1136/bmjopen-2018-022423

Silva, J. M. M., Cazeiro, A. P. M., Pereira, D. G., Monteiro, R., de Campos, A. C., & Longo, E. (2024). Calculator for measuring participation and the environment–versions for young children and children and youth: report on development. *Brazilian Journal of Physical Therapy*, 28, 100776.

Sousa Junior, R.R., R. Camargos, A. C., Clutterbuck, G. L., & R. Leite, H. (2022). Effectiveness of Modified Sports for Children and Adolescents With Cerebral Palsy: A Pragmatic Study Protocol. *Pediatric Physical Therapy*, 34(1), 81–87. https://doi.org/10.1097/PEP.0000000000000852

Sousa Junior, R. R., Deisiane Oliveira Souto, Fabiane Ribeiro Ferreira, Fabiana Caetano Martins Da Silva E Dutra, Ana Cristina Resende Camargos, Clutterbuck, G. L., & Hércules Ribeiro Leite. (2023). Parents' perceptions of a modified sports intervention for children with cerebral palsy. *Developmental Medicine & Child Neurology*. https://doi.org/10.1111/dmcn.15795

Sousa Junior, R. R., Sousa, A. B., de Lima, A. F. B., de Barros Santos-Rehder, R., Simão, C. R., Fischer, G., Camargos, A. C. R., Clutterbuck, G. L., & Leite, H. R. (2024). Modified sports interventions for children and adolescents with disabilities: A scoping review. *Developmental Medicine and Child Neurology*. https://doi.org/10.1111/dmcn.15952

Souto, D. O., da Silva, L. C., de Sousa Junior, R. R., Clutterbuck, G., Anaby, D., Longo, E., Magalhães, R. C., Camargos, A. C. R., & Leite, H. R. (2023). Practitioner-led, peer-group sports intervention combined with a context-focused intervention for children with cerebral palsy: a protocol of a feasibility randomised clinical trial. *BMJ Open*, *13*(1), e068486. https://doi.org/10.1136/bmjopen-2022-068486

Souto, D. O., de Sa, C. D. S. C., de Lima Maciel, F. K., Vila-Nova, F., de Souza, M. G., Ferreira, R. G., ... & Leite, H. R. (2023). I would like to do it very much! Leisure participation patterns and determinants of Brazilian children and adolescents with physical disabilities. *Pediatric Physical Therapy*, 35(3), 304-312. https://doi.org/10.1097/pep.0000000000001019

Sport Australia. (2019). The Australian Physical Literacy Framework. https://www.sportaus.gov.au/__data/assets/pdf_file/0019/710173/35455_Physical-Literacy-Framework_access.pdf

Trost, S. G., Fragala-Pinkham, M., Lennon, N., & O'neil, M. E. (2016). Decision Trees for Detection of Activity Intensity in Youth with Cerebral Palsy. *Medicine & Science in Sports & Exercise*, 48(5), 958–966. https://doi.org/10.1249/mss.0000000000000842

Vila-Nova, F., Dos Santos Cardoso de Sá, C., Oliveira, R., & Cordovil, R. (2020). Differences in Leisure Physical Activity Participation in Children with Typical Development and

Cerebral Palsy. *Developmental Neurorehabilitation*, *24*(3), 180–186. https://doi.org/10.1080/17518423.2020.1819461

**Table 1-** Clinical and demographic characteristics of the two study groups.

| **Variable** | **SSB + PREP (n=9)** | **SSB (n=9)** |
|---|---|---|
| Age (years); mean (SD) | 9.11 (2.02) | 8.33 (1.41) |
| Sex; | | |
| Male; n (%) | 4 (44) | 6 (67) |
| Female; n (%) | 5 (56) | 3 (33) |
| Motor Type of CP | | |
| Spastic; n (%) | 7 (78) | 9 (100) |
| Ataxic; n (%) | 1 (11) | 0 (0) |
| Dyskinetic; n (%) | 1 (11) | 0 (0) |
| Distribution of brain injury | | |
| Unilateral; n (%) | 4 (44) | 3 (33) |
| Bilateral; n (%) | 5 (56) | 6 (67) |
| GMFCS level | | |
| Level I; n (%) | 5 (56) | 6 (67) |
| Level II; n (%) | 4 (44) | 3 (33) |
| MACS level | | |
| Level I; n (%) | 7 (78) | 6 (67) |
| Level II; n (%) | 2 (22) | 2 (22) |
| Level III; n (%) | 0 (0) | 1 (11) |
| CFCS level | | |
| Level I; n (%) | 6 (67) | 7 (78) |
| Level II; n (%) | 2 (22) | 1 (11) |
| Level III; n (%) | 0 (0) | 1 (11) |
| Level IV; n (%) | 1 (11) | 0 (0) |

CP: Cerebral Palsy; CFCS: Classification Function Communication System; GMFCS: Gross Motor Function Classification System; MACS: Manual Ability Classification System; n: number; PREP: Pathways and Resources for Engagement and Participation; SSB: Sports Stars Brazil. Values are expressed in numbers of individuals and percentage for categorical variables.

**Table 2:** Feasibility results for two study groups.

| Feasibility outcome | SSB+PREP n (%)* | SSB n (%)* | Summary |
|---|---|---|---|
| *Contamination between the groups* | | | |
| ● Those who spoke to other parents/caregivers about the intervention their child was receiving | 4 (44.4) | 1 (14.7) | |
| ● If answered "yes": those whose attitude toward the intervention changed after talking to one of the parents/caregivers of the other group | 2 (40) | 1 (25) | Contamination between the groups occurred |
| ● Those who agreed that any participants in the other group were aware of the type of intervention that their child was receiving | 6 (66.7) | 2 (22.6) | |
| *Credibility and acceptability of intervention* | | | |
| ● The intervention serves as a means to promote participation in sports and recreational activities | 9 (100) | 7 (100) | |
| ● The intervention is good at improving participation in sports and recreational activities | 9 (100) | 7 (100) | |
| ● The intervention would be recommended to a friend or family member who has CP | 9 (100) | 6 (85.7) | Most parents/caregivers believed that both interventions had credibility and were acceptable considering the proposed objectives. |
| ● The intervention might be considered again if the child faces any limitations in participating in sports and/or recreational activities | 9 (100) | 6 (85.7) | |
| ● The intervention successfully enhances the child's participation in sports and recreational activities | 8 (88.9) | 7 (100) | |
| *Therapist's communication* | | | Most parents/caregivers found communication with the therapist easy |
| ● Were the instructions given by the therapists difficult to understand? | 1 (11.1) | 0 (0) | |
| *Acceptability of random allocation* | 8 (88.9) | 7 (100) | Most parents/caregivers accepted their child's allocation group |
| *Injury related to intervention* | 0 (0) | 0 (0) | no injuries were reported |

Legend: n: number; SSB: Sports Stars Brazil; PREP: Pathways and Resources for Engagement and Participation; CP: Cerebral Palsy

*Only the positive answers were considered.

**Table 3:** Preliminary exploratory results from the secondary outcomes

| | | SSB+PREP mean (SD) or median (IQR) | SSB mean (SD) or median (IQR) | p value (between-group difference) | 95% CI (between-group difference) | Effect size |
|---|---|---|---|---|---|---|
| *Time point* | *Outcomes* | | | | | |
| | **COPM, mean (SD)** | | | | | |
| Baseline | *Performance* | 4.8 (1.64) | 4.8 (1.98) | 1.00 | -1.8 to 1.8 | - |
| Post intervention | *Performance* | 7.1 (1.96) | 4.6 (1.99) | 0.02*[a] | 0.4 to 4.6 | 1.27 |
| Follow up | *Performance* | 7.3 (1.79) | 6.2 (1.60) | 0.27 | -0.9 to 3.2 | - |
| Baseline | *Satisfaction* | 5.2 (1.64) | 4.7 (1.41) | 0.45 | -0.9 to 2.1 | - |
| Post intervention | *Satisfaction* | 7.4 (2.13) | 5.1 (1.96) | 0.04*[a] | 0.5 to 4.4 | 1.12 |
| Follow up | *Satisfaction* | 7.7 (2.06) | 6.8 (1.60) | 0.41 | -1.4 to 3.2 | - |
| | **PEM-CY, mean (SD)** | | | | | |
| Baseline | *Frequency (school)* | 5.0 (5.0-6.0) | 5.0 (4.0-5.5) | 0.96 | - | - |
| Post intervention | *Frequency (school)* | 5.0 (4.0-6.0) | 5.0 (4.0-5.0) | 0.33 | - | - |
| Follow up | *Frequency (school)* | 4.0 (4.0-5.0) | 6.0 (4.5-6.0) | 0.15 | - | - |
| Baseline | *Involvement (school)* | 5.0 (5.0-5.0) | 5.0 (5.0-5.0) | 0.32 | - | - |
| Post intervention | *Involvement (school)* | 5.0 (4.0-5.0) | 5.0 (4.0-5.0) | 0.84 | - | - |
| Follow up | *Involvement (school)* | 4.0 (4.0-5.0) | 4.0 (4.0-5.0) | 0.04*[b] | - | - |
| Baseline | *Frequency (community)* | 5.0 (5.0-5.0) | 4.0 (4.0-5.0) | 0.11 | - | - |
| Post intervention | *Frequency (community)* | 4.0 (4.0-5.0) | 4.0 (3.0-5.0) | 0.85 | - | - |
| Follow up | *Frequency (community)* | 5.0 (3.0-5.0) | 4.0 (3.0-5.0) | 0.34 | - | - |
| Baseline | *Involvement (community)* | 5.0 (4.0-5.0) | 5.0 (4.0-5.0) | 1.00 | - | - |
| Post intervention | *Involvement (community)* | 5.0 (4.3-5.0) | 5.0 (4.0-5.0) | 0.48 | - | - |
| Follow up | *Involvement (community)* | 4.0 (4.0-5.0) | 5.0 (3.-5.0) | 0.63 | - | - |
| | **FES, mean (SD)** | | | | | |
| Baseline | *FES* | 3.6 (0.46) | 3.2 (0.34) | 0.08 | -0.5 to 0.8 | - |
| Post intervention | *FES* | 3.9 (0.27) | 3.4 (0.26) | 0.005*[a] | 0.2 to 0.8 | 1.84 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Follow up | *FES* | 3.5 (0.49) | 3.3 (0.27) | 0.48 | -0.4 to 0.8 | - |
| | **PLPQ-Quest, mean (SD)** | | | | | |
| Baseline | *PLPQ-Quest* | 75.8 (26.84) | 69.7 (18.49) | 0.59 | -16.9 to 29.1 | - |
| Post intervention | *PLPQ-Quest* | 76.6 (17.49) | 74.7 (17.33) | 0.83 | -18.3 to 22.2 | - |
| Follow up | *PLPQ-Quest* | 53.4 (27.93) | 68.3 (17.77) | 0.36 | -50.5 to 26.8 | - |
| | **Physical Activity level, mean (SD)** | | | | | |
| Baseline | *Time spent in LPA (%)* | 32.1 (10.58) | 31.6 (5.45) | 0.90 | -7,9 to 8.9 | - |
| Post intervention | *Time spent in LPA (%)* | 33.1 (6.85) | 30.2 (4.61) | 0.43 | -32.2 to -47.1 | - |
| Follow up | *Time spent in LPA (%)* | 34.4 (6.28) | 25.6 (4.55) | 0.07 | 0.3 to 17.3 | - |
| Baseline | *Total time spent in MVPA* | 63.4 (39.33) | 61.1(11.69) | 0.87 | -26.7 to 31.3 | - |
| Post intervention | *Total time spent in MVPA* | 73.3 (34.05) | 65.8 (26.78) | 0.69 | -4.8 to -10.6 | - |
| Follow up | *Total time spent in MVPA* | 67.5 (42.88) | 67.0 (19.20) | 0.93 | -52.9 to 53.9 | - |
| Baseline | *Sedentary behaviour (%)* | 57.8 (14.41) | 58.4 (5.52) | 0.91 | -11.5 to 10.3 | - |
| Post intervention | *Sedentary behaviour (%)* | 55.4 (10.82) | 55.7 (6.73) | 0.96 | -12.2 to -11.7 | - |
| Follow up | *Sedentary behaviour (%)* | 53.2 (11.05) | 61.1 (9.08) | 0.38 | -23.3 to 7.5 | - |

**Legend:** COPM: Canadian Occupational Performance Measure; FES: Family Empowerment Scale; IQR: Interquartile range; LPA: light physical activity; MVPA: moderate-to-vigorous physical activity; n: number; SD: standard deviation; SSB: Sports Stars Brazil; PEM-CY: Participation and Environment Measure for Children and Youth; PLPQ-Quest: Physical Literacy Profile Questionnaire; PREP: Pathways and Resources for Engagement and Participation.

*$p \leq 0.05$

[a] Independent Student T-test

[b] Mann-Whitney (U) test.

**Figure 1**

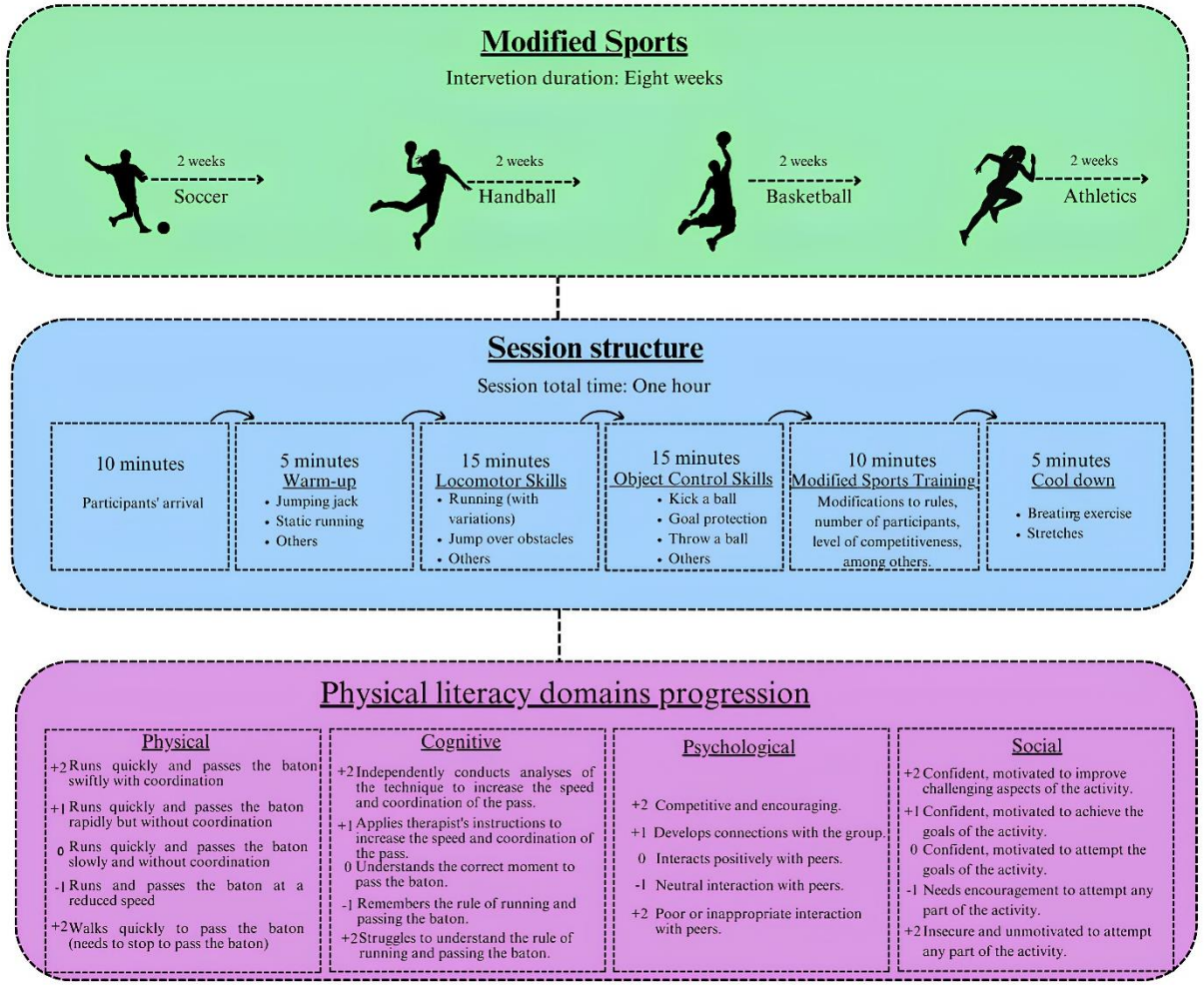

Modified Sports
Intervetion duration: Eight weeks
2 weeks
Soccer
2 weeks
Handball
2 weeks
Basketball
2 weeks
Athletics
Session structure
Session total time: One hour
10 minutes
Participants' arrival
5 minutes
Warm-up
• Jumping jack
• Static running
• Others
15 minutes
Locomotor Skills
• Running (with variations)
• Jump over obstacles
• Others
15 minutes
Object Control Skills
• Kick a ball
• Goal protection
• Throw a ball
• Others
10 minutes
Modified Sports Training
Modifications to rules, number of participants, level of competitiveness, among others.
5 minutes
Cool down
• Breating exercise
• Stretches
Physical literacy domains progression
Physical
+2 Runs quickly and passes the baton swiftly with coordination
+1 Runs quickly and passes the baton rapidly but without coordination
0 Runs quickly and passes the baton slowly and without coordination
-1 Runs and passes the baton at a reduced speed
+2 Walks quickly to pass the baton (needs to stop to pass the baton)
Cognitive
+2 Independently conducts analyses of the technique to increase the speed and coordination of the pass.
+1 Applies therapist's instructions to increase the speed and coordination of the pass.
0 Understands the correct moment to pass the baton.
-1 Remembers the rule of running and passing the baton.
+2 Struggles to understand the rule of running and passing the baton.
Psychological
+2 Competitive and encouraging.
+1 Develops connections with the group.
0 Interacts positively with peers.
-1 Neutral interaction with peers.
+2 Poor or inappropriate interaction with peers.
Social
+2 Confident, motivated to improve challenging aspects of the activity.
+1 Confident, motivated to achieve the goals of the activity.
0 Confident, motivated to attempt the goals of the activity.
-1 Needs encouragement to attempt any part of the activity.
+2 Insecure and unmotivated to attempt any part of the activity.

**Figure 2**

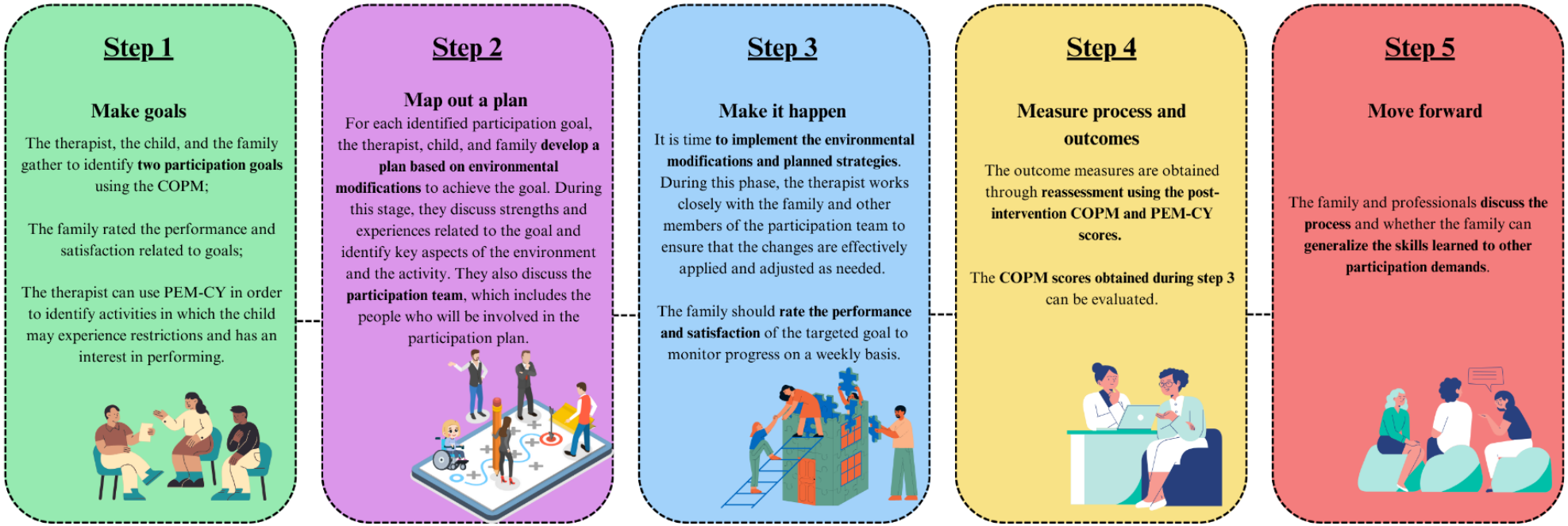
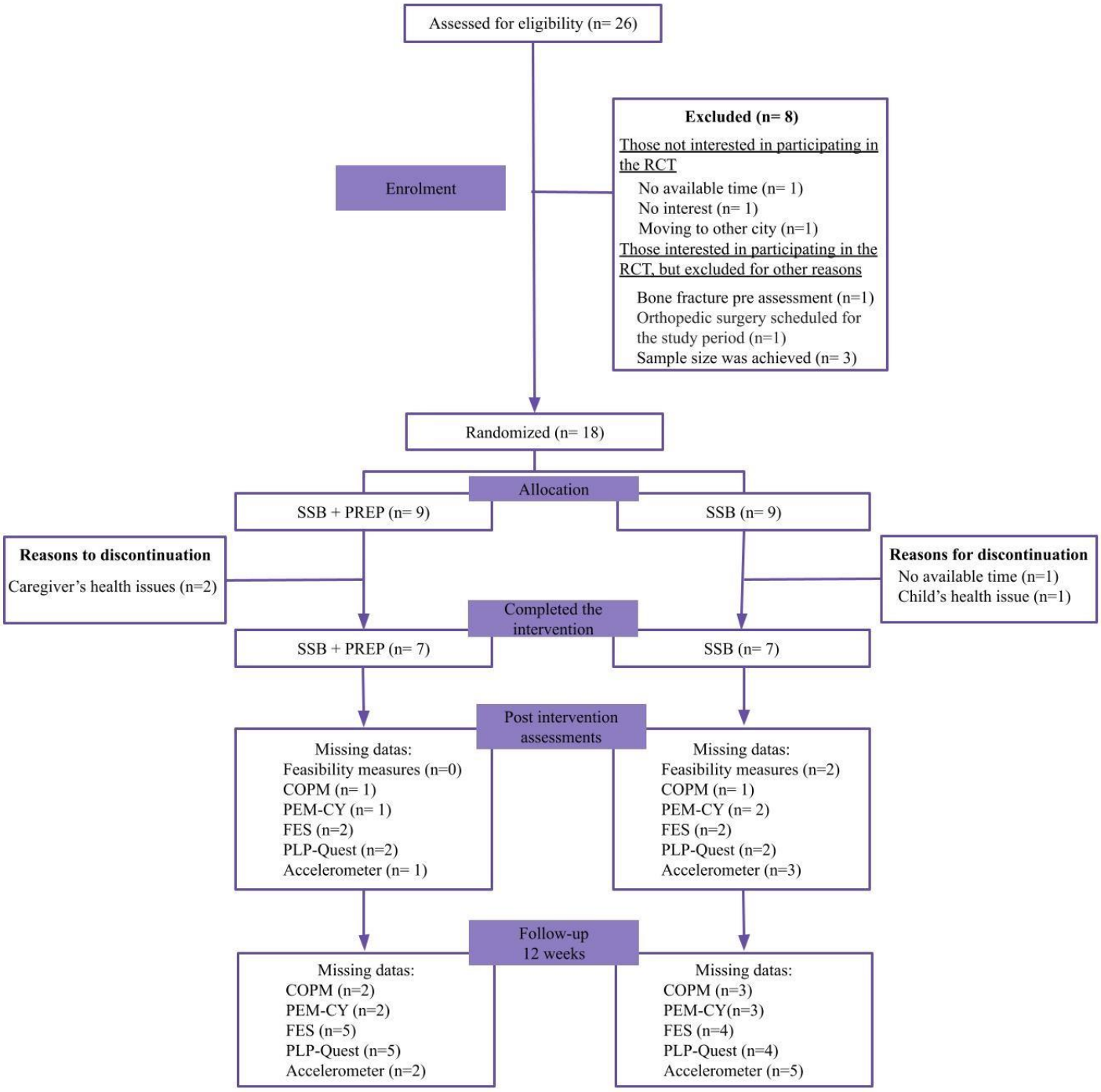

Step 1
Make goals
The therapist, the child, and the family gather to identify two participation goals using the COPM;
The family rated the performance and satisfaction related to goals;
The therapist can use PEM-CY in order to identify activities in which the child may experience restrictions and has an interest in performing.
Step 2
Map out a plan
For each identified participation goal, the therapist, child, and family develop a plan based on environmental modifications to achieve the goal. During this stage, they discuss strengths and experiences related to the goal and identify key aspects of the environment and the activity. They also discuss the participation team, which includes the people who will be involved in the participation plan.
Step 3
Make it happen
It is time to implement the environmental modifications and planned strategies. During this phase, the therapist works closely with the family and other members of the participation team to ensure that the changes are effectively applied and adjusted as needed.
The family should rate the performance and satisfaction of the targeted goal to monitor progress on a weekly basis.
Step 4
Measure process and outcomes
The outcome measures are obtained through reassessment using the post-intervention COPM and PEM-CY scores.
The COPM scores obtained during step 3 can be evaluated.
Step 5
Move forward
The family and professionals discuss the process and whether the family can generalize the skills learned to other participation demands.

**Figure 3**


Assessed for eligibility (n= 26)
Enrolment
Excluded (n= 8)
Those not interested in participating in the RCT
No available time (n= 1)
No interest (n= 1)
Moving to other city (n=1)
Those interested in participating in the RCT, but excluded for other reasons
Bone fracture pre assessment (n=1)
Orthopedic surgery scheduled for the study period (n=1)
Sample size was achieved (n= 3)
Randomized (n= 18)
Allocation
SSB + PREP (n= 9)
SSB (n= 9)
Reasons to discontinuation
Caregiver's health issues (n=2)
Reasons for discontinuation
No available time (n=1)
Child's health issue (n=1)
Completed the intervention
SSB + PREP (n= 7)
SSB (n= 7)
Post intervention assessments
Missing datas:
Feasibility measures (n=0)
COPM (n= 1)
PEM-CY (n= 1)
FES (n=2)
PLP-Quest (n=2)
Accelerometer (n= 1)
Missing datas:
Feasibility measures (n=2)
COPM (n= 1)
PEM-CY (n= 2)
FES (n=2)
PLP-Quest (n=2)
Accelerometer (n=3)
Follow-up 12 weeks
Missing datas:
COPM (n=2)
PEM-CY (n=2)
FES (n=5)
PLP-Quest (n=5)
Accelerometer (n=2)
Missing datas:
COPM (n=3)
PEM-CY(n=3)
FES (n=4)
PLP-Quest (n=4)
Accelerometer (n=5)

**Supplementary material 1:** Participants frequency in Sports Stars Brazil sessions

| Group | Participant | Frequency in Spors Stars Brazil sessions n (%) |
|---|---|---|
| Sports Stars Brazil +PREP | 1 | 7 (88) |
| | 2 | 4 (50) |
| | 3 | 5 (63) |
| | 4 | 3 (38) |
| | 5 | 6 (75) |
| | 6 | 3 (38) |
| | 7 | 7 (88) |
| | 8 | 7 (88) |
| | 9 | 6 (75) |
| Sports Stars Brazil | 10 | 3 (38) |
| | 11 | 1 (12) |
| | 12 | 6 (75) |
| | 13 | 7 (88) |
| | 14 | 4 (50) |
| | 15 | 4 (50) |
| | 16 | 6 (75) |
| | 17 | 8 (100) |
| | 18 | 0 (0) |

Legend: n: number; PREP: Pathways and Resources for Engagement and Participation

**Supplementary material 2:** Satisfaction questions and answers rate.

| Satisfaction question | SSB + PREP* n (%) | SSB* n (%) |
|---|---|---|
| Intervention time | 9 (100) | 4 (57.1) |
| Duration of intervention | 9 (100) | 6 (85.7) |
| Total period of intervention | 9 (100) | 6 (85.7) |
| Place of intervention delivery | 9 (100) | 5 (71.4) |
| Materials used during activities | 9 (100) | 6 (85.7) |
| Practice of modified sports | 9 (100) | 6 (85.7) |
| Practicing activities with other children | 9 (100) | 6 (85.7) |
| Therapists' interaction with parents/caregivers and children | 9 (100) | 6 (85.7) |
| Interaction between the child and the other children | 9 (100) | 6 (85.7) |
| Child's current skill level compared to before the intervention | 9 (100) | 4 (57.1) |
| The activities adaptations suggested by therapists through SSB | 9 (100) | 5 (71.4) |
| The therapist's ability to guide/assist in planning and implementing strategies through PREP | 9 (100) | - |

Legend: n: number, PREP: Pathways and Resources for Engagement and Participation; SSB: Sports Stars Brazil.

* Only completely satisfied responses were considered. The possible answers were: dissatisfied, more and less satisfied, and satisfied.

**Supplementary material 3:** Description of goals for each participant.

| Group | Participant | Goal 1 | Goal 2 |
|---|---|---|---|
| **Sports Stars Brazil +PREP** | 1 | Take comic book classes | Learn to ride a bike |
| | 2 | Roller skate | Bike riding |
| | 3 | Practice martial arts | Take music lessons |
| | 4 | Swimming | Learn to roller skate |
| | 5 | Target shooting | Practice taekwondo |
| | 6 | Take ballet classes | Bike riding at Mom's house. |
| | 7 | Play capture the flag on the street with friends | Play soccer as a goalkeeper |
| | 8 | Play soccer | Play with a skateboard |
| | 9 | Bike riding | Swimming |
| **Sports Stars Brazil** | 10 | Take soccer classes | Play volleyball |
| | 11 | Practice judo | Play soccer |
| | 12 | Bike riding | Play volleyball |
| | 13 | Play soccer | Ride a bike |
| | 14 | Swimming | Play soccer with cousins Play soccer |
| | 15 | Play basketball | Play soccer |
| | 16 | Play basketball in a group | Take a cooking course |
| | 17 | Swimming | Participate in extracurricular physical activities (dodgeball) |
| | 18 | Engage in physical activity more often at home | Engage more while participating in physical activities |

Legend: PREP: Pathways and Resources for Engagement and Participation.

**Supplementary material 4**

*Case study*

L.M.R. is a male child, intelligent, kind, funny, and sociable, and enjoys participating in active recreational activities. He is 10 years old and has bilateral spastic cerebral palsy. L.M.R. is classified as level I in GMFCS, MACS, and CFCS. The family is very involved and committed to the child's healthcare. The child presents demand related to participation in physical activities and improvement in the performance of more complex motor skills (running, grabbing, or kicking a ball). L.M.R. would like to participate in a greater variety of physical activities (learning new games and sports), and his family would like that L.M.R was more confidence and engage more in active play with his friends from the neighborhood and at school.

**1. Participation chosen-goals**

- Playing soccer as a goalkeeper; performance=7; satisfaction=8
- Playing "capture the flag" on the street with friends; performance=6; satisfaction=3

**2. Discuss a plan**

**<u>Goal 1</u>**

The planning was carried out, considering the following points:

- The child's strengths regarding the desired task and previous experiences: He has previously played as a goalkeeper in street soccer games with friends; considers himself good at defense; knows the best strategies for defending (using hands for high balls and feet for low balls); familiar with the rules.
- The challenging aspects of the activity: Catching the balls, as he is afraid of attempting to catch strong balls and of diving to defend (fear of hurting his arm when falling on the ground).
- The location and timing for the activity: He would like to play in an open court in their neighborhood, with goals and marked lines; during weekdays, he plays in the street, and on weekends, the family can take him to a court in the neighborhood.
- With whom he would like to play: With friends from the neighborhood.
- Required materials: The child has a ball and goalkeeper gloves.

- The need for training and preparation: All friends enjoy soccer and know the rules.
- Who could be part of the participation team? - Friends from the neighborhood; sister, parents, and a physical education teacher.
- Which part of the activity he would most like to do? - Catching the balls more often.

**Goal 2**

- The child's strengths regarding the desired task and previous experiences: He knows the game "capture the flag" and played it once with friends in the street; enjoys running; enjoys playing defense by "blocking" opponents from passing through his area.
- The challenging aspects of the activity: His friends who play with him in the street are resistant to practicing other activities, preferring always to play soccer; the physical education teacher does not vary the activities.
- The location and timing for the activity: In the street where they live or in an open court in their neighborhood.
- With whom he would like to play: With friends from the street and school.
- Required materials: Any simple object (flip-flop, bottle, among others) to be used as the flag.
- The need for training and preparation: The child and his friends know the rules of the game.
- Who could be part of the participation team? - The school's physical education teacher.
- Which part of the activity he would most like to do? - Stay in defense (preventing opponents from crossing his area).

**3. Execute the plan**

| **Goal 1: Playing soccer as a goalkeeper** | | |
|---|---|---|
| **Barriers/Environmental or Activity Supports** | **Strategies** | **Comments** |
| Fear of falling and getting hurt while attempting to defend a ball in the goal | • Training in different ways to fall on a soft and safe surface (mat)<br>• Purchase of knee and elbow pads to provide more autonomy and safety<br>• Guidance provided by a physical education professional | All strategies were implemented and worked |
| Availability of friends | • Invite friends in advance and take them to play on weekends at the neighborhood court | During the intervention period, the child was unable to invite friends, but the |

| | | |
|---|---|---|
| | | family reported that they will invite them in the next opportunities. |
| Lack of variation in physical education activities offered | • The child discussing with the teacher and suggesting activity variations;<br>• The therapist discussing with the teacher;<br>• The parents talking to the teacher. | The child and the therapist spoke with the teacher, and both strategies worked. |
| Playing surfaces being asphalt | • Playing with knee and shin guards;<br>• Playing at the neighborhood court. | All strategies were implemented and worked. |
| Difficulty in performing more challenging movements to defend the goa | • Receiving guidance from a physical education professional;<br>• Practicing the task at home during the week. | All strategies were implemented and worked. |
| **Goal 2: Playing capture the flag on the street with friends** | | |
| Lack of variation in the physical education activities offered | • The child discussing with the teacher and suggesting the game;<br>• The therapist discussing with the teacher;<br>• The parents talking to the teacher. | The child and the therapist spoke with the teacher, and both strategies worked. |
| Need for many players | • Inviting other children who play at the neighborhood court to play;<br>• Suggesting the game be played during physical education class;<br>• Organizing a match at Sports Star Brazil*. | The second and third strategies were implemented and worked. |
| Lack of interest from friends in playing capture the flag | • Talking to friends to encourage them to play;<br>• L.M.R.'s older sister seggested the game among friends;<br>• Additionally, she will encourage L.M.R. to talk to his friends to suggest the game. | All strategies were implemented and worked. |

* In the Sports Stars Brazil intervention, professionals conducted a dynamic activity during the modified sports stage aimed at capturing the flag of the opposing team. The task included training motor skills developed in the session, related to athletics, and practicing the task the child was interested in. The other participating children were highly engaged and reported enjoying the activity.

**4. Discuss with family**

At the end of the intervention period, the family reported that the child was playing as a goalkeeper whenever he played with friends in the street, ranging from 2 to 4 times a week. Moreover, the child had the opportunity to play "capture the flag" with friends at school, thus achieving the established goals. Subsequently, the family sought out a private soccer school for the child, who began training as a goalkeeper weekly, one month after the intervention ended. This training is conducted with children of typical development within the same age range as L.M.R. Additionally, L.M.R.'s sister suggested that she led the capture the flag game in the street more often.

Throughout the intervention period, performance scores and satisfaction with goals established in the COPM were collected weekly with the child's mother. Figures 1a, b, and 2a, b shows the pattern of change in scores during intervention.

**Figure 1a**


**Figure 1b**


Figure 1a, b: Scores for (a) performance and (b) satisfaction in the COPM obtained twice a week during the intervention for goal 1.

**Figure 2a**

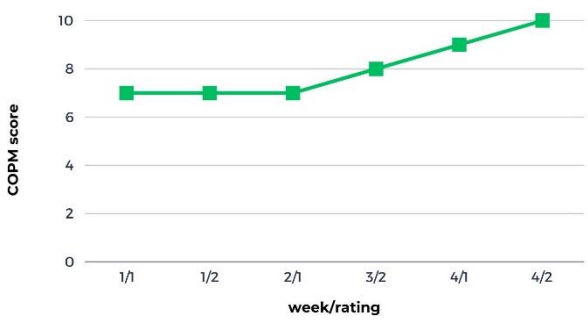



**Figure 2b**

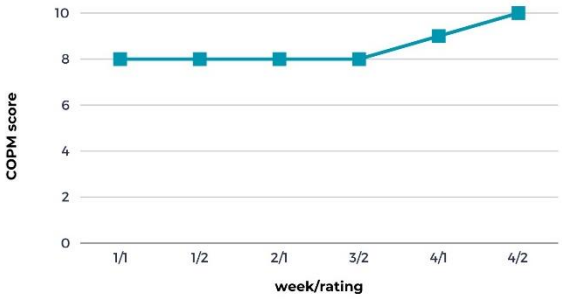


Figure 2a, b: Scores for (a) performance and (b) satisfaction in the COPM obtained twice a week during the intervention for goal 2.

**Post intervention COPM**

- Playing soccer as a goalkeeper; performance=9; satisfaction=9
- Playing "capture the flag" on the street with friends; performance=9; satisfaction=9

It was not possible to conduct the follow-up assessment, as the family refused to participate due to lack of time.

## 4. CONSIDERAÇÕES FINAIS

O presente estudo teve por objetivo avaliar a viabilidade de implementar um ECA que investigue a efetividade de combinar o programa Sports Stars Brasil com o PREP, quando comparado ao Sports Stars Brasil. Além disso, resultados preliminares relacionados a combinação dessas intervenções em desfechos de metas de participação em atividade física, perfil de participação, empoderamento familiar, alfabetização física e nível de atividade física foram investigados. Os resultados de viabilidade apontaram que realizar um ECA é viável, entretanto algumas adaptações serão necessárias. Os procedimentos que necessitam de monitoramento são relacionados ao cegamento da avaliadora, taxa de atrito e a aderência dos participantes. Os procedimentos que necessitam de adaptações são relacionados ao recrutamento, avaliação das variáveis e a contaminação entre os grupos. Em relação aos resultados preliminares, os desfechos que apresentaram diferença significativa foram desempenho e satisfação avaliados pela COPM, e empoderamento familiar na avaliação pós intervenção; e envolvimento na escola no período de follow-up, ambos a favor do grupo Sports Stars Brasil +PREP. Além disso, foi observado um tamanho de efeito alto para o desempenho e satisfação e o empoderamento familiar.

Este estudo elucida o potencial em combinar intervenções que possuem um mesmo alvo, mas agem por mecanismos de ação distintos. A participação é um desfecho complexo, influenciado por diferentes fatores que se modificam de acordo com a individualidade e contexto de cada criança. Sendo assim, implementar uma intervenção que possui abordagem ecológica e que considera as barreiras e facilitadores individuais, associada a uma intervenção que promove a participação por meio da melhora da competência em atividade, senso de si e preferências, tem potencial de modificar de forma significativa o perfil de participação das crianças com PC. A aquisição de desfechos significativos para a família e a criança vem sendo orientado pelas principais diretrizes de cuidado em saúde de crianças com incapacidades, assim como a participação ativa de ambos no processo de aquisição de desfechos de participação. Sendo assim, as intervenções implementadas seguem essas diretrizes. Além disso, os princípios disseminados pela Classificação de Funcionalidade, Incapacidade e Saúde para Criança e Jovens (CIF-CJ), que considera a relação mútua entre desfechos de estrutura e função, atividade e participação, influenciados por fatores pessoais e ambientais, foram base racional para a combinação das intervenções, assim como o modelo da família de constructos relacionados a participação. Os resultados aqui apresentados auxiliam o pesquisador na condução de um estudo mais robusto com adequada qualidade, uma vez que apresenta

metodologias e procedimentos testados, assim como as adequações necessárias. Além disso, mostra que é viável implementar os dois modelos de intervenção de forma combinada.

## REFERÊNCIAS

ABID, M. *et al.* Facilitators and barriers to participation in physical activities in children and adolescents living with cerebral palsy: a scoping review. **Disability and Rehabilitation**, p. 1–16, 29 nov. 2022.

ANABY, D. *et al.* The effect of the environment on participation of children and youth with disabilities: a scoping review. **Disability and Rehabilitation**, v. 35, n. 19, p. 1589–1598, 25 jan. 2013.

ANABY, D. R. *et al.* The effectiveness of the Pathways and Resources for Engagement and Participation (PREP) intervention: improving participation of adolescents with physical disabilities. **Developmental Medicine & Child Neurology**, v. 60, n. 5, p. 513–519, 6 fev. 2018.

BAMM, E. L.; ROSENBAUM, P. Family-Centered Theory: Origins, Development, Barriers, and Supports to Implementation in Rehabilitation Medicine. **Archives of Physical Medicine and Rehabilitation**, v. 89, n. 8, p. 1618–1624, ago. 2008.

**CanChild**. Disponível em: <https://www.canchild.ca/en/shop/25-prep>.

CASPERSEN, C. J.; POWELL, K. E.; CHRISTENSON, G. M. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. **Public Health Reports (Washington, D.C.: 1974)**, v. 100, n. 2, p. 126–131, 1 mar. 1985.

CLUTTERBUCK, G. L.; AULD, M. L.; JOHNSTON, L. M. SPORTS STARS study protocol: a randomised, controlled trial of the effectiveness of a physiotherapist-led modified sport intervention for ambulant school-aged children with cerebral palsy. **BMC Pediatrics**, v. 18, n. 1, 2 ago. 2018.

CLUTTERBUCK, G. L.; AULD, M. L.; JOHNSTON, L. M. SPORTS STARS: a practitioner-led, peer-group sports intervention for ambulant children with cerebral palsy. Activity and participation outcomes of a randomised controlled trial. **Disability and Rehabilitation**, v. 44, n. 6, p. 1–9, 30 jun. 2020A.

CLUTTERBUCK, G. L.; AULD, M. L.; JOHNSTON, L. M. SPORTS STARS: a practitioner-led, peer-group sports intervention for ambulant, school-aged children with cerebral palsy. Parent and physiotherapist perspectives. **Disability and Rehabilitation**, p. 1–10, 7 jul. 2020B.

CLUTTERBUCK, G. L. *et al*. The SPORTS Participation Framework: illuminating the pathway for people with disability to enter into, participate in, and excel at sport. **Brazilian Journal of Physical Therapy**, v. 28, n. 3, p. 101081, 22 maio 2024.

COSTER, W. *et al*. Development of the participation and environment measure for children and youth: conceptual basis. **Disability and Rehabilitation**, v. 34, n. 3, p. 238–246, 16 dez. 2011.

COUTINHO, P. *et al*. How structured and unstructured sport activities aid the development of expertise in volleyball players. **Psychology of Sport and Exercise**, v. 25, p. 51–59, jul. 2016.

CÔTÉ, Jean; ERICKSON, Karl; ABERNETHY, Bruce. Play and practice during childhood. **Conditions of children's talent development in sport**, p. 9-20, 2013.

DARRAH, J. *et al*. Context therapy: a new intervention approach for children with cerebral palsy. **Developmental Medicine & Child Neurology**, v. 53, n. 7, p. 615–620, 13 maio 2011.

EIME, R. M. *et al*. A Systematic Review of the Psychological and Social Benefits of Participation in Sport for Children and adolescents: Informing Development of a Conceptual Model of Health through Sport. **International Journal of Behavioral Nutrition and Physical Activity**, v. 10, n. 1, p. 98, 15 ago. 2013.

HOWLEY, E. T. Type of activity: resistance, aerobic and leisure versus occupational physical activity. **Medicine and Science in Sports and Exercise**, v. 33, n. Supplement, p. S364–S369, jun. 2001.

HSIEH, Y.-H.; RYAN, M.; ANABY, D. Towards multi-faceted outcomes of participation-based interventions: mapping the PREP's effects for children and youth with disabilities. **Disability and rehabilitation**, p. 1–10, 21 nov. 2023.

IMMS, C. *et al*. Participation, both a means and an end: a conceptual analysis of processes and outcomes in childhood disability. **Developmental Medicine & Child Neurology**, v. 59, n. 1, p. 16–25, 19 set. 2017.

LAW, M. *et al*. Improving the participation of youth with physical disabilities in community activities: An interrupted time series design. **Australian Occupational Therapy Journal**, v. 62, n. 2, p. 105–115, 9 fev. 2015.

LAW, M.; BAPTISTE, S.; CARSWELL, A. **COPM 5th Edition**. [s.l.] CAOT Publications ACE, 2015.

LAW, M.; *et al*. Pathways and Resources for Engagement and Participation (PREP): a practice model for occupational therapists [Internet]. Translated by: LEITE, H.; *et al*. Available at: https://www.canchild.ca/en/shop/25-prep (accessed june 11, 2024).

LONGO, E.; BADIA, M.; ORGAZ, B. M. Patterns and predictors of participation in leisure activities outside of school in children and adolescents with Cerebral Palsy. **Research in Developmental Disabilities**, v. 34, n. 1, p. 266–275, jan. 2013.

LONGO, Egmar *et al*. I want to play: children with cerebral palsy talk about their experiences on barriers and facilitators to participation in leisure activities. **Pediatric Physical Therapy**, v. 32, n. 3, p. 190-200, 2020.

MCINTYRE, S. *et al*. Global prevalence of cerebral palsy: A systematic analysis. **Developmental Medicine & Child Neurology**, v. 64, n. 12, 11 ago. 2022.

NOVAK, I. *et al*. State of the Evidence Traffic Lights 2019: Systematic Review of Interventions for Preventing and Treating Children with Cerebral Palsy. **Current Neurology and Neuroscience Reports**, v. 20, n. 2, fev. 2020.

PIGGIN, J. What Is Physical Activity? A Holistic Definition for Teachers, Researchers and Policy Makers. **Frontiers in Sports and Active Living**, v. 2, n. 72, 18 jun. 2020.

POITRAS, V. J. *et al*. Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. **Applied Physiology, Nutrition, and Metabolism**, v. 41, n. 6 (Suppl. 3), p. S197–S239, jun. 2016.

ROSENBAUM, P., et. al. A report: the definition and classification of cerebral palsy. Dev Med Child Neurol, v. 49, n. 2, p. 8-14, 2007.

ROSENBAUM, P.; GORTER, J. W. The "F-words" in childhood disability: I swear this is how we should think!. **Child: Care, Health and Development**, v. 38, n. 4, p. 457–463, 1 nov. 2011.

SHIELDS, N.; SYNNOT, A. Perceived barriers and facilitators to participation in physical activity for children with disability: a qualitative study. **BMC Pediatrics**, v. 16, n. 1, 19 jan. 2016.

SHIKAKO-THOMAS, K. *et al*. Determinants of Participation in Leisure Activities in Children and Youth with Cerebral Palsy: Systematic Review. **Physical & Occupational Therapy In Pediatrics**, v. 28, n. 2, p. 155–169, jan. 2008.

SOUSA JUNIOR, R. R. DE *et al.* Moving together is better: a systematic review with meta-analysis of sports-focused interventions aiming to improve physical activity participation in children and adolescents with cerebral palsy. **Disability and Rehabilitation**, p. 1–11, 19 jul. 2022A.

SOUSA JUNIOR, R. R. *et al*. Effectiveness of Modified Sports for Children and Adolescents With Cerebral Palsy: A Pragmatic Study Protocol. **Pediatric Physical Therapy**, v. 34, n. 1, p. 81–87, 1 jan. 2022B.

SOUSA JUNIOR, R. R. *et al.* Parents' perceptions of a modified sports intervention for children with cerebral palsy. **Developmental Medicine & Child Neurology**, 6 nov. 2023.

SOUSA JUNIOR, R. R. *et al.* Modified sports interventions for children and adolescents with disabilities: A scoping review. **Developmental Medicine and Child Neurology**, 12 maio 2024.

THELEN, E. Motor development. A new synthesis. **The American Psychologist**, v. 50, n. 2, p. 79–95, 1 fev. 1995.

VERSCHUREN, O. *et al.* Exercise and physical activity recommendations for people with cerebral palsy. **Developmental Medicine & Child Neurology**, v. 58, n. 8, p. 798–808, 7 fev. 2016.

WRIGHT, A. *et al*. Barriers and facilitators to physical activity participation for children with physical disability: comparing and contrasting the views of children, young people, and their clinicians. **Disability and Rehabilitation**, v. 41, n. 13, p. 1–9, 30 jan. 2019.

# ANEXO A- APROVAÇÃO PELO COMITÊ DE ÉTICA EM PESQUISA DA UFMG

UNIVERSIDADE FEDERAL DE MINAS GERAIS

## PARECER CONSUBSTANCIADO DO CEP

**DADOS DO PROJETO DE PESQUISA**

**Título da Pesquisa:** SPORTS STARS Brasil: A eficácia de uma intervenção centrada no esporte em grupo para crianças e adolescentes com Paralisia Cerebral com ou sem terapia focada no contexto.

**Pesquisador:** Hércules Ribeiro Leite

**Área Temática:**

**Versão:** 7

**CAAE:** 33238520.5.0000.5149

**Instituição Proponente:** Escola de Educação Física, Fisioterapia e Terapia Ocupacional

**Patrocinador Principal:** Financiamento Próprio

**DADOS DA NOTIFICAÇÃO**

**Tipo de Notificação:** Envio de Relatório Final

**Detalhe:**

**Justificativa:**

**Data do Envio:** 08/05/2024

**Situação da Notificação:** Parecer Consubstanciado Emitido

**DADOS DO PARECER**

**Número do Parecer:** 6.908.031

**Apresentação da Notificação:**

Este projeto descreve a investigação da intervenção Sports Stars Brasil, uma intervenção de esportes modificados, multidisciplinar para crianças e adolescentes com paralisia cerebral (PC) deambuladoras (classificadas como nível I e II no Sistema de Classificação da Função Motora Grossa-GMFCS). Esta população apresenta dificuldades na participação em atividades físicas (esportivas e recreativas); sendo assim, intervenções de esportes modificados como o Sports Stars Brasil, tem o potencial de promover resultados positivos neste desfecho.

**Objetivo da Notificação:**

Os objetivos desse projeto foram: 1) investigar a eficácia do Sports Stars Brasil em

**Endereço:** Av. Presidente Antonio Carlos, 6627 2º. Andar Sala 2005 Campus Pampulha
**Bairro:** Unidade Administrativa II **CEP:** 31.270-901
**UF:** MG **Município:** BELO HORIZONTE
**Telefone:** (31)3409-4592 **E-mail:** coep@prpq.ufmg.br

comparação com os cuidados fisioterapêuticos usuais; 2) explorar as experiências dos participantes e de suas famílias que participaram do programa Sports Stars e identificar os resultados percebidos por eles acerca das ¿f-words¿ e 3) avaliar a eficácia de uma combinação do Sports Stars Brasil com intervenção focada no contexto em comparação com o Sports Stars Brasil isoladamente para crianças e adolescentes com PC.

**Avaliação dos Riscos e Benefícios:**

"Riscos:

Por se tratar de um treino de atividades dinâmicas e esportivas, esta intervenção e seu processo de avaliação, oferecem um pequeno risco de quedas, cansaço ou entorses. Todas as atividades e exercícios e todas as avaliações com a supervisão máxima de um profissional treinado. Caso ocorra alguma intercorrência, a equipe de profissionais ficará responsável por dar a devida assistência ao participante e sua família e realizar os primeiros socorros quando necessário. Períodos de descansos entre os procedimentos de avaliação serão dados sempre que necessários. Durante os procedimentos de avaliação desta pesquisa, os participantes e seus pais/responsáveis poderão ficar constrangidos com alguma pergunta dos testes, bem como em realizar alguma das atividades em grupo. Assim, fica resguardado o direito dos pais ou dos participantes em não responder ou interromper os procedimentos de avaliação quando quiserem ou de não realizarem algum exercício que se sintam constrangidos."

**Comentários e Considerações sobre a Notificação:**

Notificação atendida.

**Considerações sobre os Termos de apresentação obrigatória:**

O projeto apresenta todos os termos solicitados.

**Conclusões ou Pendências e Lista de Inadequações:**

O Pesquisador apresentou relatório solicitado.

UNIVERSIDADE FEDERAL DE MINAS GERAIS



**Considerações Finais a critério do CEP:**

Tendo em vista a legislação vigente (Resolução CNS 466/12), o CEP-UFMG recomenda aos Pesquisadores: comunicar toda e qualquer alteração do projeto e do termo de consentimento via emenda na Plataforma Brasil, informar imediatamente qualquer evento adverso ocorrido durante o desenvolvimento da pesquisa (via documental encaminhada em papel), apresentar na forma de notificação relatórios parciais do andamento do mesmo a cada 06 (seis) meses e ao término da pesquisa encaminhar a este Comitê um sumário dos resultados do projeto (relatório final).

**Este parecer foi elaborado baseado nos documentos abaixo relacionados:**

| Tipo Documento | Arquivo | Postagem | Autor | Situação |
|---|---|---|---|---|
| Envio de Relatório Final | relatorio_pesquisa_sportsstars.pdf | 08/05/2024 08:39:12 | RICARDO RODRIGUES DE SOUSA JUNIOR | Postado |

**Situação do Parecer:**
Aprovado

**Necessita Apreciação da CONEP:**
Não

BELO HORIZONTE, 25 de Junho de 2024

**Assinado por:**
**Corinne Davis Rodrigues**
**(Coordenador(a))**

**Endereço:** Av. Presidente Antonio Carlos, 6627 2º. Andar Sala 2005 Campus Pampulha
**Bairro:** Unidade Administrativa II **CEP:** 31.270-901
**UF:** MG **Município:** BELO HORIZONTE
**Telefone:** (31)3409-4592 **E-mail:** coep@prpq.ufmg.br

## APÊNDICE I- TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO (PAIS, MÃES OU RESPONSÁVEIS)

**Título do Estudo:** *SPORTS STARS* Brasil: A eficácia de uma intervenção centrada no esporte em grupo para crianças e adolescentes com Paralisia Cerebral com ou sem terapia focada no contexto.

Prezados pais ou responsáveis,

O Sr(a) e seu filho estão convidados a participar desta pesquisa coordenada pelo professor Dr. Hércules Ribeiro Leite que tem como objetivo investigar a eficácia do *Sports Stars Brasil*, um tratamento fisioterapêutico em grupo, centrado na realização de atividades esportivas em crianças e adolescentes com Paralisia Cerebral (PC)*;* e investigar se essa intervenção combinada com um acompanhamento fisioterápico no contexto do esporte é mais eficaz para facilitar a participação dos indivíduos em atividades esportivas. Para realizar essa pesquisa, nós precisamos de sua autorização para que seu(sua) filho(a) possa participar do estudo. Sua participação nesse estudo nos ajudará a investigar se o *Sports Stars* é um tratamento eficaz para introduzir crianças e adolescentes com PC em atividades esportivas.

Após a obtenção do seu consentimento para participar desta intervenção, haverá um sorteio para verificar se seu filho(a) participará do programa *Sports Stars* imediatamente com ou sem orientações fisioterápicas, ou depois de quatro meses de tratamento fisioterápico que ele realiza normalmente, nesse período você e seu filho receberão orientações fisioterápicas. O programa *Sports Stars* ocorrerá em grupos de 6 a 8 participantes com idades semelhantes, uma vez por semana, uma hora cada, durante oito semanas consecutivas, nas quadras esportivas da Escola de Educação Física, Fisioterapia e Terapia Ocupacional da Universidade Federal de Minas Gerais. Durante cada sessão semanal serão trabalhadas habilidades motoras de seu (sua) filho(a), através de atividades de corrida, salto, atividades com bola, assim como a introdução a prática dos esportes: futebol, handball, atletismo e basquete.

Após seu (sua) filho(a) realizar o programa *Sports Stars* seu(sua) filho(a) poderá receber acompanhamento de um fisioterapeuta. Este acompanhamento fisioterápico consistirá em quatro encontros semanais de uma hora cada na Escola de Educação Física, Fisioterapia e Terapia Ocupacional da Universidade Federal de Minas Gerais. Em cada encontro, este profissional vai ajudar você e ao seu(sua) filho(a) a identificar dificuldades que limitem a participação dele(a) no esporte e dará sugestões para lidar com essas dificuldades que vocês levantarem.

Caso seu(sua) filho(a) seja sorteado para realizar o programa Sports Stars após quatro meses, ele(a) continuará realizando as atividades de fisioterapia que ele já costuma realizar, durante este tempo, conforme for estabelecido pelo profissional que atende seu (sua) filho (a) e receberá somente orientações do fisioterapeuta descritas anteriormente.

Após o seu consentimento, realizaremos uma avaliação fisioterápica com você e seu(sua) filho (a). Você será perguntado(a) através de uma série de questionários sobre as características do seu filho(a); sobre como o seu filho participa em atividades do dia-a-dia (em casa, na escola e na comunidade); sobre quais as principais dificuldades que ele(a) tem para realizar atividades de corrida, salto e atividades com bola; e sobre o que você gostaria que seu(sua) filho(a) fizesse diferente para ser capaz de realizar atividades físicas e recreativas. Estes questionários levarão em torno de 30 minutos para serem respondidos. Seu (sua) filho(a) realizará uma avaliação física guiada por um fisioterapeuta treinado. Nessa avaliação faremos testes que avaliarão a força muscular, equilíbrio e como seu(sua) filho(a) realiza atividades de corrida, salto e atividades com bola. Essa série de avaliações tem o objetivo de verificar o que seu(sua) filho(a) é capaz de fazer. As avalições do(a) seu(sua) filho(a) durarão em torno de duas horas com períodos de descanso, caso seja necessário. Caso você não queira

que seu(sua) filho(a) realize alguma das atividades propostas, o teste será interrompido em qualquer momento. Essas avaliações e questionários serão repetidos após 8, 12, 24 semanas da primeira avaliação em algum horário que você e seu (sua) filho(a) estejam disponíveis.

Por se tratar de um treino de atividades dinâmicas e esportivas em grupo, esta intervenção, bem como o processo de a avaliação, oferecem um pequeno risco de que seu(sua) filho(a) se canse, caia ou se machuque durante as atividades esportivas. Assim, faremos todas as atividades e exercícios e todas avaliações com a supervisão máxima de um profissional treinado. Caso ocorra alguma intercorrência as atividades serão interrompidas e nossa equipe dará completa assistência a você e ao seu (sua) filho(a) e os devidos primeiros socorros caso necessário. Todas as avaliações realizadas com seu(sua) filho(a) serão filmadas para pontuação dos testes. Você ou seu(sua) filho (a) poderão se sentir constrangidos durante a filmagem. Para evitar que isso aconteça, todos os detalhes dos procedimentos para sigilo das filmagens serão previamente explicados e discutidos com você e seu (sua) filho(a). Ressaltamos que os vídeos serão utilizados apenas para pontuar o teste. Os vídeos obtidos pelas filmagens serão mantidos em completo sigilo. Ao responder os questionários, durante a realização dos testes e das atividades do programa, você e/ou seu(sua) filho(a) poderão se sentir desconfortáveis ou constrangidos com alguma pergunta ou procedimento. Caso isso aconteça poderemos interromper qualquer um dos testes ou questionários bem como as atividades do programa, em qualquer momento, e será respeitada a sua vontade sem nenhum prejuízo para vocês.

Para garantir que as informações desse estudo sejam confidenciais, as informações obtidas de você e de sua criança receberão um código de identificação ao entrar no estudo e o nome do seu(ua) filho(a) não será divulgado em qualquer situação. Os dados e vídeos gerados nesta pesquisa serão armazenados na Escola de Educação Física, Fisioterapia e Terapia Ocupacional da UFMG por 5 anos no Laboratório de Investigação & Intervenção no Desenvolvimento na Infância e Adolescência (IDEIA), sob responsabilidade do professor Dr. Hércules Ribeiro Leite (telefones de contato no final deste documento). Se as informações originadas do estudo forem publicadas em revista ou evento científico, você e sua criança não serão identificados, sendo sempre representados por abreviações ou nomes fictícios.

Ressaltamos que sua participação nesta pesquisa é inteiramente voluntária e vocês não receberão nenhum pagamento ou compensação financeira para participar. Além disso, vocês não terão nenhum tipo de despesa adicional com este estudo. Caso você tenha gastos com deslocamento para as avaliações ou para realizar as intervenções do programa, nossa equipe ficará responsável em te reembolsar com o valor da condução em dinheiro (ida e volta) em cada encontro ou momento de avaliação. É importante destacar também que você e seu(sua) filho(a) são livres para consentir na participação ou no abandono do estudo a qualquer momento. Uma via deste documento é destinada a você em caso de dúvidas. Você poderá obter qualquer informação deste estudo com os pesquisadores, e informações de aspecto ético no Comitê de Ética em Pesquisa da Universidade Federal de Minas Gerais (UFMG). Os telefones estão listados abaixo. Estaremos a sua disposição para responder perguntas ou prestar esclarecimentos sobre o andamento do trabalho.

Caso você concorde em participar do estudo, por favor, assine no espaço indicado abaixo.

Agradecemos a sua colaboração.

Atenciosamente,

_____
**Prof. Hércules Ribeiro Leite**
**Coordenador da Pesquisa**
**Professor Adjunto-Departamento de Fisioterapia, UFMG**

_____
**Ricardo Rodrigues de Sousa Junior**
**Fisioterapeuta**

**Consentimento**

Eu, _____, responsável por _____declaro que li e entendi todas as informações sobre o "***SPORTS STARS* Brasil: A eficácia de uma intervenção centrada no esporte em grupo para crianças e adolescentes com Paralisia Cerebral com ou sem terapia focada no contexto.",** sendo os objetivos e procedimentos explicados claramente. Tive tempo suficiente para pensar e escolher participar do estudo e tive oportunidade de tirar todas as minhas dúvidas. Estou assinando este termo voluntariamente e tenho direito de, agora ou mais tarde, discutir qualquer dúvida em relação ao projeto.

_____
Assinatura do pai/responsável

Belo Horizonte, ____ de _____ de 20___.

**Telefone para contato/informações:**
Professor Dr. Hércules Ribeiro Leite
Departamento de Fisioterapia, UFMG
Fone: (31) 3409-7404 email: herculesdtnaa@gmail.com

Ricardo Rodrigues de Sousa Junior
Fisioterapeuta
Fone: (31) 98834-1027 email: rrsousajunior@gmail.com

Laboratório de Investigação & Intervenção no Desenvolvimento na Infância e Adolescência (IDEIA)
**Fone: (31)** 3409-4796

**Em caso de dúvidas relacionadas às questões éticas:**
Comitê de Ética em Pesquisa - COEP/UFMG: Av. Pres. Antônio Carlos, 6627 –Unidade Administrativa II 2º. Andar –Sala 2005 – CEP 31270-901 Belo Horizonte – MG Telefone: (31) 3409-459

**APÊNDICE II- TERMO DE ASSENTIMENTO LIVRE E ESCLARECIDO (CRIANÇAS 6 A 11 ANOS)**

Título da Pesquisa: *SPORTS STARS* Brasil: A eficácia de uma intervenção centrada no esporte em grupo para crianças e adolescentes com Paralisia Cerebral com ou sem terapia focada no contexto.

Olá,

Você está convidado a participar desta pesquisa coordenada pelo professor Dr. Hércules Ribeiro Leite que vai estudar sobre um tratamento de Fisioterapia em grupo chamado *Sports Stars*. Este tratamento foca na realização de atividades de esportes para crianças e adolescentes com Paralisia Cerebral (PC). Nossa pesquisa também quer descobrir se o programa *Sports Stars* também funciona quando é combinada com um acompanhamento de um fisioterapeuta durante a realização de esportes. Para realizar essa pesquisa, nós precisamos de sua autorização. Sua participação nos ajudará a entender se o *Sports Stars* é um bom tratamento para incentivar crianças e adolescentes com PC a realizarem esportes. Os detalhes dessa pesquisa estão explicados a seguir:

| | | |
|---|---|---|
|  |  |  |
| **O Sports Stars é um tratamento de fisioterapia em grupo de 6 a 8 crianças assim como você** | **Ele vai acontecer uma vez por semana, com duração de uma hora, durante oito semanas nas quadras da UFMG** | **Lá, nós vamos treinar atividades de corrida, salto, atividades com bola e também vamos te ensinar a praticar alguns esportes: futebol, handball, atletismo e basquete.** |

| | | | |
|---|---|---|---|
|  |  |  |  |
| Se você e seus pais/responsáveis aceitarem participar desta pesquisa, um fisioterapeuta vai realizar uma avaliação com vocês | Seus pais ou responsáveis serão perguntados sobre as suas características; como você participa em atividades do dia-a-dia e quais as principais dificuldades você tem para realizar atividades de corrida, salto e atividades com bola | Estes questionários levarão em torno de 30 minutos para serem respondidos. | Você realizará alguns testes com um fisioterapeuta. Esses testes são para nós observarmos o que você é capaz de fazer. |

| | | | |
|---|---|---|---|
|  |  |  |  |
| Vamos observar como está a sua força muscular, equilíbrio e como você realiza atividades de corrida, salto e atividades com bola. | Essas avaliações durarão em torno de duas horas com períodos de descanso, caso seja você precise | Caso você não queira que realizar alguma das atividades, nós vamos parar o teste em qualquer momento. | Essas avaliações e entrevistas serão repetidas depois de 8, 12, 24 semanas da primeira avaliação em algum horário que você e sua família estejam disponíveis. |

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| Você irá participar do *Sports Stars* uma vez por semana, em torno de uma hora em cada encontro. As datas e os horários são repassados aos seus pais ou familiares | Nós realizaremos um sorteio para saber se você receberá além do *Sports Stars* um acompanhamento de um fisioterapeuta para te ajudar a participar de atividades de esporte | Caso você seja sorteado, esse acompanhamento será realizado nos mesmos dias do *Sports Stars* com duração por volta de uma hora cada | Em cada encontro, o fisioterapeuta vai ajudar você a apontar quais são suas dificuldades em realizar atividades esportivas e dará sugestões para podermos melhorar essas dificuldades. | Caso você não seja sorteado para receber esse acompanhamento, você receberá esse acompanhamento com um fisioterapeuta após três meses do projeto Sports Stars |

| | | | |
|---|---|---|---|
|   |  |  | |
| Como faremos atividades agitadas e esportivas em grupo, este tratamento e os testes podem levar a um pequeno risco de você se cansar, cair ou se machucar | Assim, faremos todas as atividades e exercícios e todas avaliações com um fisioterapeuta bem próximo de você | Caso aconteça alguma coisa, nós vamos parar as atividades e nossa equipe vai cuidar de você e ajudar aos seus pais | |

Para que as informações desse estudo sejam guardadas e que ninguém possa ter acesso, as informações obtidas de você receberão um código e o seu nome não será divulgado para ninguém. As informações e vídeos gerados nesta pesquisa serão guardados na Escola de Educação Física, Fisioterapia e Terapia Ocupacional da UFMG por 5 anos no Laboratório de Investigação & Intervenção no Desenvolvimento na Infância e Adolescência (IDEIA), sob os cuidados do professor Dr. Hércules Ribeiro Leite. Se as informações deste estudo forem mostradas em revista ou congresso, não contaremos seu nome, sendo sempre utilizado códigos ou nomes de mentira.

A sua participação nesta pesquisa é totalmente voluntária e vocês não receberão nenhum pagamento para participar. Vocês não terão nenhum tipo de gasto com este estudo. Caso seus pais tenham gastos com o levando você para a entrevista, nossa equipe ficará responsável devolver o valor da passagem em dinheiro (ida e volta) no dia da avaliação ou nos encontros do projeto. Além disso, os pesquisadores serão responsáveis por pagar de volta seus pais ou responsáveis caso ocorra qualquer problema por conta do projeto de pesquisa. Você é livre para participar ou abandonar o estudo a qualquer momento. Como benefício por participar desta pesquisa, você poderá receber dos pesquisadores, um relatório com os seus resultados das atividades realizadas no projeto Sports Stars. Uma via deste documento é para a você em caso de dúvidas. Você poderá obter qualquer informação deste estudo com os pesquisadores e com o Comitê de Ética em Pesquisa da Universidade Federal de Minas Gerais (UFMG). Os telefones estão listados abaixo. Estaremos a sua disposição para responder perguntas ou prestar esclarecimentos sobre o andamento do trabalho. Agradecemos a sua colaboração.

Caso você concorde em participar do estudo, por favor, assine no espaço indicado abaixo.

Agradecemos a sua colaboração.

Atenciosamente,

_____

**Prof. Hércules Ribeiro Leite**
**Coordenador da Pesquisa**
**Professor Adjunto-Departamento de Fisioterapia, UFMG**

_____

**Ricardo Rodrigues de Sousa Junior**
**Fisioterapeuta**

Eu, _____ declaro que li e entendi todas as informações sobre o "***SPORTS STARS* Brasil: A eficácia de uma intervenção centrada**

**no esporte em grupo para crianças e adolescentes com Paralisia Cerebral com ou sem terapia focada no contexto.",** sendo os objetivos e procedimentos explicados de forma clara. Tive tempo suficiente para pensar e escolher participar do estudo e tive oportunidade de tirar todas as minhas dúvidas. Estou assinando este termo voluntariamente e tenho direito de, agora ou mais tarde, discutir qualquer dúvida em relação ao projeto.

_____

Assinatura ou iniciais da criança

Belo Horizonte, ____ de _____ de 20___.

**Telefone para contato/informações:**
Professor Dr. Hércules Ribeiro Leite
Departamento de Fisioterapia, UFMG
Fone: (31) 3409-7404 email: herculesdtnaa@gmail.com

Ricardo Rodrigues de Sousa Junior
Fisioterapeuta
Fone: (31) 98834-1027 email: rrsousajunior@gmail.com

Laboratório de Investigação & Intervenção no Desenvolvimento na Infância e Adolescência (IDEIA) Fone: (31) 3409-4796

**Em caso de dúvidas relacionadas às questões éticas:**
Comitê de Ética em Pesquisa - COEP/UFMG: Av. Pres. Antônio Carlos, 6627 –Unidade Administrativa II 2º. Andar –Sala 2005 – CEP 31270-901 Belo
Horizonte – MG Telefone: (31) 3409-4592
Email: coep@prpq.ufmg.br

# APÊNDICE III- MINI-CURRÍCULO (2022-2024)

## Artigos publicados em periódicos científicos

- Silva, LC, Faria CDCM, Peniche PC, Brito SAF, & Aguiar LT. Validity of the two-minute walk test to assess exercise capacity and estimate cardiorespiratory fitness in individuals after stroke: a cross-sectional study. Topics in Stroke Rehabilitation, p. 1–10, 27, 2023.
- Souto DO, Silva LC, Sousa Junior RR, Clutterbuck, G, Anaby, D, Longo E, ... & Leite, H. R. Practitioner-led, peer-group sports intervention combined with a context-focused intervention for children with cerebral palsy: a protocol of a feasibility randomised clinical trial. BMJ open, v. 13, n. 1, p. e068486, 2023.

## Capítulos de livros publicados

- Silva L, Souza AC, Souto D, Sousa Junior R, Magalhães R, Leite HR. Intervenção focada no contexto associada a uma intervenção de esportes modificados. Hércules R.; Camargos ACR (org.); Goncalves RV (Org.). Intervenções para crianças e adolescentes com paralisia cerebral: raciocínio clínico para tomada de decisão baseada em evidênia. 1. ed. Rio de Janeiro: Medbook, 2023. v. 1. Pag 223-234.
- Silva, LC, Aguilar, PVF., Leite, HR. Sports Stars- Um programa de esportes modificados. Hércules R; Camargos ACR. (org.); Goncalves RV (Org.). Intervenções para crianças e adolescentes com paralisia cerebral: raciocínio clínico para tomada de decisão baseada em evidência. 1. ed. Rio de Janeiro: Medbook, 2023. v. 1. Pag 357-365.
- Souto, DO, Silva, LC, Magalhães RC, Leite, HR. Intervenção focada no contexto. HR; Camargos ACR (org.); Goncalves RV (Org.). Intervenções para crianças e adolescentes com paralisia cerebral: raciocínio clínico para tomada de decisão baseada em evidênia. 1. ed. Rio de Janeiro: Medbook, 2023. v. 1. Pag 335-346.

## Outras produções

- Leite HR, Silva LC, Longo E, Camargos AC, Anaby D, Clutterbuck G, Souto D. Oral presentation: A context-focused approach combined with a modified sports intervention for children with cerebral palsy: A feasibility randomised clinical trial. Develop Med Child Neuro. 66(Suppl. 2):5‑112, 2024.

- Leite HR, Souto D, Silva LC, Longo E, Magalhães, RC. Tradução para o português do manual: *Pathways and Resources for Engagement and Participation (PREP): a practice model for occupational therapists*. Disponível em: https://www.canchild.ca/en/shop/25-prep (acessado em 11 de junho de 2024).

## Pôsters apresentados em eventos científicos

- Silva LC, Souza ACAR, Ribeiro EM, Xavier JMR, Sousa Junior RR, Leite HR Qual o nível de Alfabetização Física de crianças e adolescentes com Paralisia Cerebral? II Congresso Internacional de Paralisia Cerebral, 2023.

- Silva LC, Beleza FNR, Santos PP, Aguilar PVF, Sousa Junior RR, Leite HR. Sports Stars Brasil: Estudo de Viabilidade de Uma Intervenção Focada em Esportes. II Congresso Internacional de Paralisia Cerebral, 2023.

- Silva LC, Beleza, FNR, Santos PP, Aguilar PVF, Sousa Junior RR, Leite HR. Sports Stars Brazil: Feasibility Study of a Modified Sports Intervention in Adolescents with Cerebral Palsy. 2023 World Abilitysport Conference (online). 2023.

**Participação em eventos científicos**

- II Congresso Internacional de Paralisia Cerebral (2023)
- 2023 World Abilitysport Conference (2023)
- I Simpósio TEA Abenepiminas: Transtorno do Espectro Autista, Ciência e Prática (2024)
- III Encontro Mineiro entre Fisioterapeutas e Especialistas- Fisioterapia no Transtorno do Espectro Autista (TEA)- CREFITO 4 (2023)

Cursos

- Inglês avançado. Gringo English. Multicampus (2024/01).

**Experiência docente**

- Jornada Pedagógica: Nova Lima Inclusiva- Por uma Escola para todos 2024. Instituição: Rede Municipal de Educação de Nova Lima. Tema da aula: Corpo e Movimento em uma proposta inclusiva (8hrs).

**Experiência como orientadora e coorientadora**

- Orientação. Trabalho de Conclusão de Curso. Camila Bruscato Rocha Leme. Os impactos positivos da dança em desfechos de estrutura e função de crianças e adolescentes com Paralisia Cerebral: uma revisão bibliográfica. Especialização em Fisioterapia Neurofuncional da Criança e do Adolescente da Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais.

- Coorientação. Trabalho de Conclusão de Curso. Acsa Soares Santos. Tradução e confiabilidade da versão em português-brasil da escala de empoderamento familiar (FES) em cuidadores de indivíduos com paralisia cerebral. Graduação em Fisioterapia pela Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais.

- Coorientação. Trabalho de Conclusão de Curso. Julia Melo Rocha Xavier. Intervenção de esportes modificados combinada à intervenção focada no contexto em crianças com paralisia cerebral: um relato de caso. Graduação em Fisioterapia pela Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais.

**Experiência como banca examinadora**

- Banca de defesa de trabalho de conclusão de curso. Elenisia de Assis Pinto Diniz. Efeitos da adição do recurso lúdico à estratégia terapêutica no desenvolvimento motor da criança. Especialização em Fisioterapia Neurofuncional da Criança e do Adolescente da Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais (2024).

- Banca de defesa de trabalho de conclusão de curso. Lorrayne Martins Rezende Santo. Intervenção fisioterapêutica colaborativa família-profissional em uma criança com síndrome de joubert: relato de caso. Especialização em Fisioterapia Neurofuncional da Criança e do Adolescente da Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais (2024).

- Banca de defesa de trabalho de conclusão de curso. Larissa Caroline Lopes Belisario. Efeitos da equoterapia em desfechos motores de crianças e adolescentes com transtorno do espectro do autismo: uma revisão de literatura. Especialização em Fisioterapia Neurofuncional da Criança e do Adolescente da Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais (2024).

- Banca de defesa de trabalho de conclusão de curso. Joyce Caroline Porto da Rocha. Programas domiciliares para intervenção em participação e fatores ambientais com crianças com deficiência: uma revisão de escopo. Especialização em Fisioterapia Neurofuncional da Criança e do Adolescente da Escola de Educação Física, Fisioterapia e Terapia Ocupacional, da Universidade Federal de Minas Gerais (2024).

**Auxílio financeiro**

- Bolsa de mestrado voltada para políticas de afirmação (pessoas negras) Carrefour (julho, 2023).