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The role of water-based interventions on human communication-related outcomes: a scoping review protocol

Rita Feio da Gama Alegria [1,2] 0000-0001-6327-6088
João Pedro de Melo Pestana Mouga Malheiro [1,2] 0000-0002-1931-3192
Ana Rita da Costa Cruz [1] 0009-0006-0283-7973
Christina César Praça Brasil [3] 0000-0002-7741-5349
Maria Teresa Moreira [1,2] 0000-0002-2554-697X
Vânia Daniela da Rocha Peixoto [1] 0000-0002-8212-2137

[1] Fernando Pessoa School of Health, Porto, Portugal
[2] RISE-Health, Fernando Pessoa School of Health, Porto, Portugal
[3] University of Fortaleza, Brazil

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Corresponding Author:
Rita Alegria; Fernando Pessoa Health School, Porto, Portugal;
ralegria@ufp.edu.pt

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ABSTRACT

Introduction: Human communication is a dynamic and multifactorial process that supports social participation, interpersonal relationships, learning, and overall wellbeing. Communication difficulties can significantly affect autonomy and quality of life. Recently, water-based interventions have gained relevance due to the unique sensory, motor, and psychosocial properties of water. Although widely explored in motor rehabilitation, evidence regarding the effects on communication-related outcomes remains fragmented and insufficiently synthesized.
Objectives: To map and synthesize the available scientific evidence regarding the effects of water-based interventions on communication-related outcomes in human populations.
Methodology: A scoping review will be conducted following the Joanna Briggs Institute methodological guidance and reported according to the PRISMA-ScR checklist. The research question was structured using the PCC framework: population (human participants of any age or clinical condition), concept (water-based interventions), and context (any setting in which communication-related outcomes are assessed). Searches will be conducted in PubMed, Web of Science, Scopus, APA PsycInfo, and EBSCO databases, including grey literature. Quantitative, qualitative, and mixed-methods studies will be included. Study selection and data extraction will be performed independently by two reviewers.
Results: This review is expected to identify the types of aquatic interventions, the populations studied, the communication outcomes assessed, and the evaluation instruments used, while identifying literature gaps.
Conclusion: This scoping review will try to contribute to a broader understanding of the role of aquatic interventions in communication, supporting future clinical, educational, and interdisciplinary practices.

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Autor correspondente:
Rita Alegria; Escola Superior de Saúde Fernando Pessoa, Porto, Portugal;
ralegria@ufp.edu.pt

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RESUMO

Introdução: A comunicação humana é um processo dinâmico e multifatorial que sustenta a participação social, relações interpessoais, aprendizagem e bem-estar geral. Dificuldades de comunicação podem afetar significativamente a autonomia e a qualidade de vida. Recentemente, as intervenções em meio aquático ganharam relevância devido às propriedades sensoriais, motoras e psicossociais da água. Embora exploradas na reabilitação motora, as evidências sobre os efeitos nos resultados de comunicação permanecem fragmentadas e insuficientemente sintetizadas.
Objetivos: Mapear e sintetizar a evidência científica disponível sobre os efeitos das intervenções em meio aquático nos resultados relacionados com a comunicação em populações humanas.
Metodologia: Será realizada uma revisão de escopo de acordo com as orientações do *Joanna Briggs Institute* e o checklist *PRISMA-ScR*. A questão de investigação foi estruturada no acrónimo PCC: população (humanos de qualquer idade ou condição clínica), conceito (intervenções em meio aquático) e contexto (qualquer cenário de avaliação da comunicação). As pesquisas incluirão *PubMed*, *Web of Science, Scopus*, APA *PsycInfo* e EBSCO, além de literatura cinzenta. Estudos quantitativos, qualitativos e de métodos mistos serão incluídos. A seleção e extração de dados serão realizadas de forma independente por dois revisores.
Resultados: Espera-se identificar os tipos de intervenções aquáticas, as populações estudadas, os resultados de comunicação avaliados e os instrumentos de medida utilizados, além de identificar lacunas na literatura.
Conclusão: Esta revisão irá tentar contribuir para uma compreensão mais ampla do papel das intervenções aquáticas na comunicação, apoiando futuras práticas clínicas, educativas e interdisciplinares.

Introduction

Human communication is a complex, dynamic, and multidimensional process that enables individuals to express needs, share experiences, build relationships, and participate actively in society. It integrates verbal and non-verbal dimensions and involves cognitive, sensory, motor, emotional, and social components that are fundamental to learning, autonomy, social participation, and quality of life.[1,2] Communication difficulties may adversely affect social integration, emotional regulation, educational participation, and interpersonal functioning, particularly among individuals with neurodevelopmental or neurological conditions.[3]

Among paediatric populations, communication impairments are particularly prevalent among children with autism spectrum disorder (ASD), developmental language disorder, intellectual disability, and other neurodevelopmental conditions. Social communication difficulties in these populations are often linked to reduced participation in meaningful interactions, increased social isolation, behavioural dysregulation, and lower quality of life.[4,5] Consequently, interventions that promote communicative engagement and social participation have become increasingly relevant in rehabilitation and educational contexts.
Beyond the pediatric population, communication disorders in adults also represent a significant clinical and social challenge. Conditions such as aphasia resulting from stroke, neurodegenerative diseases, and traumatic brain injury often lead to profound limitations in verbal expression and social interaction, severely impacting quality of life.[6] While aquatic interventions have been extensively studied in adults for motor recovery - particularly in stroke and neurological rehabilitation[7,8] - there is a notable scarcity of synthesized evidence specifically targeting communication-related outcomes in this demographic.

In recent years, aquatic interventions have attracted increasing attention as complementary therapeutic and educational approaches. These interventions encompass a broad range of water-based activities, including hydrotherapy, aquatic therapy, adapted swimming programs, Halliwick-based interventions, WATSU®, and multisystem aquatic rehabilitation approaches.[6] The therapeutic potential of aquatic environments is largely attributed to the unique physical properties of water, such as buoyancy, hydrostatic pressure, viscosity, resistance, and thermodynamic effects, which may facilitate movement, sensory modulation, postural support, and emotional regulation.[9]

Beyond their recognised motor and functional benefits, aquatic-based interventions may also positively influence communication-related processes. Water immersion and multisensory stimulation may help reduce anxiety, improve sensory regulation, increase attention, and enhance readiness for social interaction.10 Additionally, the supportive properties of water may reduce postural and motor demands, allowing individuals to devote greater attentional and cognitive resources to communicative interaction and social engagement.[11] Some studies have also suggested that aquatic environments may facilitate eye contact, joint attention, reciprocal interaction, and participation in communicative exchanges, particularly among children with ASD.[12,13]

Existing evidence on aquatic interventions has predominantly focused on motor rehabilitation, physical functioning, and behavioural outcomes. However, communication-related outcomes have increasingly appeared in the literature, although evidence remains scattered across disciplines, populations, intervention models, and methodological designs. Studies vary substantially in intervention characteristics, the communication outcomes assessed, intervention duration, and evaluation instruments, limiting the integration and interpretation of findings.[14]

Given the heterogeneity and exploratory nature of the available evidence, a scoping review is the most appropriate methodological approach. Scoping reviews map the breadth, nature, and characteristics of the evidence and identify research gaps, conceptual boundaries, and future research priorities without restricting inclusion to specific methodological designs.[15,16]

Therefore, the present scoping review aims to map and synthesise the available scientific evidence on the effects of aquatic-based interventions on communication-related outcomes in human populations, identifying intervention types, target populations, contexts of application, communication domains assessed, and existing gaps in the literature.

Methodology

Research question

The present scoping review will be guided by the following primary research question: *What scientific evidence exists regarding the effects of aquatic-based interventions on communication-related outcomes in human populations?*

The research question was structured according to the Population, Concept, and Context (PCC) framework recommended by the Joanna Briggs Institute for scoping reviews.[15]

Cross-cultural adaptation methodological framework

This scoping review will be conducted according to the methodological guidance proposed by the Joanna Briggs Institute (JBI) for scoping reviews and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).[15,16]

The review protocol was registered in the Open Science Framework (OSF) prior to the commencement of the review process (DOI: https://orcid.org/0009-0007-1142-1707).

Eligibility criteria

Eligibility criteria were established according to the PCC Framework:

- Population: This review will consider studies involving human participants of any age, sex, or clinical condition. Both clinical and non-clinical populations will be considered eligible, including children, adolescents, adults, and older adults presenting communication-related difficulties or typical development.
- Concept: The concept of interest includes any aquatic-based intervention involving water as an integral therapeutic, educational, rehabilitative, or supportive component. Interventions may include, but are not limited to: Hydrotherapy; Aquatic therapy; Adapted swimming programs; Halliwick method; WATSU®; Aquatic rehabilitation; Water-based exercise programs; Multisystem aquatic interventions; Aquatic speech and language interventions.
- Context: Studies conducted in any setting will be considered eligible, including:

Hospitals and rehabilitation centers; Educational environments; Community programs; Sports and recreational settings; Home-based contexts.

Studies will be included when communication-related outcomes are assessed or described.

Types of sources

This scoping review will include primary studies with the following methodological designs:

- Randomized controlled trials; Non-randomized experimental studies; Quasi-experimental studies; Cohort studies; Cross-sectional studies; Observational studies; Case studies; Qualitative studies; Mixed-methods studies.
- Systematic reviews and meta-analyses will not be included in the final synthesis; however, they may be consulted to identify additional primary studies through citation tracking. Editorials, opinion papers, conference abstracts without full text, letters to the editor, and unpublished commentaries will be excluded.

Search strategy

The search strategy will follow the three-step approach recommended by the Joanna Briggs Institute.15[13] Initially, a preliminary exploratory search was conducted in PubMed and EBSCO databases to identify relevant descriptors, keywords, synonyms, and indexing terms related to aquatic-based interventions and communication-related outcomes.

Based on this preliminary analysis, a comprehensive search strategy was developed and adapted to each database.

Additionally, grey literature sources will be consulted through OpenGrey and Google Scholar. The reference lists of all included studies will also be manually screened to identify potentially relevant publications not retrieved through the electronic search.

Search strategies will combine controlled vocabulary terms and free-text keywords using Boolean operators (AND, OR). Controlled vocabulary will be adapted to the indexing system of each database, including Medical Subject Headings (MeSH) in PubMed, Web of Science, and EBSCOhost (including CINAHL) (table 1).

Table 1 – Database search strategy.

Database: Pubmed Filters: last 10 years, English, Portuguese, Spanish Results: 654 Search strategy (21 de November de 2025) (Hydrotherapy OR Aquatic Therapy OR aquatic intervention OR hydrotherapeutic OR water-based therapy) AND (Communication OR Speech OR Language OR Communication Disorders OR communication skill OR speech production OR language development OR social interaction)
Database: Web of Science Filters: last 10 years, English, Portuguese, Spanish Results: 166 Search strategy (21 de November de 2025) TS=(Hydrotherapy OR "Aquatic Therapy" OR "aquatic intervention" OR hydrotherapeutic OR "water-based therap*" OR "water-based exercis*" OR "aquatic exercis*" OR "aquatic rehabilitation" OR "pool therap*" OR Balneotherapy OR Hydrokinesiotherapy) AND TS=(Communication OR Speech OR Language OR "Communication Disorders" OR "communication skill*" OR "speech production" OR "language development" OR "social interaction" OR "Speech-Language Pathology" OR "Speech Therapy" OR "Communication Deficits" OR "Speech Impairment")
Database: EBSCO Filters: last 10 years, English, Portuguese, Spanish Results: 141 Search strategy (21 de November de 2025) (Hydrotherapy OR "Aquatic Therapy" OR "aquatic intervention" OR hydrotherapeutic OR "water-based therap*" OR "water-based exercis*" OR "aquatic exercis*" OR "aquatic rehabilitation" OR "pool therap*" OR Balneotherapy OR Hydrokinesiotherapy)AND (Communication OR Speech OR Language OR "Communication Disorders" OR "communication skill*" OR "speech production" OR "language development" OR "social interaction" OR "Speech-Language Pathology" OR "Speech Therapy" OR "Communication Deficits" OR "Speech Impairment")

Studies published in English, Portuguese, and Spanish will be considered eligible. No initial temporal restrictions will be applied in order to comprehensively map the available evidence.

Study selection

All retrieved records will be imported into a reference management software for duplicate removal and subsequently uploaded to the Rayyan platform to support study screening and selection.[17]

Study selection will be conducted independently by two reviewers in two sequential stages: Title and abstract screening.

Studies that do not meet the eligibility criteria will be excluded. Any disagreements between reviewers will be resolved through discussion and, when necessary, consultation with a third reviewer.

The study selection process will be documented using a PRISMA-ScR flow diagram.[16]

A pilot screening phase involving approximately 10% of the retrieved records will be conducted to ensure consistency among reviewers and to refine the eligibility criteria whenever necessary.

Data extraction

Data extraction will be independently performed by two reviewers using a standardized extraction form specifically developed for this review and guided by JBI recommendations.[15]

The following information will be extracted from the included studies: Author(s); Year of publication; Country of origin; Study design; Population characteristics; Clinical condition; Sample size; Type of aquatic-based intervention; Intervention duration and frequency; Context of intervention; Comparator (if applicable); Communication-related outcomes assessed; Assessment instruments used; Main findings; Reported limitations.

The data extraction tool may be refined throughout the review process if additional relevant variables emerge during extraction.

Data analysis and presentation

Extracted data will be synthesized descriptively and presented through narrative synthesis and summary tables.

Findings will be organized according to:

Types of aquatic-based interventions; Target populations; Communication-related outcomes; Assessment instruments; Contexts of intervention.

The review aims to map the extent, nature, and characteristics of the available evidence rather than to assess the effectiveness of interventions or produce pooled quantitative estimates.[15,16]

Risk of Bias Assessment

In line with the Joanna Briggs Institute's methodological guidance for scoping reviews, a formal methodological quality assessment or risk-of-bias evaluation will not be conducted, as the primary objective of this review is to map the available evidence rather than to critically appraise study quality.[15]

Results

This scoping review is expected to provide a comprehensive overview of the available scientific evidence regarding aquatic-based interventions and their effects on communication-related outcomes across different human populations.

Specifically, the review is expected to identify the main types of aquatic interventions currently described in the literature, including hydrotherapy, aquatic therapy, adapted swimming programs, Halliwick-based interventions, WATSU®, multisystem aquatic approaches, and other water-based therapeutic or educational models. Additionally, the review is expected to characterize the populations involved, including age groups, condition, and the contexts in which these interventions are implemented.

The review is also expected to map the communication-related outcomes assessed within the literature, including expressive and receptive language, social communication, eye contact, joint attention, pragmatic skills, verbal interaction, communicative engagement, and other communication-related domains. Furthermore, it is anticipated that the review will identify the assessment instruments and methodological approaches most frequently used to evaluate these outcomes.

Based on preliminary observations from the literature, it is expected that a substantial proportion of the available evidence will involve children with autism spectrum disorder (ASD), with a particular focus on social communication and interaction outcomes. However, evidence involving other clinical populations, developmental conditions, and age groups may also emerge.

This scoping review is also expected to identify key methodological limitations in the existing literature, including small sample sizes, heterogeneity in intervention protocols, variability in communication outcome measures, and limited use of controlled study designs. The review may also reveal underexplored areas and gaps requiring future investigation, particularly regarding standardization of interventions, long-term outcomes, and broader communication domains.

Ultimately, the findings of this review are expected to contribute to a broader understanding of the potential role of aquatic interventions in communication-related rehabilitation and to support future clinical, educational, and interdisciplinary practices in aquatic environments.

Discussion

This scoping review will address an emerging, interdisciplinary field of research examining the relationship between aquatic interventions and communication-related outcomes. Although aquatic interventions have traditionally been associated with motor rehabilitation, physical conditioning, and sensory regulation, growing evidence suggests that aquatic environments may also support communication, social interaction, and psychosocial engagement, particularly for individuals with neurological conditions.[18,19]

The unique physical and sensory properties of water may create favorable conditions for communicative interaction and social participation. Buoyancy, hydrostatic pressure, and reduced gravitational demands may facilitate movement, body awareness, and postural control, potentially freeing up greater cognitive and attentional resources for social engagement and communication tasks.[7] Additionally, aquatic environments may support emotional regulation and reduce anxiety, factors that are particularly relevant for individuals with communication difficulties and sensory processing challenges.[12]

Current literature suggests that aquatic-based interventions may positively influence communication-related domains, including social interaction, eye contact, communicative engagement, reciprocal interaction, and pragmatic communication skills, particularly among children with autism spectrum disorder (ASD).[12,13] However, the available evidence remains conceptually and methodologically heterogeneous, with substantial variability in intervention models, duration and intensity, study populations, and outcome measures. This heterogeneity limits comparability across studies and complicates the interpretation and generalization of findings.

Another relevant consideration is the multidimensional nature of communication. Communication-related outcomes may encompass linguistic, social, emotional, behavioral, and functional dimensions, which are often assessed using different conceptual frameworks and measurement instruments. Consequently, studies addressing aquatic interventions may focus on distinct communication domains, ranging from expressive and receptive language to broader indicators of social participation and interaction. This diversity further reinforces the need for a comprehensive mapping of the available evidence.

From a methodological perspective, preliminary observations suggest that many studies in this field use small sample sizes, employ non-randomized designs, have limited control groups, and feature short intervention periods. Similar methodological limitations have been identified in previous reviews of aquatic interventions inneurodevelopmental populations.[11,14] Furthermore, communication outcomes are often secondary outcomes within broader rehabilitation studies, rather than the primary focus of investigation. These aspects highlight the importance of identifying methodological gaps and supporting future research with greater methodological rigor.

The present scoping review may help clarify how communication-related outcomes are currently conceptualized and assessed in aquatic intervention research. It may also support interdisciplinary reflection among speech and language therapists, physiotherapists, occupational therapists, psychologists, educators, and other professionals working in aquatic rehabilitation contexts.

By systematically mapping the existing literature, this review may provide valuable information on intervention characteristics, populations, communication domains, and assessment approaches currently represented in the evidence base. Additionally, identifying research gaps may support the development of future studies focusing on standardized intervention protocols, long-term outcomes, broader clinical populations, and communication-specific therapeutic approaches in aquatic environments.

Conclusion

Water-based interventions have increasingly emerged as promising approaches within therapeutic, rehabilitative, and educational contexts, particularly for populations with communication and social interaction difficulties. Nevertheless, the available evidence on their effects on communication-related outcomes remains fragmented, heterogeneous, and dispersed across disciplines and methodological approaches.

This scoping review protocol proposes a systematic mapping of the existing scientific literature to identify the characteristics, extent, and nature of the available evidence on water-based interventions and communication-related outcomes. By identifying intervention types, target populations, communication domains assessed, methodological approaches, and existing research gaps, this review may contribute to a broader and more integrated understanding of the role of aquatic environments in communication-related rehabilitation and support.

Furthermore, the findings of this review may support future interdisciplinary clinical and educational practices that incorporate water-based approaches, while also informing future research directions focused on methodological standardisation, communication-specific outcomes, and the development of evidence-based intervention models in aquatic settings.

The data supporting the results can be found or stating that it will be provided on request.

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