



REVIEW ARTICLE

BARRIERS AND PROMOTION STRATEGIES FOR PHYSICAL ACTIVITY AMONG DEAF COLLEGE STUDENTS: A NARRATIVE REVIEW

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ABSTRACT

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Physical activity is widely regarded as a key component of student health and well-being in higher education, yet deaf and hard-of-hearing college students continue to encounter persistent barriers when engaging in sport, exercise, and physical education activities. Although research on accessibility and inclusion in universities has grown, relevant evidence remains distributed across multiple fields, including deaf education, disability studies, physical activity, and adapted physical education. This narrative review draws on existing literature to examine barriers and promotion strategies shaping physical activity participation among deaf college students in adapted physical education contexts. Drawing on studies identified through Web of Science, Scopus, and PubMed, the review adopts a thematic approach to synthesize patterns across studies. The findings suggest that participation is shaped not only by communication access, but also by interrelated factors such as social belonging, instructional practices, and institutional conditions. Communication barriers remain the most persistent challenge, yet they are closely embedded within broader social and environmental dynamics that influence the consistency and quality of participation. The literature also indicates that the most promising strategies tend to integrate accessible communication and instruction with inclusive program design and sustained support from peers, faculty, and institutional systems. At the same time, the current evidence base remains limited, particularly in relation to conceptual integration and the systematic evaluation of intervention effectiveness. Overall, this review highlights that physical activity participation among deaf college students should be understood not only as a health issue, but also as a broader matter of inclusion and equitable participation in university life.

1. INTRODUCTION

1.1. Physical Activity and Health in Higher Education

Physical activity is a central component of student health in higher education. Recent evidence shows that physical activity interventions can improve undergraduate students' mental health, including anxiety, depression, and stress, while broader public health research continues to position college-aged populations as a key group for long-term health promotion. The university years are particularly important because they combine habit formation with increased academic pressure, changing routines, and psychological strain. Yet physical inactivity remains common, and institutional attention to student physical activity is often weaker than its importance would justify (Heath & Levine, 2022; Scroggs et al., 2025).

For students with disabilities, this problem is even more pronounced. Disabled populations remain underrepresented in physical activity surveillance, intervention research, and policy planning, which in turn weakens the evidence base for developing inclusive health promotion strategies. Low participation in physical activity should therefore not be understood only as an issue of individual motivation or lifestyle preference; it is also shaped by structural factors such as access, institutional design, and the availability and quality of support systems (Heath & Levine, 2022).

1.2. Deaf College Students in Physical Activity Contexts

For deaf and hard-of-hearing college students, physical activity participation is shaped by barriers that differ in important and context-specific ways from those experienced by the general university population. Recent higher education research shows that DHH students continue to encounter uneven accessibility and fragmented support structures, often depending on interpreters, captioning, transcription, and other accommodations that may be delayed, only partially available, or inconsistently implemented. These challenges extend beyond the classroom and become particularly visible in environments that depend on real-time interaction and rapid communication processes (Percival et al., 2025; Tannenbaum-Baruchi et al., 2025).

Physical activity contexts tend to amplify these challenges. Sport, exercise, and physical education settings often rely on rapid oral instruction, auditory cues, spontaneous peer interaction, and immediate verbal feedback. For students whose access depends on visual or signed communication, participation is therefore shaped not only by willingness to engage, but also by whether the environment is accessible, predictable, and socially inclusive in practice. Recent qualitative work on Deaf or hard-of-hearing collegiate athletes shows that sport participation can be highly meaningful; however, the quality of these experiences is closely contingent on communication access, coach and peer awareness, and opportunities for authentic social belonging (Rich et al., 2024).

1.3. Why Adapted Physical Education Matters

Against this background, adapted physical education should be understood not merely as a support service, but as a practical and context-sensitive framework for translating formal inclusion into meaningful participation. In higher education, adapted physical education extends beyond the addition of accommodations within environments primarily designed for hearing

students. For deaf college students, meaningful inclusion requires visually accessible modes of instruction, consistent communication routines, inclusive forms of peer interaction, and effective coordination across teaching, disability support, and campus activity systems. Recent work on higher education inclusion suggests that support structures are often fragile, responsibilities are unevenly distributed, and inclusive practices frequently depend on individual initiative rather than on systematically embedded institutional processes (Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

This point is especially relevant to physical activity because participation in these settings depends on communication, embodied learning, and social interaction at the same time. Adapted physical education is important because it shifts attention from presumed student deficits to the design of the learning environment itself and asks under what conditions participation becomes realistic, equitable, and worthwhile for deaf students. Haegele et al. (2024) make a related point in their critical discussion of Universal Design for Learning in physical education, arguing that inclusive design in movement settings requires careful critical examination rather than being treated as an inherently sufficient or self-evident solution (Haegele et al., 2024).

1.4. Aim and Scope of the Review

Although relevant scholarship has grown, the literature remains scattered across higher education accessibility research, disability inclusion studies, deaf education, student support research, sport participation scholarship, and physical activity studies. This fragmentation creates three problems. First, students with disabilities are often treated as a broad category, which can obscure the linguistic, cultural, communicative, and psychosocial specificities of deaf learners. Second, although DHH students in higher education have received increasing attention, recent work has focused more on accommodation and academic adjustment than on physical activity participation itself. Third, the field still lacks a clear synthesis of which barriers most consistently constrain participation and which strategies appear most relevant for improving it in or around adapted physical education contexts (Percival et al., 2025; Rich et al., 2024; Tannenbaum-Baruchi et al., 2025).

Accordingly, this article adopts a narrative review to examine the literature on barriers and promotion strategies related to physical activity participation among deaf college students in adapted physical education settings. The purpose is to clarify what is currently known, identify where the evidence remains conceptually or empirically thin, and provide a more coherent basis for future research and more inclusive practice in universities. In addition, this review seeks to move beyond descriptive synthesis by identifying strategies that are not only conceptually relevant but also potentially operational in real educational settings.

2. LITERATURE REVIEW

2.1. Search Sources and Keywords

This article uses a narrative review approach. A narrative review is suitable when the literature is thematically relevant but methodologically diverse, and when the purpose is to integrate dispersed scholarship, clarify major lines of argument, and identify directions for future research rather than to produce a highly restrictive evidence synthesis. Recent methodological discussions emphasize that narrative reviews should remain flexible, but they should also make

their search logic, scope, and interpretive structure sufficiently transparent to ensure credibility and enable critical appraisal (Bahl, 2023; Gonot-Schoupinsky et al., 2022).

To identify relevant studies, the review draws on four major databases: Web of Science, Scopus, PubMed, and ERIC. The search strategy was organized around four concept clusters: population, behavior, educational context, and problem type. Population terms included deaf students, deaf college students, hard of hearing students, and deaf and hard of hearing students. Behavior terms included physical activity, exercise, sport participation, and physical activity participation. Educational context terms included adapted physical education, physical education, inclusive physical education, higher education, college, and university. Problem-related terms included barriers, challenges, facilitators, support strategies, promotion strategies, inclusion, and accessibility (Bahl, 2023; Turnbull et al., 2023).

2.2. Inclusion Focus and Review Boundaries

The review focuses on literature concerning deaf or hard-of-hearing students in postsecondary or higher education settings. Studies were considered relevant when they addressed at least one of the following issues: participation in physical activity, exercise, sport, physical education, or adapted/inclusive physical education; barriers that constrain such participation; or strategies, supports, and institutional practices intended to improve access, engagement, or inclusion. Empirical studies were prioritized, but discussion papers and review-based articles were also considered when they made a direct contribution to understanding participation within university-related physical activity contexts (Bahl, 2023; Turnbull et al., 2023).

Several boundaries were applied to preserve thematic focus. Research dealing exclusively with primary or secondary school populations was not treated as core evidence, although such work was occasionally consulted when it helped clarify concepts related to communication, inclusion, or instructional adaptation. Likewise, studies discussing disability only in broad terms, without identifiable relevance to deaf or hard-of-hearing learners, were not prioritized. Priority was given to recent scholarship from approximately the last decade, while a small number of earlier studies were retained when they remained conceptually foundational. This balance reflects recent methodological guidance that review boundaries should be justified by the structure and maturity of the field rather than by arbitrary recency alone (Turnbull et al., 2023).

2.3. Thematic Organization of the Literature

After screening and close reading, the literature was organized thematically rather than chronologically. This choice reflects the purpose of the review, which is to clarify how existing scholarship explains physical activity participation among deaf college students, rather than simply to track publication trends over time. A thematic structure is particularly useful in narrative reviews because it allows studies with different methods, disciplinary languages, and national contexts to be synthesized around shared conceptual concerns (Gonot-Schoupinsky et al., 2022; Turnbull et al., 2023)

Based on this logic, the review is organized into four substantive parts: the current research landscape, major barriers to participation, promotion strategies, and research gaps with future directions. This structure was chosen because participation is rarely shaped by a single factor; barriers and strategies are better understood as interrelated dimensions within broader processes

of inclusion.

3. PHYSICAL ACTIVITY PARTICIPATION AMONG DEAF COLLEGE STUDENTS: CURRENT RESEARCH LANDSCAPE

3.1. Main Research Contexts and Participant Groups

Recent scholarship suggests that deaf and hard-of-hearing students have become more visible in higher education research, but they remain less visible in work that focuses specifically on physical activity, sport, and adapted physical education. Most current studies still examine accessibility, support services, and students' adjustment to university life rather than physical activity participation as a primary outcome. As a result, deaf college students are increasingly recognized within broader inclusion debates, yet their participation in physical activity is still rarely treated as a distinct object of inquiry (Percival et al., 2025; Tannenbaum-Baruchi et al., 2025).

Where physical activity is addressed more directly, the participant groups are often narrow and highly context-specific. Rich et al. (2024), for example, focused on Deaf or hard-of-hearing collegiate athletes and showed that sport participation can be personally meaningful and socially valuable, while also being strongly shaped by communication access, coach and peer awareness, and the quality of inclusion within the sporting environment (Rich et al., 2024). Taken together, these studies suggest that the field is still relatively small and unevenly developed, with much of the available evidence concentrated in single institutions, specific sports contexts, or local higher education systems (Tannenbaum-Baruchi et al., 2025).

3.2. Common Research Designs and Focal Issues

Methodologically, the field is currently dominated by qualitative and case-based inquiry. Recent studies on DHH students in higher education rely heavily on semi-structured interviews and experience-centered designs to examine accessibility, communication, support, and inclusion. This emphasis on lived experience is valuable because it foregrounds perspectives that are often marginalized in institutional policy and service discussions and captures dimensions of participation that are difficult to reduce to quantitative indicators alone (Percival et al., 2025; Tannenbaum-Baruchi et al., 2025).

At the same time, this methodological pattern also shapes the limits of the field. The current literature is better at showing how deaf students experience higher education than at comparing participation patterns across settings or evaluating the effects of particular interventions. Thematically, three issues recur across the recent literature: accessibility, inclusion, and institutional response. What remains less developed is a sustained body of work that places physical activity participation itself at the center of analysis (Percival et al., 2025; Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

3.3. Trends and Limitations in the Existing Literature

Overall, the field is expanding, but it remains conceptually and empirically uneven. One visible trend is that recent studies are moving beyond compliance-based accounts of accommodation and toward broader concerns with belonging, recognition, and the fragility of inclusion in higher education. Another trend is that institutional culture and interprofessional

coordination are increasingly being treated as central, rather than peripheral, to students' participation and adjustment (Márquez-González et al., 2025; Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

At the same time, several limitations remain. The literature is still relatively small when attention is restricted to deaf college students and physical activity-related participation, adjacent fields often develop in parallel rather than in direct dialogue, and intervention evaluation remains weak. These limitations justify the need for a more focused synthesis that brings accessibility research, higher education inclusion studies, and emerging work on sport and physical activity into the same analytical frame.

4. MAJOR BARRIERS TO PHYSICAL ACTIVITY PARTICIPATION

4.1. Communication Barriers

Communication barriers remain the most visible and recurrent constraint in the literature on deaf college students' participation in physical activity. Recent higher education studies show that DHH students still rely heavily on interpreters, captioning, transcription, and other accommodations, yet these supports are often delayed, uneven, or only partially effective in fast-moving educational settings. In physical activity contexts, this problem becomes more acute because instruction, feedback, safety guidance, and peer interaction frequently occur in real time (Percival et al., 2025; Tannenbaum-Baruchi et al., 2025).

Rich et al. (2024) further show that Deaf or hard-of-hearing collegiate athletes often attach strong personal and social value to sport participation, but that the quality of those experiences depends heavily on whether communication is accessible within the activity environment (Rich et al., 2024). These barriers are not merely technical problems; they shape safety, confidence, and students' sense of being able to participate on equal terms.

4.2. Social and Psychological Barriers

Communication barriers rarely operate in isolation. Recent studies suggest that they are closely tied to social and psychological processes, especially belonging, recognition, and students' sense of legitimacy within higher education environments. When students must continuously negotiate access, explain their needs, or adapt to environments not designed for them, participation can become emotionally costly (Tannenbaum-Baruchi et al., 2025).

This dimension is equally relevant in physical activity settings. Rich et al. (2024) show that sport participation can foster confidence, enjoyment, and social connection, but only when students feel genuinely included rather than merely accommodated (Rich et al., 2024). More broadly, recent work on inclusion in higher education emphasizes that students' participation is shaped not only by formal support, but also by the fragility of belonging and the uneven quality of everyday interaction (Ristad et al., 2024).

4.3. Institutional and Environmental Barriers

The literature also points to a third layer of barriers: institutional and environmental conditions that shape whether participation is realistically possible. Recent higher education research suggests that support systems are often fragile, responsibilities are unevenly distributed,

and accessibility depends too heavily on local practice rather than coherent institutional design (Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

Broader disability research in campus recreation provides a useful parallel. Abrahamson et al., (2025) found below-average accessibility across multiple sections of university recreation facilities, including weaknesses in policies, access routes, training, and adapted programming (Abrahamson et al., 2025). Although this work is not limited to deaf students, it highlights an important point for the present review: physical activity participation in higher education is shaped not only by individual access needs, but also by the accessibility of facilities, staff preparation, program design, and institutional commitment.

5. PROMOTION STRATEGIES FOR IMPROVING PARTICIPATION

5.1. Instructional and Communication-Based Supports

Communication is widely recognized as a central factor shaping physical activity participation among deaf and hard-of-hearing (DHH) college students. However, prior work often remains conceptual and offers limited guidance for implementation. To enhance applicability, communication should be embedded within instructional design rather than treated as an external support.

In practice, this can be achieved through structured, visually oriented teaching routines adapted to movement-based contexts. Instructors may provide brief pre-class visual materials (e.g., captioned or sign-supported demonstrations) to reduce real-time processing demands. During class, demonstration-based instruction should be prioritized, with verbal input minimized and reinforced visually. As activities proceed, consistent visual cues (e.g., gestures, spatial markers, or color signals) can regulate transitions and ensure safety, for example, by assigning specific gestures to indicate start, stop, and transition phases to ensure consistent interpretation across participants. Feedback may be delivered through demonstration, gesture, or concise written clarification.

Such multimodal approaches have been shown to improve comprehension and engagement when visual channels are treated as primary rather than supplementary (Lieberman et al., 2019). At the same time, sign language interpretation requires coordination with instructional flow, including attention to positioning and timing in dynamic environments, with interpreters positioned within the shared visual field of instructors and students and instructional pacing adjusted to accommodate interpretation lag during complex demonstrations or transitions (Napier et al., 2018).

To support evaluation, these strategies can be linked to observable indicators, including task accuracy, response time, frequency of clarification requests, and perceived communication clarity. These indicators can be aligned with specific instructional strategies; for instance, response time may reflect the effectiveness of visual cueing, while task accuracy may indicate comprehension of demonstration-based instruction. These measures help assess whether communication design translates into meaningful participation.

5.2. Inclusive Program Design

Instruction alone is insufficient if program structures remain inaccessible. Inclusive design

involves anticipating communication diversity rather than retrofitting accommodations.

This can be operationalized in three ways. First, reduce reliance on auditory signals by incorporating visual alternatives (e.g., visual start cues). Second, allow flexible participation formats (individual, paired, or small-group) to accommodate different interaction preferences. Third, stabilize rules and expectations through consistent visual representation, thereby reducing ambiguity. For example, visual diagrams or fixed spatial layouts can be used to communicate task sequences and boundaries in advance.

Evidence from campus recreation research suggests that accessibility is shaped not only by facilities but also by program design and staff preparedness. Abrahamson et al. (2025) show that institutions with structured accessibility practices achieve more consistent participation outcomes. Notably, well-designed environments reduce the need for ongoing individual adjustment, making inclusion more sustainable (Abrahamson et al., 2025).

5.3. Peer, Faculty, and Institutional Support

Participation is also shaped by social and institutional contexts. When support relies primarily on individualized accommodations, it tends to remain uneven. Shared responsibility across peers, faculty, and institutions is therefore essential (Ristad et al., 2024).

At the peer level, introducing basic visual communication strategies within groups can facilitate interaction and reduce reliance on repeated clarification. Peer-assisted approaches have been associated with improved engagement in adapted physical education (Lieberman et al., 2019). For example, by assigning peer partners, establishing shared visual cues, and structuring interaction roles during group-based activities.

At the faculty level, instructional preparedness is critical. Training in visual pedagogy and inclusive communication can improve both accessibility and instructional quality (Haegele & Sutherland, 2015)

At the institutional level, coordination across units remains necessary. Fragmented systems often result in inconsistent access, even when individual supports are available. A more integrated approach can improve continuity and effectiveness.

5.4. Illustrative Cases of Strategy Implementation

To ground the above strategies, three examples from existing research are briefly outlined.

Case 1: Communication-Oriented Coaching

Rich et al. (2024) found that visually oriented coaching—emphasizing demonstration and reduced reliance on auditory feedback—enhanced both engagement and perceived inclusion among DHH collegiate athletes (Rich et al., 2024), typically involving structured demonstration sequences and explicit visual signaling during skill transitions.

Case 2: Accessibility in Campus Recreation

Abrahamson et al. (2025) reported that institutions with structured policies, staff training, and inclusive program design demonstrated higher accessibility levels, highlighting the importance of institutional coordination (Abrahamson et al., 2025), including the use of

consistent visual communication protocols and staff preparedness for diverse communication needs.

Case 3: Peer-Assisted Participation

Studies in adapted physical education indicate that peer-assisted models can reduce communication barriers and support sustained participation by improving interaction during group activities (Lieberman et al., 2019), often through structured pairing, shared signaling systems, and defined interaction roles during tasks.

Taken together, these cases suggest that effective strategies depend on coordinated adjustments across instructional, social, and institutional levels rather than isolated interventions.

6. RESEARCH GAPS AND FUTURE DIRECTIONS

6.1. Population and Context Gaps

A first major gap concerns population specificity. Although recent higher education research has paid greater attention to deaf and hard-of-hearing students, much of the literature still addresses them primarily through the broad lenses of accessibility, adjustment, and support rather than through physical activity participation itself. In addition, deaf students are often grouped within wider disability categories, which can obscure the linguistic, communicative, and cultural conditions that shape their participation in physical activity settings (Percival et al., 2025; Tannenbaum-Baruchi et al., 2025).

A second gap concerns context. Existing work is still concentrated in particular national and institutional settings, and much of it is based on single-site or case-based inquiry. The field therefore needs more context-sensitive comparison across institutions and, where possible, across national systems, especially because recent research suggests that inclusion in higher education is highly dependent on local coordination, staff responsibility, and institutional culture (Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

6.2. Conceptual and Theoretical Gaps

A further gap lies in conceptual integration. The current literature often develops in parallel across higher education accessibility research, deaf education, disability inclusion studies, and sport or physical activity scholarship. As a result, barriers are frequently described, and supports are often listed, but the field still lacks a sufficiently integrated account of how communication, social belonging, institutional design, and physical activity participation relate to one another (Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

This lack of integration also affects how physical activity is positioned conceptually. In many studies, physical activity appears as a secondary setting in which accessibility or inclusion problems become visible, rather than as a core educational and health-related outcome worthy of direct analysis. Recent work on Deaf or hard-of-hearing collegiate athletes suggests that physical activity should be understood not only as a health behavior, but also as part of how students experience inclusion in university life (Rich et al., 2024).

6.3. Methodological Gaps

Methodologically, the field remains stronger in describing experience than in evaluating change. Much of the recent evidence relies on qualitative, case-based, or small-sample studies, which are valuable for understanding lived experience but less effective for identifying broader participation patterns or for testing the effects of particular interventions. The problem is therefore no longer only that challenges exist, but that the evidence base for strategy selection remains underdeveloped (Percival et al., 2025; Rich et al., 2024). Although the present review outlines a set of potentially applicable strategies, their effectiveness remains insufficiently tested in empirical and intervention-based studies.

Future work would benefit from mixed-methods and comparative designs that retain the richness of student experience while also offering clearer evidence on participation outcomes, program effects, and the conditions under which support becomes sustainable in practice (Márquez-González et al., 2025; Ristad et al., 2024).

6.4. Implications for Future Research and Practice

Taken together, these gaps suggest that future research should move in three directions. First, it should treat deaf college students as a more clearly defined population in studies of physical activity, sport, and adapted physical education. Second, it should develop more integrated conceptual models linking communication access, social belonging, institutional conditions, and participation outcomes. Third, it should strengthen the evaluation of support strategies, especially those involving communication design, staff development, and inclusive program structures (Rich et al., 2024; Ristad et al., 2024; Tannenbaum-Baruchi et al., 2025).

For practice, the implication is equally clear. Higher education institutions are unlikely to improve physical activity participation among deaf students through isolated adjustments alone. What is needed is a more coherent approach that brings together accessibility, inclusive program design, staff preparedness, and institutional coordination.

7. CONCLUSION

This review set out to examine the barriers and promotion strategies related to physical activity participation among deaf college students in adapted physical education settings. Taken together, the literature suggests that participation is shaped by more than individual willingness or health awareness. Instead, it emerges from the interaction of communication access, social belonging, instructional practice, and institutional conditions. Across the studies reviewed, communication barriers remain the most visible and persistent constraint, but they rarely operate alone. They are closely tied to students' confidence, sense of belonging, and ability to participate on terms that feel both equitable and sustainable. The review also indicates that adapted physical education should not be understood simply as a set of accommodations added to a hearing-centered environment. Rather, its effectiveness depends on whether inclusive principles can be translated into structured, context-sensitive, and assessable practices that support meaningful participation. Its value lies in providing a framework through which participation can be designed as accessible, socially meaningful, and educationally legitimate from the outset. At the same time, the evidence base remains limited: the field is still stronger in describing barriers and student experiences than in evaluating the effectiveness of particular strategies. Overall, physical activity participation among deaf college students should be understood not only as a health issue, but

also as a question of inclusion in university life.

CONFLICT STATEMENT

The authors declare no conflict of interest.

COOPERATION STATEMENT

All authors contributed equally to this work and approved the final manuscript.

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