

# Mindfulness Interventions for Emotion Regulation and Anxiety in Deaf and Hard-of-Hearing Students

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## Abstract

The purpose of this study is to investigate the features, efficacy, and adaptations of mindfulness-based interventions to enhance regulation of emotion and reduce anxiety in students with Deaf and Hard-of-Hearing conditions. We performed a systematic literature review with bibliometric analysis which was based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Through the Scopus database and relevant articles, 563 results were generated. Quality synthesis of data 10 studies were selected following removal of duplicates and application of inclusion criteria. Results suggest that mindfulness-based interventions contribute to improved emotion regulation, specifically increases in emotional awareness, self-control and adaptive coping strategies among Deaf and Hard-of-Hearing students. These interventions may also indirectly reduce anxiety by strengthening internal psychological qualities. Nevertheless, most of the interventions are not carried out using just mindfulness but through wider approaches such as psycho-education and emotional intelligence. Additionally, the accessibility adaptations, such as visual supports and sign language (SL) use, seem to have a great impact on the efficacy of mindfulness interventions across different disabilities or conditions. While these results are promising, the literature reflects an absence of experimental studies and treatment protocols tailored to this population. Future research should seek to create effective, low resource counselling protocols suited to the specific needs of students with Deaf and Hard-of-Hearing conditions.

## 1. Introduction

Over recent decades, increasing scholarly attention has been directed toward the mental health challenges and overall well-being of students with Deaf and Hard-of-Hearing (DHH) conditions (Efrina et al., 2018; Olsson & Loeb, 2026). Individuals with DHH typically experience partial or total hearing loss and rely on visual, gestural, or alternative modes of communication to access information (Bruce & Borders, 2015; Nelson & Bruce, 2019). These conditions often result in significant barriers to communication, social participation, and access to learning, which may subsequently influence their emotional and psychosocial development (Marlina et al., 2025).

A growing body of research indicates that students with DHH frequently encounter difficulties in emotional expression and regulation, primarily due to limited access to language during critical developmental periods (Sidera et al., 2020). Language deprivation has been shown to hinder the ability to identify, understand, and manage emotions effectively, thereby constraining social interaction and increasing vulnerability to maladaptive psychological responses, such as anxiety, stress, and social isolation (Adeyeye, 2024; Efrina et al., 2023). Empirical evidence further suggests that students with DHH tend to experience higher levels of anxiety compared to their hearing peers, largely attributed to communication barriers, academic pressures, and reduced social support (Hammad et al., 2024). In addition, impairments in executive functioning and emotional processing have been closely associated with difficulties in emotion regulation within this population (Aldawsari, 2025; Ashori & Jalil-Abkenar, 2021).

Emotion regulation constitutes a fundamental component of psychological well-being, as it enables individuals to respond adaptively to emotional experiences and environmental demands (Gross et al., 2019; Marlina et al., 2023). Deficits in emotion regulation have been consistently linked to adverse psychological outcomes, including heightened anxiety, depression, and maladaptive behaviors (Samson et al., 2015; Young et al., 2019). Therefore, the identification and development of effective and accessible psychological interventions for students with DHH remain a critical priority.

In this context, mindfulness-based interventions (MBIs) have emerged as a promising approach in contemporary psychological practice (D. Zhang et al., 2021). Mindfulness refers to an individual's capacity to

maintain present-moment awareness in a non-judgmental and accepting manner (Efrina et al., 2025; Kabat-Zinn, 2003). Previous studies have demonstrated that mindfulness practices can enhance emotion regulation, reduce anxiety, and improve overall psychological well-being (Tang et al., 2019). Moreover, mindfulness holds potential as a culturally responsive and accessible intervention for students with DHH, particularly when adapted through visual modalities, kinesthetic activities, and sign language-based approaches (Cannon et al., 2022).

Despite its potential, empirical research examining the application of mindfulness-based interventions specifically within DHH populations remains limited (Castillo, 2019). Most existing studies have focused on general populations, with relatively few investigations addressing the unique characteristics and needs of individuals with DHH (Cannon & Marx, 2024; Hall, 2020). Although some evidence suggests that mindfulness may enhance self-control and emotional well-being among individuals with hearing impairments, there remains a lack of systematic understanding regarding how such interventions are designed, adapted, and implemented to effectively address emotion regulation and anxiety in this group (T.-A. Zeng et al., 2025).

Accessibility and contextual adaptation are essential considerations in the development of interventions for students with DHH (Tsaputra & Amani, 2025). Effective programs must be aligned with individuals' communication preferences, cultural contexts, and learning characteristics (Padri et al., 2025; Fitri et al., 2025). The integration of visual supports, sign language, and adaptive learning strategies is crucial to ensure that interventions are both meaningful and accessible. This perspective is consistent with the broader view that educational and psychological services for DHH students should be context-sensitive and tailored to their specific needs (Hartman et al., 2023).

Given these considerations, there is a clear need for a comprehensive synthesis of existing research on mindfulness-based interventions targeting emotion regulation and anxiety among students with DHH. Therefore, this systematic literature review aims to: (1) identify the characteristics of mindfulness-based interventions implemented for students with DHH; (2) examine their effectiveness in improving emotion regulation; (3) analyze their impact on reducing anxiety; (4) evaluate the accessibility adaptations employed; and (5) identify existing research gaps to inform future studies.

## 2. Method

### 2.1. Research Design

To systematically identify, appraise, and synthesize existing evidence surrounding the impact of mindfulness-based interventions (MBIs) on emotion regulation and anxiety in Deaf and Hard-of-Hearing (DHH) individuals. Methods: This was a Systematic Literature Review (SLR) study, based on the Cochrane Collaboration's methodology and used the PRISMA guidelines for reporting systematic reviews to search for studies. This calls for consistency, transparency and repeatability in the assessment of scientific evidence (Kumar, 2023). Additionally, this was supported by a bibliometric component to monitor the currents of research, identify frequently occurring themes and map the evolution of publication in this field. This qualitative synthesis was complemented by quantitative information on the structure of the research domain, obtained through a concurrent bibliometric analysis.

### 2.2. Search Strategy

The literature search was performed mainly in the Scopus database since it covers peer-reviewed international publications of high quality. To maintain the relevance of findings, all articles were limited to publication within 2015-2026. The search query applied was: (("mindfulness" OR "mindfulness-based intervention" OR "MBSR" OR "MBCT") AND ("emotion regulation") AND ("anxiety")) AND (("deaf" OR "hard of hearing")AND ("adaptation"OR"accessibility")) Boolean operators (AND, OR) were used to further narrow down the search and ensure that all relevant studies were captured.

### 2.3. Inclusion and Exclusion Criteria

To ensure the quality and relevance of selected studies, the criteria on Table 1 were applied.

**Table 1. Inclusion and Exclusion Criteria**

Inclusion Criteria	Exclusion Criteria
Articles published in peer-reviewed journals	Studies not involving DHH populations
Studies involving students with DHH	Articles not related to mindfulness or psychological outcomes
Research focusing on mindfulness, emotion regulation, or anxiety	Non-academic publications (e.g., editorials, opinion papers)
Empirical studies (quantitative, qualitative, or mixed methods) and relevant reviews	Studies lacking clear methodology or insufficient data
Articles published in English	Article not published in English

Inclusion Criteria	Exclusion Criteria
Studies published between 2015 and 2026	Studies published outside 2015-2016

## 2.4. Study Selection Process (PRISMA)

Study selection was performed based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to provide methodological rigor and transparency in conducting studies (Shamseer et al., 2015; X. Zhang et al., 2020). Initially, a total of 563 records were identified through database searching (see Table 2). This yielded 540 articles for screening after removing 477 repeat records. Of those, 520 were irrelevant to the research objective and thus excluded during title and abstract screening.

This yielded 20 articles fulfilling the inclusion criteria, where the full text was assessed for eligibility. Of these, 10 articles were excluded using their inclusion criteria (articles not targeting mindfulness interventions, students with DHH or emotion regulation/anxiety outcomes). Ultimately, the qualitative synthesis comprised 10 articles.

**Table 2. PRISMA Flow Summary**

PRISMA Stage	Amount (n)
Identification (Records identified from databases – Scopus, etc.)	563 records identified
Records after duplicates removed	540 records (after duplicate removal)
Screening (Title & Abstract screening)	540 records screened
Records excluded (Title & Abstract screening)	520 records excluded
Eligibility (Full-text articles assessed)	20 articles assessed for eligibility
Full-text articles excluded (with reasons)	10 articles excluded
Included (Studies included in qualitative synthesis)	10 articles included

## 2.5. Bibliometric Analysis

Bibliometric analysis was conducted using visualization tools, particularly VOSviewer, to explore the structural patterns and developmental trends within the research domain. This analysis encompassed several key dimensions, including keyword co-occurrence, publication trends over time, and the identification of thematic clusters related to mindfulness, emotion regulation, anxiety, and Deaf and Hard-of-Hearing (DHH) populations. Through this mapping process, the analysis provided a comprehensive overview of dominant research themes, emerging areas of interest, and existing gaps in the literature, thereby offering a broader contextual understanding of the field.

## 2.6. Data Extraction and Synthesis

Data from the selected studies were systematically extracted and organized to ensure consistency and analytical clarity. The extraction process captured essential study characteristics, including the authors and year of publication, research design, study focus in alignment with the predefined research questions (RQ1-RQ5), and the main findings of each study. Subsequently, the extracted data were analyzed using a thematic synthesis approach, which facilitated the identification of recurring patterns, relationships, and conceptual linkages across studies. The synthesis was structured in accordance with the five research questions to maintain coherence between the study objectives and the resulting interpretations.

## 2.7. Quality Assessment

The quality of the included studies was rigorously evaluated using criteria adapted from established systematic literature review guidelines. This assessment considered the clarity and appropriateness of the research design, the adequacy of the sample, the level of methodological rigor, and the relevance of each study to the research questions. Only studies that met acceptable academic and methodological standards were included in the final analysis, thereby ensuring the reliability, credibility, and validity of the synthesized findings.

# 3. Results and Discussion

## 3.1. Results

This section presents the findings of the systematic literature review conducted in accordance with PRISMA guidelines, complemented by bibliometric analysis. A total of 563 records were initially identified through database searches. Following screening and eligibility assessment, 10 studies met the inclusion criteria and were included in the qualitative synthesis. This section provides an integrated perspective by combining quantitative bibliometric findings with qualitative thematic analysis. The bibliometric analysis aims to map research trends, structures, and developments, while the qualitative synthesis focuses on identifying intervention characteristics, evaluating effectiveness, examining adaptation strategies, and highlighting research gaps. Accordingly, the results are organized into two main sections. First, the bibliometric findings

describe the global research landscape. Second, the selected studies are systematically analyzed to address the research questions (RQ1–RQ5).

### 3.1.1. Overview of Findings

The findings of this combined systematic literature review and bibliometric analysis highlight the role of mindfulness-based interventions in improving emotion regulation and reducing anxiety among students with Deaf and Hard-of-Hearing (DHH) conditions. In addition to identifying relevant sources, countries and keyword relations through bibliometric analysis. In the meantime, the qualitative synthesis is focused on feature, efficacy and adaptations of school-based mindfulness interventions available for students with DHH.

### 3.1.2. Bibliometric Analysis

#### 3.1.2.1. Annual Scientific Production

Scientific publications trend of mindfulness, emotion regulation and DHH populations over time span 2016–2026 We can see a gradual increase in publications over time with a dramatic uptick after 2021 and peaking at ~2024 – 2025 (see Figure 1). This trend indicates growing academic interest in the intersection of mental health interventions and accessibility for students with DHH. The decline in 2026 may be due to incomplete indexing of recent publications.

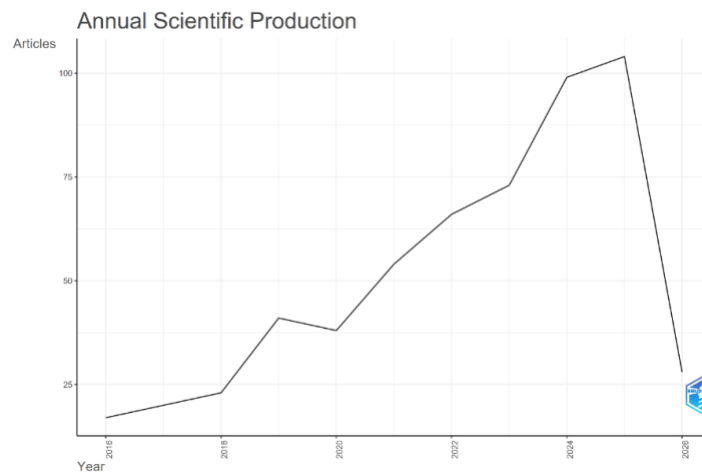


Figure 1. Annual Scientific Production

#### 3.1.2.2. Most Relevant Sources

The analysis of sources reveals that several high-impact journals dominate publications in this field (see Figure 2). Frontiers in Psychology emerges the most influential as shown in Table 1, subsequently followed by BMC Psychology and Frontiers in Psychiatry. Such findings reflect that research on the subject matter of mindfulness and emotional well-being among DHH populations tends to be disseminated via psychology and interdisciplinary health journals.



Figure 2. Most Relevant Sources





Figure 5. Bibliometric Summary

### 3.1.3. Qualitative Synthesis of Selected Studies

Table 2 summarizes the 10 selected articles included in the systematic review.

Table 2. Summary of Selected Studies

Author & Year	Title	Research Design	Focus RQ	Key Findings
(Rosellini, 2016)	Exploring Mindfulness as a Culturally Sensitive Intervention for the Deaf Community	Literature Review	RQ1, RQ4, RQ5	Mindfulness is potentially a culturally sensitive intervention for DHH, but empirical evidence remains limited.
(T. Zeng et al., 2025)	Relationship between Mindfulness and Self-Control in Deaf Individuals	Quantitative (Cross-sectional, mediation model)	RQ2	Mindfulness improves self-control, though mediating effects differ in DHH populations.
	Causal Model of Positive Thinking, Mindfulness and Gratitude as Variables Predicting Happiness of the Hearing Impaired and the Normal	Quantitative (Causal Model/SEM)	RQ2, RQ3	Mindfulness significantly predicts emotional well-being and happiness.
(Li et al., 2024)	Anxiety and Academic Procrastination in Deaf and Hard of Hearing College Students	Quantitative (Moderated mediation)	RQ3	Anxiety significantly affects academic behavior through rumination.
(Pizzie et al., 2026)	Assessing Academic Anxiety in d/Deaf, DeafBlind, and Hard-of-Hearing Individuals	Quantitative (Psychometric validation)	RQ3, RQ4	Accessible bilingual instruments improve anxiety assessment accuracy.
(Shabnan & Aldawsari, 2025)	Executive Functions and their Relationship to Emotional Regulation in Hard of Hearing	Quantitative (Cross-sectional)	RQ2	Strong relationship between executive function and emotion regulation.
(Muis, 2026)	Health Without Barrier: Improving Emotion Regulation through Psychoeducation in the Deaf Community	Experimental (Pretest-Posttest)	RQ1, RQ2, RQ4	Visual and sign-based psychoeducation significantly improves emotion regulation.
(Bu et al., 2025)	Body Image and Negative Emotions in Chinese Deaf and Hard-of-Hearing College Students	Quantitative (Regression analysis)	RQ3	Body image influences anxiety through self-evaluation mechanisms.
(Ashori & Jalil-abkenar, 2020)	Emotional Intelligence: Quality of Life and Cognitive Emotion Regulation of Deaf and Hard-of-Hearing Adolescents	Quasi-experimental	RQ2	Emotional intelligence training enhances emotion regulation.
(Chen et al., 2025)	Inclusive Emotion Technologies: Addressing the Needs of DHH Learners	Mixed Methods (User study)	RQ4, RQ5	Visual and adaptive technologies are essential for emotional awareness in DHH.

### 3.2. Discussion

This study highlights some important characteristics, efficacy and modification of mindfulness-based interventions for students who have Deaf and Hard-of-Hearing (DHH) needs together with the current limitations within the existing literature. Regarding the characteristics of interventions, this study reviewed that mindfulness programs designed for students with DHH are still in their infancy and frequently offered as a part of other psychological or educational intervention. Instead of being offered as individual programs, mindfulness tends to be embedded as components within multi-modal approaches such as emotional intelligence training, psychoeducation or self-regulation enhancement programs. This indicates that mindfulness in DHH contexts is often integrated into hybrid intervention models. Furthermore, the length and format of interventions were highly heterogeneous ranging from single-session to multi-week programs suggesting that there is no uniformity in intervention design (Pizzie et al., 2026).

Second, regarding effectiveness, evidence consistently shows that mindfulness-related approaches improve emotion regulation to students with DHH (Muis, 2026). Multiple studies demonstrated that mindfulness improves self-control, emotional awareness, and adaptive coping strategies. Such outcomes relate directly to enhanced executive functioning and psychological adjustment. Nonetheless, the mechanisms for these improvements seem to be distinct from those observed in hearing populations. Assuming, for example, that the mediating effect of internal emotional states like inner peace would be attenuated in DHH individuals) Indicates that differences in communication and sensory experiences may affect pathways for emotional processing (Ashori & Jalil-abkenar, 2020)..

The findings indicate that mindfulness-based interventions exert an indirect effect on reducing anxiety among students with DHH. This effect is primarily mediated through improvements in emotion regulation, self-awareness, and cognitive control. However, only a limited number of studies have examined mindfulness as a primary intervention specifically targeting anxiety. Instead, most studies suggest that reductions in anxiety occur as a secondary outcome of enhanced emotional regulation capacities (Khafagy et al., 2026). Furthermore, students with DHH often experience anxiety due to communication barriers, academic challenges, and social relationship difficulties. In this context, interventions that strengthen internal coping mechanisms, such as mindfulness, play a crucial role in mitigating psychological stress and enhancing adaptive functioning.

Adaptation to different conditions is a major driver of intervention effectiveness. These findings emphasise the need to tailor interventions, such as mindfulness-based interventions, to suit varying types of students specifically students with DHH (Rosellini, 2016). Some well known adaptations that are helpful accommodation types include: visual supports, sign language, gesture Communication and interactive or kinesthetic activity. Elsewhere, studies have highlighted the importance of available technologies such as visual emotion mapping systems and simplified self-report tools. They are adaptations that go beyond being just supportive, they are necessary adjustments in order to help them connect with learning and concepts (Chen et al., 2025).

Last, we then outline some research gaps and limitations of previous studies. An important gap exists with few empirical studies concerning DHH students when mindfulness is examined as the primary intervention. The majority of studies are cross-sectional or based on proxy measures, while there is a relative lack of experimental or longitudinal designs. We additionally highlight the lack of standardised intervention protocols and the limited exploration of long-term effects (Bu et al., 2025). A further gap is the limited attention given to accessibility principles in intervention design, especially those targeting cultural and linguistic components of the DHH community.

Thus, the important findings suggest that while mindfulness-based interventions are promising in tackling emotional and psychological components for individual of DHHs, additional meta-research is needed to devise more-narrow-focus models with increased availability and better empirical evidence. Future investigations should focus on developing structured and adaptive mindfulness interventions for DHH populations using visual/multimodal approaches, which can then be evaluated using long-term, controlled experimental designs.

### 3.3. Implementation of Mindfulness-Based Interventions for DHH Students

The findings of this study provide important practical implications for the implementation of mindfulness-based interventions in educational and counseling settings for students with Deaf and Hard-of-Hearing (DHH). First, mindfulness interventions should not be applied as generic programs, but rather adapted to align with the communication needs and learning characteristics of DHH students. The integration of visual supports, sign language, and multimodal instructional strategies is essential to ensure accessibility and meaningful engagement.

Educators and school counselors should consider embedding mindfulness practices within broader psychosocial or educational programs, such as emotional intelligence training, self-regulation programs, or

inclusive classroom instruction. This integrated approach is consistent with the finding that mindfulness is often more effective when implemented as part of a comprehensive intervention model rather than as a standalone strategy.

The use of technology-based supports, such as visual emotion mapping tools, interactive applications, and video-based instruction, can enhance the effectiveness of mindfulness practices for DHH students. These tools not only facilitate understanding but also support active participation and self-reflection. Finally, it is important to develop structured and context-sensitive intervention protocols that are feasible to implement in school settings, particularly those with limited resources. Such protocols should emphasize consistency, adaptability, and cultural responsiveness to maximize their impact on students' emotional regulation and psychological well-being.

### 3.4. Limitations

Despite providing a comprehensive synthesis of existing literature, this study has several limitations that should be acknowledged. First, the number of studies included in the qualitative synthesis is relatively small, which may limit the generalizability of the findings. This reflects the overall scarcity of research specifically examining mindfulness-based interventions for DHH populations.

The majority of the included studies employed cross-sectional or non-experimental designs, with only a limited number of experimental or longitudinal studies available. As a result, the ability to establish causal relationships between mindfulness interventions and psychological outcomes remains constrained. Considerable heterogeneity was observed across studies in terms of intervention design, duration, measurement tools, and outcome variables. This variability makes it difficult to draw definitive conclusions regarding the most effective intervention models.

The bibliometric analysis was limited to a single database (Scopus), which may have excluded relevant studies indexed in other databases. This limitation could potentially affect the comprehensiveness of the literature coverage. Although accessibility and adaptation were identified as critical factors, relatively few studies provided detailed descriptions of how mindfulness interventions were specifically tailored for DHH students. This highlights the need for more explicit reporting and development of standardized, accessible intervention frameworks.

## 4. Conclusion

This study demonstrates that mindfulness-based interventions contribute positively to emotion regulation and indirectly reduce anxiety among students with Deaf and Hard-of-Hearing (DHH) conditions by enhancing emotional awareness and adaptive coping mechanisms. However, their effectiveness is contingent upon the degree of accessibility and contextual adaptation, particularly through visual, sign language, and multimodal approaches. Despite these promising outcomes, the current body of literature remains limited by the lack of standardized intervention protocols and the scarcity of experimental and longitudinal evidence. These limitations indicate a critical need for more rigorous and context-sensitive research to establish the effectiveness and scalability of mindfulness-based interventions for DHH populations.

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All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/ or publication of this article.

## Data Availability

The datasets generated during and/ or analyzed during the current study are available from the corresponding author on reasonable request.

## Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

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