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Review

Adolescents’ experience of bracing for idiopathic scoliosis: a systematic review and meta-analysis

Gaia Dussi[a], Stefania Chiappinotto[a], Gaia Magro[a], Sara Dentice[a], Chiara Moreal[a], Alessandro Galazzi[b], Verusca Gasparroni[c], Giacomo Rossettini[d,e], Francesca Zecchini[c], Stefano Schierano[c], Alvisa Palese[a,*]

[a] Department of Medicine, University of Udine, Via Colugna 50, 33100 Udine, Italy
[b] Department of Medicine and Surgery, LUM University, SS 100, Km 18, 70010 Casamassima, Bari, Italy
[c] Azienda Sanitaria Universitaria Friuli Centrale, Via Pozzuolo 330, 33100 Udine, Italy
[d] Department of Physiotherapy, Faculty of Sport Sciences, Universidad Europea de Madrid, 28670 Villaviciosa de Odon, Spain
[e] School of Physiotherapy, University of Verona, Via Galvani 4, 37131 Verona, Italy

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ABSTRACT

Background: Brace treatment is the most common conservative approach for adolescents with idiopathic scoliosis (AIS). However, lived experiences with the brace may influence adherence and the achievement of successful outcomes.

Aim: To synthesize qualitative studies on the lived experiences, perceptions, and challenges faced by AIS during brace treatment, and strategies they use to enhance or ensure adherence.

Design: A systematic review of qualitative studies, followed by a meta-synthesis.

Methods: MEDLINE, CINAHL, Web of Science, Cochrane Library, Scopus, Physiotherapy Evidence Database, and PsycINFO were searched (from inception to September 1, 2025). References included in these studies and studies included in the ISICO (Italian Scientific Spine Institute) website were also reviewed. We selected primary qualitative or mixed methods studies with identifiable qualitative data, focused on the lived experiences of adolescents with AIS aged 10–18 years, and published in English or Italian. The methodological quality of the studies was assessed with the Joanna Briggs Institute and the Mixed Methods Appraisal tools. Extracted data in the form of texts and quotes were thematically synthesized.

Findings: Ten studies involving 135 adolescents, mainly female (78.5%), aged 10–18 years, with a Cobb angle of 25.8° to 37.2° and an overall duration of bracing from 7.7 months to 2.9 years. Three analytical themes emerged: 1) “Losing and reconstructing selfhood through and beyond brace treatment,” 2) “Redefining self and social roles,” and 3) “Regaining agency.”

Conclusion: Bracing involves a dynamic process of developmental and relational transitions. Adolescents’ experiences shift from an initial disruption characterized by psychological shock, physical discomfort, and social stigma, to gradual adaptation and self-regulation, during which they reconstruct their sense of self, identity, and autonomy. Support from parents, peers, teachers, and healthcare professionals is crucial. At the same time, active involvement in treatment planning enhances adolescents’ sense of agency, helping them overcome resistance and burden and integrate the brace into daily life.

Introduction

Idiopathic scoliosis, a term introduced by Kleinberg [1], refers to a spinal deformity not associated with a specific disease that can develop at any age. Adolescent idiopathic scoliosis (AIS) is one of the most common spinal deformities in teenagers, affecting 2–4% of the general population, primarily among otherwise healthy adolescents [2–4].

Abbreviations: AIS, adolescents with idiopathic scoliosis; CINAHL, Cumulative Index to Nursing and Allied Health Literature; COREQ, Consolidated criteria for reporting qualitative research; ENTREQ, ENhancing Transparency in Reporting the Synthesis of Qualitative Research; GRAMMS, Good Reporting of A Mixed Methods Study; ISICO, Italian Scientific Spine Institute; JBI, Joanna Briggs Institute; MMAT, Mixed Methods Appraisal Tool; PEDro, Physiotherapy Evidence Database; PRISMA-S, Statement for Reporting Literature Searches in Systematic Reviews guidelines; PROSPERO, Prospective Register of Systematic Reviews; PsycINFO, Psychological Information Database; SRQR, Standards for Reporting Qualitative Research; SPIDER, Sample, Phenomenon of Interest, Design, Evaluation, Research Type

[*] Corresponding author.

E-mail address: alvisa.palese@uniud.it (A. Palese).

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Table 1
Search strategy according to SPIDER.

Framework	Elements	Search strategy
S (Sample)	Adolescents with idiopathic scoliosis	(“Child” OR “adolescent” OR “adolescent*” OR “child*” OR “teen*”) AND (“scoliosis” OR “spinal curvatures” OR “spinal” OR “idiopathic scoliosis” OR spinal deformit* OR “spinal disease*” OR “juvenile idiopathic scoliosis”) AND (Brace OR Brac* OR “orthotic devices” OR “Conservative Treatment”)
PI (Phenomenon of Interest)	Brace treatment experience(s)	“Perception” OR “perception*” OR “life change events” OR “life chang* event*” OR “life change*” OR “Behavior and Behavior Mechanisms” OR “emotions” OR emotion*
D (Design)	Qualitative studies (e.g., focus group, interview, diaries)	“Focus group*” OR “interview*” OR “grounded theory” OR “observat* stud*” OR “quali-quantitative study” OR “mix-method study”
E (Evaluation)	Challenges, strategies	“Treatment adherence and compliance” OR “adherence” OR “compliance” OR “adherence and compliance” OR “Psychological Well-Being” OR “well-being” OR “satisfaction” OR “patient satisfaction” OR “Acceptance” OR “Adolescent Health” OR “Child Health” OR “positive behavior” OR “motivation*”
R (Research type)	Qualitative	“Qualitative Research” OR “qualitative research*”

SPIDER - Sample, Phenomenon of interest, Design, Evaluation, Research Type framework.

Conservative management is the first-line approach for most adolescents with AIS, and only 0.1−0.3% of cases require surgical correction [5,6]. Approximately 10% of adolescents receive conservative treatments, including observation, physiotherapeutic scoliosis-specific exercises, inpatient rehabilitation, or bracing [2,3]. Braces reduce the need for surgery in many adolescents with AIS [2], and the effectiveness of conservative treatments depends heavily on the active engagement of adolescents and their caregivers. Participation in physiotherapy, regular follow-up visits, monitoring and adjusting brace pressure, and above all, adherence to brace wear are essential for achieving positive outcomes [7]. Quantitative studies have examined the impact of bracing on body image and health-related quality of life [8,9], with some reporting no significant effects [10,11]. However, bracing has also been described as a stressful experience that negatively affects adolescents’ well-being [12,13], impairs self-image [14], and reduces physical activity levels [15], all contributing to increased psychosocial distress [13,14]. Therefore, brace adherence, an active process in which individuals take responsibility for their well-being and follow agreed recommendations, often involving lifestyle changes, remains a major challenge [16].

Adherence to bracing can be negatively affected by multiple factors, including people’s characteristics such as age [17], and brace-related side effects such as discomfort, restricted mobility, and broader impacts on physical, emotional, and social well-being [18,19]. Body-image concerns may further hinder adherence, especially among adolescent females [8]. Similarly, family dynamics can contribute to negative attitudes toward treatment [8].

A recent quantitative systematic review showed that higher adherence is associated with better clinical outcomes, including greater curve improvement, lower rates of progression, and reduced need for surgery [20]. However, limited insights into the lived experiences influencing adherence or the strategies adolescents use to maintain it have been documented [20]. Moreover, to our best knowledge, no studies have summarized available qualitative studies exploring the lived experiences of adolescents undergoing brace treatment, leaving the Patient Reported Experience perspective [21] not fully integrated in this field of research. Therefore, we aimed to synthesize qualitative studies on adolescents with AIS’s lived experiences, perceptions, and challenges during brace treatment, as well as the strategies they use to enhance or ensure adherence. Addressing this gap will better inform clinical practice and patient-centered care strategies.

Methods

Study design

A systematic review of qualitative research was reported in accordance with the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) (Appendix A) and the Statement for Reporting Literature Searches in Systematic Reviews (PRISMA-S) guidelines (Appendix B) [22,23].

Regulatory and ethical aspects

The review protocol was registered in the Prospective Register of Systematic Reviews (PROSPERO) [CRD42024611391]; no deviations from the original protocol occurred.

Research question

The following research question was set: “What are the experiences of AIS undergoing brace treatment; what challenges do they face, and what strategies do they develop to enhance or ensure adherence to the treatment?” The Sample, Phenomenon of Interest, Design, Evaluation, Research Type (SPIDER) framework was adopted, as recommended for systematic reviews of qualitative research [24].

Search strategy and sources

The search strategy was designed with no restrictions and organized according to the SPIDER framework (Table 1; Appendix C). Two researchers (GD and GM) searched 7 databases: MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, Cochrane Library, Scopus, Physiotherapy Evidence Database (PEDro), and Psychological Information Database (PsycINFO) from their inception to September 1, 2025. Citation searching was also performed, and the reference lists of eligible studies were manually checked. Studies published by ISICO (Italian Scientific Spine Institute) were also reviewed [25].

Eligibility criteria

Eligible studies were (a) primary qualitative or mixed methods research with identifiable qualitative data focusing on the perceptions, challenges, and lived experiences of adolescents aged 10−18 years with AIS, as this age group is most affected by this condition [3]; (b) published from their inception to September 1, 2025; (c) in English or Italian, in accordance with the team’s language proficiency to ensure accuracy in data analysis.

Studies were excluded if they (a) focused on adults’ or caregivers’ experiences or perceptions of bracing; (b) addressed experiences with surgical or other scoliosis treatments; (c) involved brace treatment for other medical reasons (eg, vertebral fractures); or (d) used other approaches (eg, literature reviews, quantitative studies, letters to the editor, protocols, commentaries, or books).

Study selection and data extraction

The Rayyan platform was used to import search results, screen for eligibility, and remove duplicates [26]. Two researchers (GD and GM) performed the search and independently assessed eligible studies based on titles and abstracts. All eligible studies were retrieved in full text and independently read and assessed for inclusion by 2 researchers (GD and GM). A third researcher (AP) was consulted to reach consensus in case of disagreements. A data extraction grid was designed and piloted in Microsoft Word in one study to assess its adequacy. Once its effectiveness was confirmed, the grid was used to extract the following data:

(a) main characteristics: author(s), publication year, title, journal, country, study aim(s), design, methods of data collection and analysis; setting, data collection year, timing of data collection according to brace duration; sampling methods, participants' main characteristics (gender, age); and main characteristics of AIS (cobb angle, type of brace and number of hours worn per day and duration of bracing);
(b) lived experiences, perceptions, challenges, and adherence strategies: data were extracted from the findings section of each study (eg, results, tables, and images), as text or participants' quotes.

Data extraction was performed by 2 researchers (GD and SC) and supervised by a senior researcher (AP). Extracted data were rechecked for accuracy by the authors; discrepancies identified were resolved by comparing the data against the original study (Appendix D).

Quality appraisal of the included studies

The Joanna Briggs Institute (JBI) tool (10 items rated as "yes," "no," or "unclear") and the Mixed Methods Appraisal Tool (MMAT) (7 items rated "yes", "no", or "can't tell") were used to assess the quality of the included studies [27,28]. Two researchers (GD and SC) assessed each study, first independently and then comparing their findings. In case of disagreement, a third researcher (AP) resolved the issues.

Data synthesis

The Thomas and Harden thematic synthesis method was used [29] following the 3 recommended steps (a) free line-by-line coding of data extracted; (b) organization of the free codes into related areas to construct descriptive themes; and (c) development of analytical themes [29]. First, 2 researchers (GD and AP) read the full text of the studies to gain a preliminary understanding of their findings. Then, they carefully read the extracted findings (eg, texts, quotes) independently and then together, and inductively coded line by line.

Second, codes were grouped by comparing similarities and differences to develop descriptive themes. The descriptive themes were then reviewed to identify analytical themes beyond the original studies, generating new interpretations, insights, and explanations regarding the experience of adolescents with AIS during brace treatment. Throughout the data synthesis, we conducted multiple meetings until consensus was reached (see trail code in Appendix E). No software was used.

Rigor and trustworthiness

Our team included researchers with diverse personal and professional backgrounds (eg, nurses, physicians, physiotherapist). Three members were clinicians working with adolescents with AIS, one researcher had relevant family experience, and another had personal experience but no professional exposure to the topic. These varied experiences provided important contextual understanding and helped ensure that interpretations remained grounded in the lived realities of participants.

Reflexivity was maintained throughout the review process and data analysis through several structured, in-person meetings [30]. During data analysis, more frequent reflexive meetings were held to discuss differing interpretations, mitigate potential bias, and ensure that perspectives potentially underrepresented in the data were considered [30]. This reflexive engagement continued through the synthesis stage until the review was completed (Appendix F). AP led the reflexive process, with SS co-facilitating and guiding discussions to ensure transparency and rigor.

Because all included studies were written in English, an English language expert was consulted to verify accuracy and consistency in interpretation, synthesis, and reporting, ensuring that the meaning of sentences and quotations was preserved during analysis [31].

Findings

Literature search

A total of 597 studies were identified and reduced to 513 after duplicates were removed. Eligible studies were first screened by title and abstract; 498 were excluded because they did not meet the inclusion criteria. The full texts of 15 studies were reviewed, and 10 were included (Fig. 1).

Characteristics of the studies

Studies were published between 2004 and 2025 and conducted in China [31−34], Iran [35−37], the US [38], Norway [39], and Greece [34] (Table 2). The studies explored (a) the subjective experiences of adolescents during brace treatment for scoliosis, obstacles to compliance, and perspectives on adolescents participation in treatment [32,33,35−39,34,40], and (b) specific stressors related to the disease and its treatment, coping strategies, and mental health issues [41].

All studies used a qualitative descriptive design with data collected through individual interviews, except for Donnelly et al. [38] and Sykorova et al. [39], who conducted focus group interviews. Studies were conducted in healthcare facilities, including both inpatient and outpatient clinics [32,35−38,34,40], in specific organizations (eg, non-government organization specializing in AIS treatment and the Spine and Back Pain Organization) [41,39], and in a school [33].

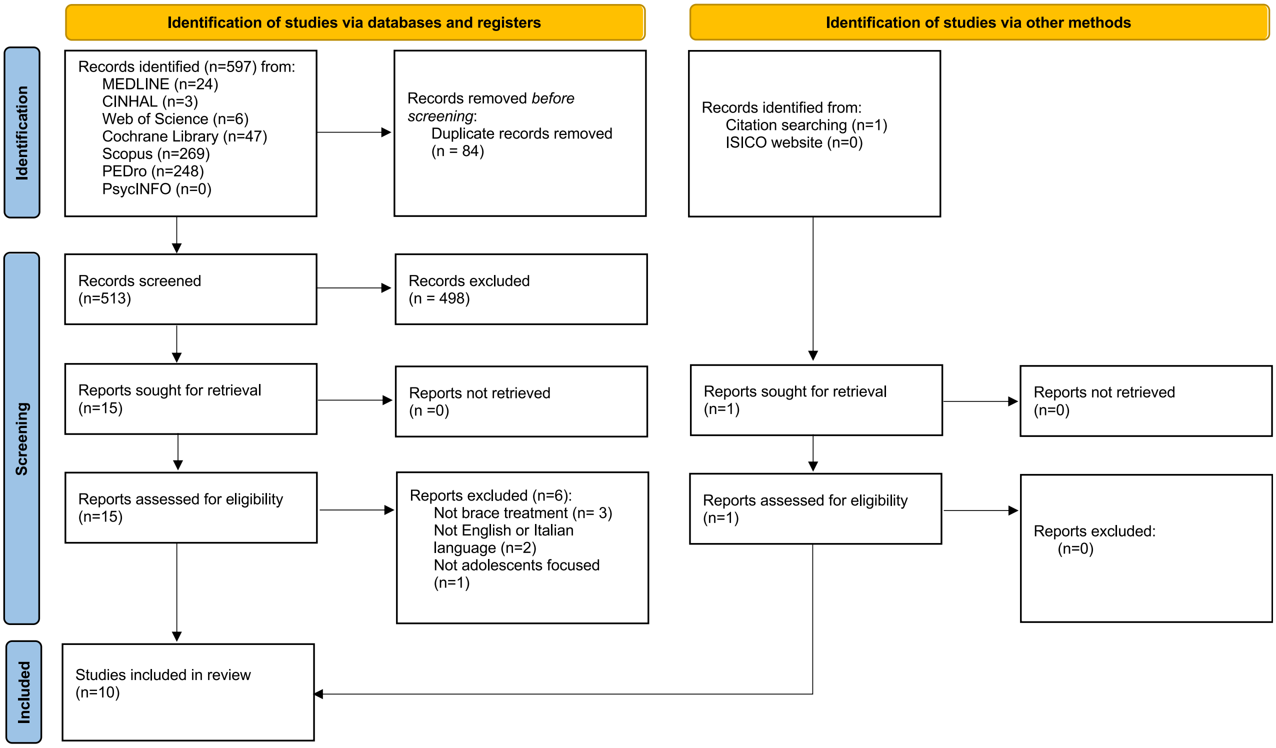
Overall, studies documented the experiences of 135 adolescents undergoing bracing treatment for AIS, identified through purposeful or convenience sampling. Ghorbani et al. investigated the same group for different purposes [35,36]. Most participants (79%) were female, with 3 studies including only females [33,38,39]. Participants' ages ranged from 10 [34,40] to 18 years. [38].

The average Cobb angle at study entry ranged from 25.8° [33] to 37.2° [35], and the overall duration of bracing ranged from 7.7 months [40] to 2.9 years [38]. Four studies [32,35,36,40] reported the types of braces used, including thoracolumbosacral orthosis, Cheneau braces, Boston braces, and Milwaukee braces. However, the relative frequency of each brace type within individual studies was not specified. Information on prescribed daily wearing time was reported in 3 studies [33,38,34], with adolescents instructed to wear the brace for >12 h per day [34] or up to 20 h [33], without specifying whether this was during the day or night. In 3 studies, data were collected after 1, 3, and 6 months of bracing, respectively [36,37,34].

Verbatim transcribed narratives from interviews or focus groups were analyzed using content analysis in 6 studies [35,36,38,39,34,40], thematic analysis in 2 studies [41,37], while 1 study did not report the data analysis method used [33].

Quality appraisal of the included studies

In the JBI tool assessment (Table 3), congruence between the stated philosophical perspective and the research methodology, the research methodology and the research question, and between the methodology, data collection, and data analysis was satisfactory in nearly all studies. However, some studies were unclear regarding the representation of participants' voices and perspectives [37−39,34], the coherence of the conclusions drawn from the analysis [32,41], and the influence of the researcher on the research and vice versa [33,34]. In addition, the cultural or theoretical positioning of the researchers was often not reported



Legend: CINAHL, Cumulative Index to Nursing and Allied Health Literature; ISICO, Italian Scientific Spine Institute; PEDro, Physiotherapy Evidence Database; PsycINFO, Psychological Information Database

Fig. 1. Flow diagram for new systematic reviews that included searches of databases, registers and other sources. Legend: CINAHL, Cumulative Index to Nursing and Allied Health Literature; ISICO, Italian Scientific Spine Institute; PEDro, Physiotherapy Evidence Database; PsycINFO, Psychological Information Database.

[32,33,37−39,34] or was unclear [41]. These aspects were considered during the interpretation of findings that were grounded primarily in participants' quotations and recurrent patterns across studies.

The MMT tool was used to assess the Wang et al. [40] study according to its mixed-method design. Satisfactory quality was rated for most of the criteria; however, adherence to the specific quality standards of each methodological component was not fully described (Table 4).

Thematic synthesis

Three main analytical themes emerged: "Losing and reconstructing selfhood through and beyond brace treatment," "Redefining self and social roles," and "Regaining agency" (Fig. 2, Appendix G).

Theme 1: Losing and reconstructing selfhood through and beyond brace treatment

The initial impact of the diagnosis, treatment, and changes required by wearing the brace clearly disrupted normal life and sense of self, reducing the autonomy adolescents had gained in decision-making and in daily activities. "Being knocked down and trying to get back up" and "Experiencing dependency on others" were the 2 descriptive themes that emerged from the studies.

Being knocked down and trying to get back up. Studies described adolescents' experiences when receiving a diagnosis, clinical information, and potential treatment options. Adolescents faced various emotions, including difficulty accepting the diagnosis, and expressed confusion about the different treatment options presented by the physician and the orthotist [38]. They reported a lack of knowledge and information about the brace [32,41,39], and felt forced into this treatment without any promise of improvement or resolution of their condition [35,38,34].

Adolescents reported a negative first visual impression upon seeing the brace and experienced a range of negative emotions, such as shock and anxiety; the concept of bracing was unknown and unimaginable to them [32,33,41,35,37,38]. They perceived themselves as being in a non-negotiable situation, without the freedom to make choices [32,33,41,35,38,34]. Adolescents were reluctant to accept that their condition required therapy [34], and experienced pressure regarding the treatment plan established by the healthcare provider [32]. Some adolescents tried to resist and lied to their parents about wearing the brace [33,41,38,34], and felt excessive psychological control from them [41,37].

However, after a challenging initial emotional and psychological impact, adolescents began to integrate the brace into their lives [35]; they felt resigned and became accustomed to wearing it [32,33,41,35]. Some studies reported that this change was promoted by regular visits, performing physiotherapy, understanding the positive effects of the brace, improved radiographic results, and the family's engagement and consistency in supporting adherence [41,35,37,38]. Overall, adolescents began to normalize treatment in their lives [35,34].

> *"I cried when I saw the brace first time. The appearance made me so unhappy that I thought it would be seen by others when wearing it throughout the treatment"* [32]

> *"When I first got my brace, it felt separate from me, but now I see it as a part of my body"* [35]

Experiencing dependency on others. The impact of braces on adolescents' daily lives was reported in several studies [33,41,35−38,40], including the difficulties performing some daily activities and managing the brace, leading to dependence on others [41,35]. Adolescents needed assistance with personal tasks and simple daily activities, such as carrying a backpack to school or getting into a car [36,38]. They also reported needing

Table 2
Characteristics of the included studies ($n = 10$).

Author(s) Year Title Journal Country	Aim Design Method of data collection Data Analysis	Setting When data collection was performed according to the bracing duration	Sampling methods Participants, number Female, % Age, number (SD) Cobb angle, ° Duration of bracing, months (SD) Type of brace Daily brace hours, number
Cheung et al. [32] 2022 Adolescents' experience during brace treatment for scoliosis: a qualitative study International Journal of Environmental Research and Public Health China	To explore the subjective experiences of adolescents during brace treatment for scoliosis to understand their obstacles to compliance and their perspectives on patient participation in the treatment process Qualitative study Semi-structured in-depth interviews Thematic analysis	In an interview room of a specialized center for the treatment of pediatric orthopedic and spine deformity problems During brace treatment	Purposeful sampling 15 adolescents Female: 86% Mean age: 13.0 (1.59) years Cobb angle average: 33.9° (5.06°) Mean duration of bracing: 13.33 months (9.17) TLSO brace NR
Donnelly et al. [38] 2004 Patient and parents' perspectives treatment for adolescents' idiopathic scoliosis The Iowa Orthopedic Journal USA	To explore three aspects of treatment for AIS from the perspective of the patient and family. Discussions centered on three core areas: the decision process when choosing a treatment, the impact of the treatment on daily living, and the ease or difficulty in compliance with recommendations Qualitative Focus group and interviews Content analysis	Tertiary referral center, sitting around tables in rooms with minimal distractions In the beginning, or middle or nearing the end of bracing treatment	Convenience sampling 12 adolescents Female: 100% Ages 13–18 years old NR Mean duration of bracing: 2.9 years NR 16–18 h per day
Ghorbani et al. [36] 2022 School time experiences of adolescents with spinal deformities during brace treatment: a qualitative study Medical Journal of the Islamic Republic of Iran Iran	To explore the adolescents' brace-wearing physical-psychosocial experiences during school time Qualitative descriptive In-depth, semi-structured face-to-face interviews and phone calls Content analysis	Orthotic and prosthetic centers After 3 months of bracing	NR 22 adolescents Female: 88% Mean age: 14.2 (3.5) years NR Mean duration of bracing: 8.5 months (1.4) Milwaukee brace and TLSO brace NR
Ghorbani et al. [35] 2024 Brace compliance process in adolescents with spinal deformities: A qualitative study PLOS ONE Iran	To explore the brace compliance process in adolescents with spinal deformities Qualitative descriptive with interpretative framework In-depth, semi-structured face-to-face interviews and phone conversations Content analysis	Three orthotic and prosthetic centers in Tehran that manufacture spinal braces After 3 months of bracing	Convenience sampling and purposeful sampling 22 adolescents Female: 88% Mean age: 14.2 (3.5) years Cobb angle average: 37.2° (11.46°) Mean duration of bracing: 8.5 months (1.4) Milwaukee brace and TLSO brace NR
Law et al. [33] 2017 Scoliosis brace design: influence of visual aesthetics on user acceptance and compliance Ergonomics China	To study the extent that visual aesthetics influence the compliance and user experience of scoliosis patients in terms of the brace design and the treatment process Qualitative–Grounded theory In-depth interviews NR	Five high schools in Hong Kong and a certified prosthetist-orthotist NR	NR 10 adolescents Female: 100% Mean age: 16.3 years Cobb angle average: 25.8° NR NR 20 h
Li et al. [41] 2024 "Am I different?" Coping and mental health among teenagers with adolescent idiopathic scoliosis: A qualitative study	To comprehensively and thoroughly explore the specific stressors related to this disease and its treatment, coping strategies, and mental health among teenagers with AIS Qualitative descriptive	Local non-government organization specializing in AIS treatment in China NR	Purposeful sampling 12 adolescents Female: 58.3% Mean age: 15.5 years Cobb angle average: 28.9°

(*continued on next page*)

Table 2 (*Continued*)

Author(s) Year Title Journal Country	Aim Design Method of data collection Data Analysis	Setting When data collection was performed according to the bracing duration	Sampling methods Participants, number Female, % Age, number (SD) Cobb angle, ° Duration of bracing, months (SD) Type of brace Daily brace hours, number
Journal of Paediatric Nursing China	Semi-structured interviews Thematic analysis		NR NR NR
Sapountzi-Krepia et al. [34] 2006 The experience of brace treatment in children/adolescents with scoliosis Scoliosis Greece	To explore the experience of brace treatment in children/adolescents with scoliosis. To investigate which feelings are created by the bracing experience in children/adolescents with scoliosis and what the opinions of children/adolescents with scoliosis are regarding the support provided to them by health-care professionals and by their families Qualitative Semi structured interview Content analysis	The outpatient scoliosis clinics of two Greek hospitals After 6 months of bracing	Convenience sampling 12 adolescents Female: 71% Ages 10–16 years old NR NR NR >12 h
Sharifi et al. [37] 2025 Brace compliance model in adolescents with idiopathic scoliosis: a Qualitative research Medical Journal of the Islamic Republic of Iran Iran	To bridge the gap in understanding the multifaceted process of brace compliance by exploring the barriers and motivators shaping adherence Qualitative–Grounded theory Face-to-face or via phone interviews Thematic analysis	Local clinics specializing in orthotic in Iran for the management of scoliosis At least 1 month of bracing	Convenience sampling 30 adolescents Female: 73% Ages: 10–16 years NR NR NR NR
Sykorova et al. [39] 2025 Exploring stakeholders' perceptions of using digital health Technologies to improve the conservative treatment of Adolescent idiopathic scoliosis: qualitative study Journal of medical internet research Norway	To explore how digital health technologies can be tailored to address AIS-specific challenges and improve conservative treatment in Norway Qualitative Focus group interviews Structured content analysis	Workshop organized by the Norwegian Spine and Back Pain Organization During brace treatment	Purposeful sampling 8 adolescents Female: 100% NR NR Duration of bracing: 3–5 years NR NR
Wang et al. [40] 2022 Exploration of contributory factors to an unpleasant bracing experience of adolescent idiopathic scoliosis patients a quantitative and qualitative research Children China	To explore the relationship between discomfort level and corrective force in different positions, such as standing, sitting, and lying down, as well as the relationship between discomfort level and treatment duration to understand if participants become accustomed to bracing as treatment length increases and whether perceived discomfort is related to psychological factors, such as mental health, self-image, and social anxiety Quantitative–Qualitative Three questionnaires and one interview Content analysis	The scoliosis clinic of Beijing Chaoyang Hospital During brace treatment	NR 14 adolescents Female: 76% Ages 10–17 years old Cobb angle average: 30.5° Mean duration of bracing: 7.7 months Cheneau brace or Boston brace NR

AIS, Adolescent Idiopathic Scoliosis; JBI, Joanna Briggs Institute; NR, Not Reported; SD, Standard Deviation;; TLSO, Thoracolumbosacral Orthosis.

Table 3
Joanna Briggs Institute critical appraisal checklist for qualitative research.

Article	1. Is there congruity between the stated philosophical perspective and the research methodology?	2. Is there congruity between the research methodology and the research question or objectives?	3. Is there congruity between the research methodology and the methods used to collect data?	4. Is there congruity between the research methodology and the representation and analysis of data?	5. Is there congruity between the research methodology and the interpretation of results?	6. Is there a statement locating the researcher culturally or theoretically?	7. Is the influence of the researcher on the research, and vice versa, addressed?	8. Are participants, and their voices, adequately represented?	9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	10. Do the conclusions draw in the research report flow from the analysis, or interpretation, of the data?
Cheung et al.[32]	Y	Y	Y	Y	Y	N	Y	Y	Y	U
Donnelly et al.[38]	Y	Y	Y	Y	U	N	Y	U	U	N
Ghorbani et al.[36]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ghorbani et al.[35]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Law et al.[33]	Y	Y	Y	Y	Y	N	N	Y	N	Y
Li et al.[41]	Y	Y	Y	Y	Y	U	Y	Y	Y	U
Sapountzi-Krepia et al.[34]	Y	Y	Y	Y	Y	N	N	U	Y	Y
Sharifi et al.[37]	Y	Y	Y	Y	Y	N	U	U	Y	Y
Sykorova et al.[39]	Y	Y	Y	Y	Y	N	U	U	Y	Y

N, no; U, unclear; Y, yes.

help putting on the brace because they could not do it themselves, which made them feel useless and uncomfortable [33,41,35,40].

> *"When I was at home, I wanted to draw, it was difficult for me how to sit, how to stand up, how to do my work, or when I wanted to bend down and pick something up, I didn't know what to do"* [37]

> *"…because it's not convenient to put on and take off the brace at school without help, and it's ugly…"* [40]

Theme 2: "*Redefining self and belonging*"

After the initial stages of shock and denial, the loss of autonomy gained during adolescence, and the attempt to integrate the brace into their lives, they undergo a transformative experience. The emotional, physical, and social challenges they face in daily life affect their self-perception compared to others. Feeling unaccepted or different exposes teenagers to multidimensional pressures, triggering personal growth as they work to find their place in life and social contexts. Three descriptive themes emerged from the studies: "Experiencing emotional and physical challenges," "Navigating between seeing oneself as different and like others," and "Struggling with social acceptance."

Experiencing emotional and physical challenges. Adolescents experience a storm of emotions and physical difficulties. Negative feelings such as anger, frustration, and fear of treatment predominated in almost all studies [32,33,41,35,37–39,34,40]. Some felt nervous and stressed, while others reported difficulty expressing negative emotions [41]. Other studies reported that teenagers felt ashamed or embarrassed to wear a brace outside the home or school [34,40].

Difficulty sleeping during the first few nights with the brace was one of the main problems reported by teenagers [35,37,34]. They frequently experienced numbness, breathlessness, and discomfort caused by the brace's pressure, along with the need to adjust to sleeping in a supine position [35,38,34]. Adolescents reported discomfort from bracing due to the inability to move freely or sit for long periods [32,33,36], which negatively affected their school performance because of back and neck pain during homework [36,37]. Additionally, studies have documented challenges with eating and participating in recreational activities such as dancing, playing instruments, and playing with peers [35,37], as well as limitations on upper trunk movement [32]. Some adolescents reported being unable to participate in sports [36,37], while others removed their braces and played sports without restriction [36], performing exercises that can help prevent the progression of spine curvature [41,39].

> *"I don't express [negative emotions], I still suppressed them, they are only in my heart"* [41]

> *"I initially felt that it was too tight. Standing up straight and walking was quite uncomfortable. However, it gradually improved over time".* [35]

Navigating between seeing oneself as different and like others. All studies examined how adolescents coped with their new life wearing a brace and reported various feelings and emotions [32,33,41,35–39,34,40]. Adolescents commonly perceived themselves as living in a new body after they began wearing the brace, experiencing feelings such as fear of looking at themselves in the mirror [37,34] or feeling bad about their body shape because they cared about their appearance [40]. Some adolescents had negative perceptions of braces [33]; they felt different from others and described themselves as robots [41,36]. They also felt they were treated differently by family and others, as if they were 'patients' [41,38,39]. Some adolescents began to conceal their braces at school or with relatives by wearing dark colors and loose-fitting clothes [32,35,40], even if they disliked such clothing [32,37].

In contrast, some teenagers had a positive experience with braces; they did not hide themselves or feel different, as many of their schoolmates also had scoliosis, which made them feel like others, accepted [33], and inspired [39].

Table 4
Mixed methods appraisal tool checklist.

	1. Are there clear research questions?	2. Do the collected data allow to address the research questions?	3. Is there an adequate rationale for using a mixed methods design to address the research question?	4. Are the different components of the study effectively integrated to answer the research question?	5. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	6. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	7. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Wang et al. [40]	Y	Y	Y	Y	Y	Y	CT

CT, Can't Tell; N, no; Y, yes.

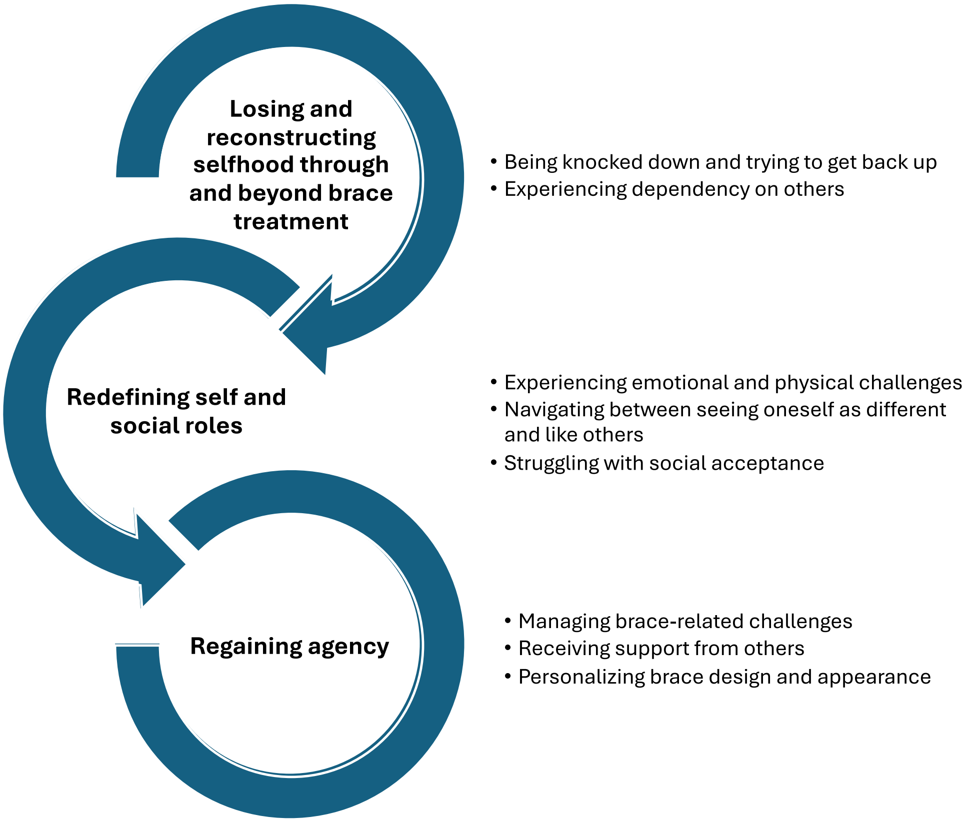


Fig. 2. Living with a brace: a meta-synthesis of adolescents' experience with idiopathic scoliosis treatment. Analytical and descriptive themes representation.

> *"Others can carry out activities normally. . .But there are some restrictions for me that makes me feel different"* [41]

> *"I didn't feel that I was inferior to other people when I wore the brace to school. There are some girls who are similar to me, I feel like we are the same"* [33]

Struggling with social acceptance. Adolescents faced social difficulties that led them to try to keep a low profile [41,35], and avoid attracting attention [35,38], driven by concerns about public perception and anxiety over the visibility of their braces, which represent a noticeable change to their body image [32,41,36,34]. The fear of judgment was especially pronounced in school, where adolescents reported worrying about classmates' opinions [41,36]. Adolescents were mocked by friends or classmates [41,36,38], and some experienced social isolation, avoiding new friendships and reducing outings with old friends, instead forming new connections with online gamers [41].

Adolescents often felt a lack of understanding from family and teachers [36,34], and mainly found comfort in their parents [34]. However, Ghorbani et al. reported that adolescents may also face difficulties within the family [35], with fathers struggling to accept the condition and resisting brace treatment, while teenagers themselves (and their mothers) accepted it. Over time, adolescents reported adapting to changed circumstances and began responding to people's questions [35,36]. When teenagers perceived that friends behave appropriately, their fear subsided [36], and they felt accepted, which ultimately led to better management of brace treatment [33,41,35].

> *"First months, it was really important for me that no one would see my brace; most people would ask me about the brace, and I didn't know what should say"* [36]

> *"My father didn't like the idea of the brace. He told me to sit up straight without it. However, I struggled to maintain proper posture and felt frustrated. Eventually, my mom bought me a brace, which helped me to sit up normally"* [35]

Theme 3: "*Regaining agency*"

Several strategies were employed, or participants expressed a desire to use them, to increase adherence to brace treatment, reflecting adolescents' pursuit of agency. Through these strategies, they transformed or sought to transform a challenging multidimensional experience into an opportunity for personal growth. Three descriptive themes emerged from the studies: "Managing brace-related challenges," “Receiving support from others,” and “Personalizing brace design and appearance.”

Managing brace-related challenges. Adherence was challenging because of physical discomfort [38], social pressures, and the desire to maintain normality in daily life [33,41,40]. Adolescents did not want to wear braces in certain situations, such as on weekends or during online classes [36,38]. Difficulties with adherence were also reported during the summer because of feeling hot and uncomfortable [32,33,36]. Teenagers experienced intense frustration and annoyance when the brace wore out after a period of use, often requiring them to return to the specialist center for repairs or replacements [32]. Nearly all studies reported that physical discomfort and pain affected adherence to brace treatment [32,33,41,35,37–40]. Pain was present from the beginning of treatment until adolescents learned to live with the brace [40].

> *“Over the weekend I usually don’t wear it because that’s like my time off, so my mom doesn’t really get on me about it . . . they know I’m going through a lot of pain”.* [38]

> *“I felt pain in the beginning of my treatment, and I still feel pain, but I can stand it now, while the concerns on the inconvenience and mal appearance do not change”* [40]

Receiving support from others. Studies reported that adolescents primarily received support from their families, friends, and classmates [41,36,34]. Close friends supported adolescents both educationally and emotionally. Adolescents reported that after learning about their condition, their peers expressed sympathy, felt upset, and offered hope of overcoming it [36]. They also received emotional support from teachers and school administrators [41,36]. Support from healthcare professionals was also highlighted [32,41,35,39,34]. Adolescents had the opportunity to talk with their doctor, physiotherapist, and orthotist about their physical problems, and these discussions helped them feel more comfortable [34]. However, some adolescents expressed a desire for psychological support to help manage the emotional impact of braces, as such support was not routinely available [32,41].

> *“My parents, and mostly my mother, were constantly by my side. . .”* [34]

> *“The doctor and the physiotherapist explained to me how to sleep wearing the brace, and that was all. . .”* [34]

Personalizing brace design and appearance. Adolescents had a negative first impression of their brace because its nude color was symbolically associated with a prosthesis or something artificial [32,33,37]. They reported that improving the appearance of the braces would reduce their emotional problems with them [33]. They also wished to be involved in the visual design of a personalized brace, which could reduce their psychological discomfort regarding its appearance [32,33,39]. The customization process, has been reported to strengthen active participation during treatment and enhance adolescents’ motivation to comply with treatment [32].

> *“The color makes me feel like I am a patient who needs to wear prosthetics”* [32]

> *“If I can be involved in the design process for the surface of the brace, it would increase my involvement with the brace. I know that I must wear it every day, so when I see positive and encouraging words, it would give me the energy to go through this tough journey”* [33]

Discussion

Studies characteristics and quality

Consistent with the Patient Reported Experience Measure [21], our findings provide a deeper understanding of adolescents’ experiences during brace treatment and may inform strategies to support their engagement when adherence is suboptimal [20].

Ten studies were retrieved, suggesting that although bracing has been recommended for decades [42], qualitative evidence is recent and limited to some countries. This highlights the need for further research on adolescents’ experiences across different countries, cultures, and healthcare systems to improve the transferability of qualitative findings. Studies engaged mainly female adolescents, reflecting the disease’s prevalence [2,7]. Moreover, participants’ Cobb angles and brace duration was in line with current bracing recommendations [2,7]. However, reporting of brace type and prescribed wearing time was inconsistent, even though recent evidence suggests that brace characteristics and prescribed wearing time are clinically relevant factors that may affect physical burden and psychosocial adaptation [43]. Additionally, several studies did not specify when interviews were conducted, limiting the interpretation of how experiences change over time and the potential impact of recall bias. Because coping strategies and adherence are time-dependent [7], future studies should specify the timing of data collection.

Most studies interviewed participants individually, using open-ended or semi-structured in-depth interviews, except for Donnelly et al. and Sykorova et al. who used focus groups [38,39]. Adolescents may respond differently in individual interviews than in focus groups, where group dynamics can influence disclosure and make it challenging to distinguish individual experiences from collective processes [44]. While this methodological variability reflects ongoing debate in qualitative research with adolescents, it also offers complementary perspectives on both personal and shared dimensions of brace treatment experiences.

Overall, studies demonstrated good methodological quality according to the JBI tool and MMAT [27,28]. Inadequacies were generally due to unclear reporting, underscoring the need for greater adherence to international reporting standards for qualitative research and mixed-method studies (eg, Consolidated criteria for reporting qualitative research - COREQ [45], Standards for Reporting Qualitative Research - SRQR [46], and Good Reporting of A Mixed Methods Study - GRAMMS checklist [47]). Furthermore, none of the studies employed repeated longitudinal interviews. As adaptation to bracing is time-dependent, future qualitative research should explicitly consider temporal trajectories and stage-specific experiences.

Thematic synthesis

Overall, the main findings of this meta-synthesis suggest a dynamic process in which adolescents with AIS gradually reconstruct their sense of self, identity, and autonomy within the constraints of brace treatment. Three main analytic themes emerged, capturing a developmental trajectory that begins with an initial shock related not only to the need to wear the brace but also to the loss of autonomy in decision-making and daily activities, effectively placing them at an earlier developmental stage than their peers. This reaction is followed by gradual adaptation, supported by families, peers, and healthcare professionals. Coping strategies focus on managing brace-related challenges, receiving support, and developing a willingness to participate in the brace construction process, thereby regaining a sense of agency.

Beyond these descriptive perspectives, which reflect an adaptation process [48], the themes reveal a dynamic transformation of self and daily life: adolescents first experience a disruption in their sense of self, then work to integrate the brace into their identity and social world, and ultimately develop personal and relational strategies to promote adherence. This evolving pathway underscores that adherence is not a fixed behavior, but a relational and developmental process shaped by internal emotions and external factors such as family, peers, and the broader social environment [49].

Specifically, our meta-synthesis reveals that adolescents experience psychological shock after diagnosis, physical discomfort when wearing the brace, and social stigma related to being “different”. These elements are consistent with findings from quantitative studies, indicating that body image, attitudes toward bracing, and family dynamics are important predictors of adherence [19,50,51]. Moreover, as reported by Bray et al. [52,53], understanding the disease is essential for successful outcomes. Providing appropriate educational interventions and tailored informational materials has been shown to positively influence brace adherence [54]. As a result, this may reduce the time lag in achieving curve improvement [2].

Furthermore, our meta-synthesis highlights that adolescents adopt a range of adaptive behaviors: the progression from initial shock to adaptation and adherence represents a developmental transition. This process aligns with Meleis' Transition Theory, which conceptualizes adaptation as a progression through phases of instability, awareness, engagement, and integration [55]. Thus, adherence can be understood as part of a developmental transition in which adolescents reconstruct their identity and negotiate a balance between dependence and autonomy.

This transition is supported by a network of relational resources—family, peers, and healthcare professionals—from whom adolescents primarily receive support rather than actively seek it. Although healthcare professionals were described as supportive, our synthesis did not include details about the frequency of follow-up care. This makes it difficult to understand how differences in clinical support may influence adolescents' adaptation and adherence over time [56].

The family's role is influenced by cultural context. Studies included were conducted in Asia, Europe, and North America. Although cultural context was not analyzed as a formal comparative dimension, some contextual variations may have influenced the findings. In collectivist cultures, such as those in China and Iran, adolescents more frequently described strong parental involvement in treatment decisions and a sense of responsibility toward family expectations [57−59]. In contrast, studies from Europe and North America tended to place greater emphasis on peer relationships, normalization within school environments, and individual coping strategies [57]. These differences suggest that autonomy, family authority, and peer dynamics may be negotiated differently depending on sociocultural context. Geographic and environmental factors, including socioeconomic conditions and regional differences, may also influence brace-wearing time [9] and, therefore, adherence.

Peers also play an important role in shaping the environment. Promoting a culture of body positivity and inclusivity may help shift societal perspectives and reduce stigma related to physical differences [60]. In clinical contexts, healthcare providers are another important source of support and should adopt a participatory approach that actively involves adolescents in treatment planning and care design to enhance their sense of agency and motivation [56]. Adolescents report greater understanding, respect, and acceptance when healthcare professionals identify and address the barriers they face [61].

In addition to relational support, practical adjustments to treatment may further facilitate adherence. Clinical studies suggest that tailoring orthotic design to adolescents' needs can improve comfort and increase adherence without compromising effectiveness, highlighting the importance of periodically reassessing brace design [43]. Regular psychosocial assessments and timely interventions are essential for addressing emotional distress and preventing social isolation, thereby supporting sustained engagement with treatment [62].

Overall, adolescents navigate the brace experience not only through individual motivation but also within the relational and social environments in which they live, where cultural meanings of appearance, school settings, and healthcare accessibility are crucial to promoting their agency in integrating the treatment into their lives and managing its multidimensional implications.

Limitations

This review has some limitations. First, we included only studies published in English or Italian to ensure accuracy in data analysis, given our team's language proficiency and the need to capture the nuances of participants' reported experiences [63]. As a result, studies published in other languages and in gray literature may have been missed, suggesting that future reviews should address this limitation to better reflect diverse experiences across different countries and cultural backgrounds.

Second, data extraction was challenging. Despite the research team's prolonged immersion in the process, specific aspects may have been missed. Moreover, as some team members had family or personal experience with AIS, reflexive discussions were conducted throughout the analytic process to examine and, where necessary, consider with care interpretations, particularly regarding the emotional burden and adaptation to brace treatment [30].

Third, we combined data reporting experiences of adolescents of different ages. Future research should consider participants' ages, which may influence psychological maturity and lived experience. Also, participants involved in the studies were mainly female, indicating an underrepresentation of male adolescents and suggesting that future studies should more explicitly explore gender perspectives. We also combined data from individual and focus group interviews, and although this approach may enrich the data [64], its methodological implications in studies involving adolescents should be clarified.

Fourth, findings were not validated by involving adolescents with AIS and confidence in the qualitative evidence was not formally assessed (eg, CERQual [65]). Therefore, clinical implications should be interpreted as practice-oriented rather than evidence-graded recommendations.

Clinical implications

Brace treatment for adolescents with AIS should be considered a phased rehabilitation process, aligned with adolescents' progression from early disruption to adaptation and longer-term agency, with clear responsibilities across stakeholders.

During the initiation phase (from diagnosis to early bracing), priorities include reducing uncertainty and psychological distress while preserving adolescent autonomy. Physical and rehabilitation medicine physicians and orthotists should provide pre-brace education that addresses expected early challenges (eg, discomfort and sleep disturbance), clarifies realistic goals, and elicits adolescents' concerns [66]. Early psychosocial screening can identify adolescents at risk of resistance, concealment behaviors, or family conflict [67]. Additionally, early follow-up, focused movement strategies, and practical day-to-day management are essential, as physical burden during early bracing strongly influences subsequent engagement and adherence to exercise [67].

In the adaptation phase, rehabilitation care should target barriers to sustained brace wear, particularly in school and peer environments. Brace fit and comfort should be continuously assessed while facilitating problem-solving regarding daily routines, physical activity, and school participation. The health care team, in collaboration with schools and families, should support practical accommodations with peer support contributing to normalization [67]. Public health strategies should also be designed to prevent stigma among peers.

In the maintenance phase, emphasis should shift toward supported self-management. This includes involving adolescents in brace personalization [68], reviewing shared goals to support ownership and reduce treatment fatigue, and providing targeted support when persistent distress, body-image concerns, or social withdrawal are identified.

Conclusions

This systematic review provides insights into the lived experiences during brace treatment for AIS, highlighting that it is a dynamic process involving developmental and relational transitions. Adolescents' experiences shift from initial disruption to gradual adaptation and self-regulation, as adolescents renegotiate autonomy and integrate the brace into daily life.

Support from parents, peers, teachers, and healthcare professionals is crucial for facilitating adherence, while participatory involvement in treatment planning enhances adolescents' sense of agency, helping them overcome resistance and burden. Cultural, environmental, and school contexts further influence this process, shaping both autonomy and social support. Our findings emphasize that supporting this complex transitional and developmental experience requires attention to individual behaviors as well as relational, cultural, and systemic factors, highlighting the need for holistic, adolescent-centered interventions that promote both identity reconstruction and social integration. Overall, the limited evidence to date—primarily focused on adherent adolescents—underscores the need for further research that includes both adherent and non-adherent adolescents to better understand their experiences and the role of emotional, family, and social environments during this transition.

Author contributions statement

Conceptualization: SS and AP. Data curation: GD, SC, GM, SD, CM, AG, VG, FZ, SS, and AP. Formal analysis: GD, SC, GM, SD, CM, and AP. Investigation: GD, SC, GM, SD, CM, and AP. Methodology: GD, SC, GM, SD, CM, AG, GR, and AP. Project administration: GD, SC, GM, SD, CM, AG, VG, FZ, SS and AP. Supervision: SC, GR, SS, and AP. Validation: SS and AP. Visualization: GD and AP. Writing – original draft: GD, SC, GM, SD, CM, AG, VG, FZ, GR, SS, and AP. Writing – review and editing: GD, SC, GM, SD, CM, AG, VG, FZ, GR, SS, and AP.

Appendixes

Appendix A. Enhancing transparency in reporting the synthesis of qualitative research: the ENTREQ statement.

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Declaration of competing interest

None.

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