

REVIEW ARTICLE

A systematic review of group-based psychosocial interventions for adolescents with Type 1 diabetes

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Abstract

Background: Adolescence is a challenging developmental period, marked by increased autonomy and reduced parental support. For adolescents with Type 1 diabetes (T1D), this often coincides with a sharp decline in glycaemic control and increased psychological burden. Group-based psychosocial interventions aim to improve coping skills, resilience and diabetes-related problem-solving, supporting adolescents as the transition towards independent self-management. We aimed to systematically review existing group psychosocial interventions for young people with T1D, and identify effective mechanisms of action.

Method: A systematic review of six databases yielded 5,259 records, of which 22 studies were eligible for inclusion. Narrative and tabular synthesis were used to describe the interventions, their underpinning theories, active mechanisms, delivery models, and reported outcomes.

Results: Six broad types of group-based psychosocial interventions were identified, cognitive behavioural/stress-management, guided self-determination for youth, psychoeducational, self-efficacy/social-cognitive, mindfulness/acceptance, and motivational/solution-focused approaches. Across studies, at least two of the nine core active techniques were consistently applied, including goal setting, problem-solving, cognitive behavioural strategies, communication training, relaxation, family teamwork, and diabetes education. Reported outcomes were heterogeneous: modest improvements were most commonly seen in psychosocial parameters (e.g. depression, diabetes distress, family functioning, self-efficacy), while effects on clinical and behavioural outcomes were mixed.

Conclusion: Group-based psychosocial interventions for adolescents with T1D show potential, particularly in improving psychosocial wellbeing, but evidence is limited by small sample sizes, variable quality, and inconsistent reporting. Standardisation of intervention components and outcome measures, alongside larger, high-quality trials, is needed to guide effective practice.

Keywords: *diabetes mellitus; Type 1; psychotherapy; cognitive behavioural therapy; coping skills; adolescent; young adult*

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To access the supplementary file, please visit the article landing page

During adolescence, individuals with Type 1 diabetes (T1D) must navigate significant physical, psychological and social change, while simultaneously assuming increasing responsibility for their diabetes management. Many adolescents experience difficulty sustaining consistent glucose monitoring, insulin adjustment and clinic attendance during this transition period, contributing to the well-documented deterioration in glycaemic control and higher frequency of

microvascular complications across adolescence and emerging adulthood.¹⁻³

Adolescence is also a critical period for identity formation and social development^{4,5} and the demands of managing T1D can bear a substantial psychosocial burden.^{6,7} The need for strict treatment adherence and constant self-monitoring often conflict with adolescents' desire for autonomy and to 'fit in' with peers, contributing to frustration and the adoption of maladaptive coping

strategies.^{8–10} Diabetes-specific distress during this stage is linked with disengagement from care and subsequent deterioration in glycaemic control.^{11,12} Moreover, concerns about body image and disordered eating behaviours, including deliberate insulin omission are prevalent in adolescents with Type 1, particularly in young females.¹³

Socially, many young people with diabetes experience feelings of isolation and stigma, and fear of judgement may cause concealment or neglect of diabetes management, particularly in social settings involving food or alcohol.^{14,15}

Overall, young people with T1D face a complex interplay of psychological and social changes. Collectively these challenges highlight the need for interventions that will equip young people with the psychological and social skills to manage diabetes effectively during this transition.

Group-based interventions offer a potential solution, providing opportunities for peer learning, social support, and shared problem-solving. This review aimed to synthesise existing evidence on group-based psychosocial interventions for young people with T1D, identifying their underpinning theories, active components, delivery, and effects.

Specifically, the review addressed the following questions:

- 1. What group-based psychosocial interventions have been provided for young people with T1D?
- 2. What underlying theoretical models have been used for these psychosocial interventions?
- 3. What are the active techniques employed in these interventions?
- 4. How have these interventions been delivered?
- 5. What are the effects of the interventions on clinical, behavioural and psychosocial outcomes?

Methods

We undertook a systematic review to identify studies of group-based psychosocial interventions for young people (aged 13–25 years) with T1D. The review was registered

on PROSPERO (CRD42023428656) and followed the Joanna Briggs Institute guidelines for systematic reviews.¹⁶

Search strategy

Six databases (Medline, Embase, CINAHL, PsychInfo, Global Health and PubMed) were systematically searched since inception up until September 2025 for relevant citations. Subject heading terms (index terms) and free-text terms related to T1D, adolescence, psychosocial interventions and group therapy were selected following an initial scoping search and combined using Boolean operators (as shown in Table 1). The search strategy was adjusted for each of the databases.

Inclusion criteria

Studies of adolescents and young adults (13–25 years) with T1D participating in group-based psychosocial interventions were included (Table 2). Any study design reporting clinical, behavioural, psychological, or social outcomes was eligible. When a study’s reported age range extended beyond 13–25 years, the mean participant age was used to determine eligibility; studies were included if the mean age fell within this range, even if some participants were outside these boundaries. Individual interventions, pharmacological interventions, or those without a psychosocial focus were excluded.

Study selection

Citations retrieved from the electronic search of the databases were imported into Covidence for removal of duplicates. Titles and abstracts were independently screened by a minimum of two of four reviewers (SW, RF, MG & JP) and excluded if it was clear that they did not meet the inclusion criteria. Any disagreements were resolved by a review and discussion between all reviewers. The full texts of potentially eligible records were then assessed. Final inclusion of studies in the review was discussed with two further authors (AF, DK). The full texts of all the identified studies were then reviewed and those that met the inclusion criteria were subject to data extraction.

Table 1. A summary of search terms

Search Term Type	Population 1	Population 2	Intervention
Index terms	Adolescent	Type 1 diabetes mellitus	N/A
Free text terms	Youth	Juvenile-onset diabetes mellitus	Psychoeducation
	Teen	Early-onset diabetes	Psychotherapy
	Teenager	Insulin dependent diabetes mellitus sudden-onset diabetes	Cognitive behavioural therapy
	Young adult		CBT
	Young people		Motivational interviewing
	Emerging adult		Coping skills
			Self-management

CBT: Cognitive Behavioural Therapy.

Table 2. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
1. Participants had a diagnosis of Type 1 diabetes	1. All participants were < 13 years old or > 25 years old
2. Participants were adolescents or young adults, in the age range of 13–25 years old	2. Participants were diagnosed with other chronic illnesses in addition to Type 1 diabetes
3. Incorporation of some explicitly described psychosocial component as part of the intervention	3. Intervention was administered to patients individually
4. Intervention was administered in a group format either to multiple patients, or multiple families	4. Interventions was delivered solely to parents in the absence of the diabetic adolescent
5. Published in English language	5. Diabetes self-management and educational interventions with no explicit psychosocial component

Table 3. A summary of intervention frameworks

Framework	Studies
Cognitive behavioural therapy and derivatives	Basch, 2024 ¹⁷ ; Hood, 2018 ¹⁸ ; Serlachius, 2016 ¹⁹ ; Rosello, 2006 ²⁰ ; Hains, 2000 ²¹ ; Bakhach, 2019 ²² ; Esfahani, 2021 ²³
Social-cognitive / Self-efficacy / Health-belief models	Guo, 2020 ²⁴ ; Edraki, 2018 ²⁵ ; Weigensberg, 2018 ²⁶
Psychoeducational / Empowerment-focused	Christie, 2016 ²⁷ ; Kichler, 2014 ²⁸ ; Price, 2016 ²⁹ ; Garcia-Perez, 2010 ³⁰ ; Greco, 2001 ³¹
Mindfulness / Acceptance / Self-compassion	Boggiss, 2020 ³² ; Ellis, 2018 ³³ ; Kortegaard, 2024 ³⁴
Guided self-determination for youth (GSD-Y)	Brorsson, 2019 ³⁵
Motivational / Solution-focused	Viner, 2003 ³⁶ ; Knight, 2003 ³⁷ ; Evcimen, 2021 ³⁸

Data extraction

The following data were extracted from each study, where reported: study design, participant characteristics, intervention content and key components, delivery method, theoretical framework, and outcomes.

Quality assessment

Study quality was evaluated using the Joanna Briggs Institute Critical Appraisal Checklist for Randomised Controlled Trials (JBI-RCT) and the Joanna Briggs Institute Critical Appraisal Checklist for Quasi-Experimental (JBI-QE) Trials for randomised controlled trials (RCTs) and non-RCTs, respectively. These checklists measure the risk of bias across several domains including randomisation, allocation concealment, blinding and attrition. For RCTs, studies reporting 10 or more items on the checklist were considered to be of 'high' quality, 7–9 items of 'moderate' quality and less than 7 of 'low' quality. Non-RCTs have inherent risk of bias, therefore only 'moderate' (7–9 items reported) and 'low' quality (<7 items reported) assessments were made for these studies. Completed checklists can be found in the supplementary materials. Quality was not used as a determinant for inclusion as the aim was to identify intervention contents and mechanisms of action rather than their effectiveness.

Data synthesis

Due to the heterogeneity of interventions and outcome measures, a narrative synthesis was undertaken. The extracted data for each study were incorporated

into tables detailing the key features of the included studies, including the study design, participants, intervention type, components, underpinning theory, active techniques and study outcomes. The findings were then integrated into a narrative synthesis to summarise the types and characteristics of the identified interventions and their reported impact on clinical, behavioural, psychological and social outcomes. Outcomes were grouped as clinical (e.g. Glycated Haemoglobin (HbA1c), Body Mass Index (BMI), hypoglycaemia), behavioural (e.g. self-management, adherence) and psychological (distress, mood, coping).

Results

A total of 5,259 records were identified from the electronic database search, with one additional record identified by manually searching reference lists and citations. After duplicate removal, the titles and abstracts of 4,818 articles were screened, leading to 245 full text articles being assessed for eligibility. Ultimately, 22 studies met the inclusion criteria for the review. Figure 1 details the Preferred Response Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram.

General characteristics of included studies

A total of 22 included studies collectively provided data from over 2,000 young people with T1D, with individual sample sizes ranging from 11 to 394 participants. Study designs included RCTs ($n = 11$), pre-/post-test designs ($n = 8$) pilot or feasibility RCTs ($n = 3$). Participants' ages

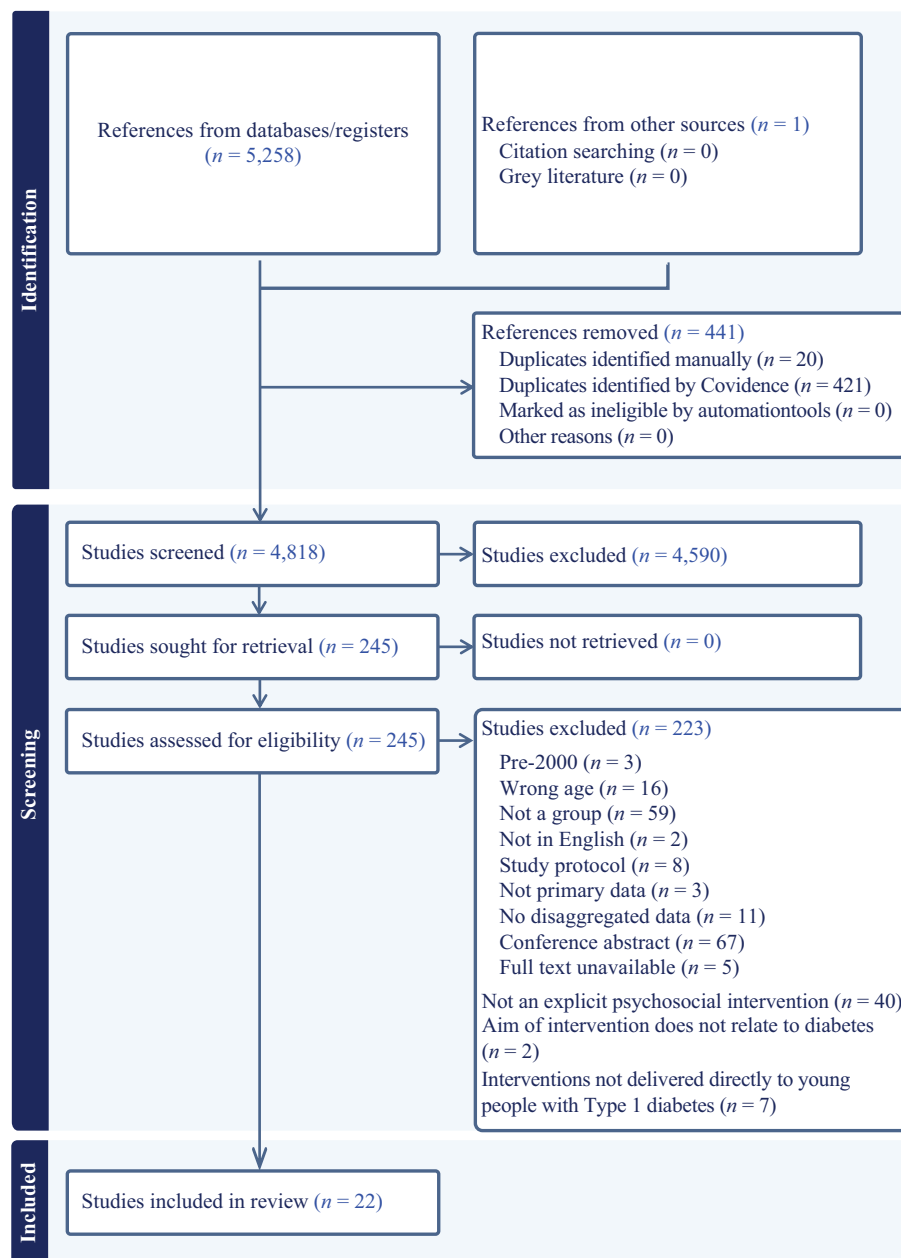


Fig. 1. PRISMA flow diagram.

ranged from 10 to 25 years, with mean diabetes duration typically between 4 and 8 years. Reported follow-up periods varied from 1 to 24 months. Most interventions recruited general adolescent or young-adult T1D populations, though several targeted specific subgroups such as those with elevated diabetes distress, depressive symptoms, disordered eating, or suboptimal glycaemic control. A summary of study characteristics is presented in the Appendix (Table 4).

Quality assessment

Overall, study quality was mixed. Six studies were graded to be of high quality, twelve studies were graded

as moderate quality and four as low quality. Common limitations included small sample sizes, baseline imbalances, and high attrition. For non-randomised and pre-post designs, risk of bias was generally moderate to high, particularly due to lack of control groups and reliance on self-reported outcomes. Completed quality appraisal checklists are summarised in the Appendix (Table 5).

Consistent with the aims of this review (to identify intervention content, theoretical frameworks, and active techniques rather than determine comparative efficacy) quality ratings were used to inform interpretation but not as exclusion criteria.

Intervention theory

The included interventions were underpinned by six main theoretical frameworks (summarised in Table 3). The most frequently applied was Cognitive Behavioural Therapy (CBT) and its derivatives ($n = 7$), typically incorporating coping-skills training, stress-management, or resilience-building techniques. These programmes, usually delivered by psychologists or trained facilitators, targeted diabetes-related distress and maladaptive coping.

Interventions grounded in Self-Efficacy Theory, Social Cognitive Theory, or the Health Belief Model ($n = 3$) focused on behavioural confidence, modelling, and perceived control over diabetes self-care. Grounded in Bandura's Social Cognitive Theory or related health-belief frameworks, they aimed to strengthen self-efficacy rather than to restructure cognition.

Psychoeducational and empowerment-focused programmes ($n = 5$) were also common, providing structured diabetes education, peer discussion, and practical skill development to enhance knowledge, normalise experiences, and promote collaborative learning.

A further three studies incorporated mindfulness-based, acceptance, or self-compassion approaches, reflecting 'third-wave' CBT models that cultivate emotional acceptance, cognitive flexibility, and stress tolerance.^{32,33,34}

Guided Self-Determination for Youth (GSD-Y) ($n = 1$) offered a distinct empowerment-based approach, encouraging reflective conversations, shared decision-making, and joint goal-setting between adolescents and parents.

Finally, motivational and solution-focused interventions ($n = 3$) sought to enhance intrinsic motivation, commitment, and self-directed problem-solving through collaborative, future-oriented dialogue.

Together, these approaches span a spectrum from emotion-focused interventions (CBT, mindfulness, Acceptance and Commitment Therapy (ACT)) to behaviour-focused frameworks (social-cognitive programmes, psychoeducation, GSD-Y). This range reflects the multifaceted nature of psychosocial support needed for adolescents managing T1D.

Active techniques

Across the 22 included studies, several core therapeutic ingredients recurred, despite variation in underlying theoretical framework or delivery format. The most prevalent were problem-solving ($n = 16$), coping-skills training ($n = 14$), stress-management techniques ($n = 12$), and goal-setting ($n = 9$). These methods directly target the behavioural and emotional challenges of adolescence, supporting adaptive disease management. Problem-solving and goal-setting components, in particular, aim to help adolescents analyse barriers, generate practical strategies, and develop agency in daily diabetes care.

Communication-skills training ($n = 10$) and social-support facilitation ($n = 11$) were also common,

highlighting the role of peer and family relationships in sustaining engagement. Many interventions encouraged open discussion of diabetes-related stressors and collaborative problem solving within the group setting.

Stress-management and cognitive behavioural strategies ($n = 8$), such as relaxation, guided imagery, and reframing were often combined to build resilience. Decision-making skills ($n = 7$) appeared less often but appeared effective in interventions focused on autonomy. A small number incorporated role-play or simulation ($n = 4$) to practise communication or coping behaviours in realistic scenarios.

Overall, despite varied structures, most programmes blended at least two core elements: typically problem-solving, CBT-based techniques, and goal-setting. When paired with opportunities for communication practice, social support, and experiential learning, these components appear to strengthen self-efficacy and engagement, even when metabolic outcomes remain unchanged.

Intervention delivery and format

Most interventions were delivered face-to-face in hospital or outpatient clinic settings, typically in small groups of 6–10 participants. Very few studies adopted hybrid or fully virtual formats to enhance accessibility and engagement.³⁹ The number of sessions ranged from 4 to 12, with individual sessions lasting between 60 and 120 min (overall range = 30–150 min). Two interventions were implemented as summer-camp programmes.^{24,30} This involved the combination of structured psychoeducational workshops with recreational and peer-support activities.

Delivery personnel most commonly included psychologists, diabetes specialist nurses, and trained educators. Facilitator training was reported in just over half of the studies and typically involved short workshops, orientation sessions, or manualised protocols. Fidelity monitoring, through session checklists, audio-recording, or supervision, was increasingly used in more recent trials but remained inconsistently reported overall. Full details of intervention delivery can be found in Appendix (Table 7).

Outcomes

Clinical outcomes

The most commonly assessed clinical outcome assessed was glycaemic control (HbA1c). Fifteen studies reported HbA1c as a primary or secondary endpoint. Statistically significant improvements were observed in three studies,^{21,35,36} all of which used motivational, stress-management, or coping-focused behavioural approaches. Several others^{17,20,32} reported modest non-significant improvements, while García-Pérez et al.³⁰ found a small but

significant short-term increase in HbA1c post-intervention, likely reflecting post-camp regression effects.

Most remaining studies showed no statistically significant change in HbA1c, but rather maintenance of glycaemic control, which represents a clinically meaningful outcome given the typical deterioration observed during adolescence. A minority of studies assessed hypoglycaemic episodes and BMI, with no significant between-group differences detected.²⁹

Behavioural outcomes

Behavioural outcomes assessed across the studies included self-management behaviours, self-efficacy, problem-solving, family communication and collaboration, adherence to treatment, frequency of blood-glucose monitoring (BGM), and healthcare utilisation.

Self-efficacy was assessed in nine studies, with significant improvements reported in six.^{20,22,23,25,36,38} These interventions commonly integrated elements of goal-setting, problem-solving, or motivational enhancement, reinforcing participants' sense of competence and control over diabetes management. Improvements in coping and problem-solving behaviours were similarly observed by Hains et al.⁴⁰ and Brorsson et al.³⁵

However, some studies reported no significant changes in communication⁴¹ or self-management behaviours,^{18,34} underscoring the variability in how behavioural outcomes are defined and measured. Importantly, no study reported deterioration in self-management behaviours following participation.

This evidence suggests that interventions integrating motivational, problem-solving, and empowerment-based components are most effective in promoting sustained positive diabetes-related behaviours, particularly among adolescents with lower baseline adherence or self-efficacy.

Psychological outcomes

Psychological outcomes were the most frequently evaluated across the included studies and encompassed a broad range of domains, including quality of life/life satisfaction, anxiety, depression, psychosocial well-being, diabetes distress, stress, resilience, coping, self-efficacy, self-perception, self-compassion, adaptation/adjustment to diabetes, hopelessness, fear of hypoglycaemia, and family conflict/responsibility.

Interventions emphasising coping, problem-solving, and cognitive behavioural techniques^{17,18,34} demonstrated reductions in depressive symptoms, diabetes distress, and perceived stress.

Findings for quality of life were mixed, with modest improvements in some empowerment- and telemedicine-based interventions but no significant group differences in most RCTs. Family conflict decreased in several

family-focused interventions^{18,35} though results were not consistently significant.

Overall, the evidence suggests that interventions incorporating stress management, emotional regulation, and resilience training are most effective in improving psychological well-being and reducing diabetes-related distress, while traditional psychoeducation alone yields limited psychological benefit.

Discussion

This review synthesises evidence from 22 studies evaluating group-based psychosocial interventions for adolescents and young adults with T1D. Despite heterogeneity in design, setting, and reporting, several key findings emerged.

Comparison with previous research

The predominance of CBT and CBT-derived approaches echoes earlier reviews in paediatric diabetes and other chronic illness.^{42–44} In this review, CBT-based programmes most consistently improved self-efficacy, coping, and diabetes-related distress, mirroring findings from meta-analyses in conditions such as inflammatory bowel disease⁴⁵ and cystic fibrosis.⁴⁰ These parallels underline CBT's adaptability in addressing illness-related stress and treatment fatigue, major barriers to self-management in adolescence.

Psychoeducational and empowerment-based programmes also appeared frequently. Their impact on diabetes knowledge, problem-solving, and engagement was generally positive but variable, reinforcing wider evidence that educational interventions work best when paired with cognitive behavioural or motivational elements.⁴⁶

Mindfulness- and acceptance-based interventions, though fewer in number, showed promising effects on stress, emotional regulation, and quality of life, aligning with emerging evidence from other paediatric chronic illnesses evaluating third-wave CBT approaches.^{47,48}

Interventions rooted in self-efficacy or social-cognitive models produced modest gains in confidence and day-to-day diabetes management.

Motivational Interviewing was rarely used in group settings. Consistent with previous reviews, MI appears more effective one-to-one, where individualised reflection and goal setting can occur.^{49,50}

Taken together, these findings reinforce earlier work by highlighting the dominance of CBT and psychoeducational approaches, the emergence of mindfulness-, acceptance-, and self-efficacy-based frameworks, and the ongoing challenge of translating psychosocial gains into consistent metabolic improvement.

Active techniques

Although the interventions differed in framework and mode of delivery, several therapeutic elements recurred

across studies. The most common were problem-solving, goal-setting, coping-skills training, and cognitive behavioural techniques. These align well with developmental needs in adolescence, supporting autonomy, self-regulation and goal setting and thus may strengthen the behavioural pathways that underpin effective self-management.

Delivery

Most interventions were delivered face-to-face in hospital or outpatient settings, typically in small groups facilitated by psychologists, diabetes nurses, or trained educators.

The COVID-19 pandemic has accelerated the use of telehealth across paediatric chronic illness management, and evidence from other populations suggests that hybrid delivery models can enhance accessibility, cost-effectiveness, and sustainability while maintaining psychosocial benefits.⁵¹ Despite these advantages, very few studies adopted hybrid or fully virtual formats.³⁹ This suggests limited shift towards digital integration within paediatric diabetes care. Future studies should explore blended models that combine the accessibility of online delivery with the interpersonal benefits of face-to-face group work.

Outcomes

Psychological outcomes showed the clearest and most consistent improvements, particularly self-efficacy, coping, and distress. Clinical outcomes such as HbA1c improved in only a few studies, though the overall stability of glycaemic control is notable given the typical deterioration seen during adolescence.

Strengths and limitations

Consistent with previous reviews, this analysis highlights several methodological limitations, including small sample sizes, short follow-up durations, high attrition rates, and heterogeneous outcome measures. Consequently, conclusions regarding treatment efficacy should be interpreted with caution.

Although the review adopted an age range of 13–25 years to capture the transition from adolescence to young adulthood, implementing strict age-related inclusion criteria was challenging due to variability in how studies defined developmental stages. There are currently no internationally standardised age boundaries for adolescence and emerging adulthood, and differences across studies likely reflect cultural variation in perceptions of maturity and independence. This contextual diversity should be considered when interpreting the findings.

Finally, few studies recruited ethnically diverse or socioeconomically disadvantaged participants, despite

evidence that these groups experience poorer glycaemic outcomes and higher disengagement from care.^{52,53}

Implications of findings

The evidence reviewed highlights the continued relevance of structured, theoretically grounded psychosocial interventions for adolescents and young adults with T1D. Cognitive behavioural therapies remain the most empirically supported, demonstrating consistent benefits for emotional wellbeing and coping, and family communication. Acceptance, mindfulness, and resilience-based models are emerging as credible complementary frameworks.

While few programmes directly improved HbA1c, the general stability of glycaemic control suggests these interventions may help to prevent decline during a high-risk life stage. This highlights the need to view psychological wellbeing and motivation as central to diabetes care rather than adjuncts to medical management. Future work should prioritise embedding psychosocial care into routine pathways, tailoring programmes to diverse populations, and evaluating hybrid delivery models.

Conclusion

Group-based psychosocial interventions, particularly those informed by CBT, demonstrate consistent psychological and social benefits and may support glycaemic stability in adolescents with T1D. Evidence remains limited by methodological weaknesses and heterogeneous outcomes. Future research should employ sound theoretical models, detailed intervention reporting, and standardised outcome sets. High-quality trials are needed to establish long-term effectiveness and inform integration into standard care pathways.

Authors' Contributions

Conceptualisation: AF, DK, SW

Data curation: SW, RF, JP, MG, MBL

Methodology, formal analysis, and validation: SW, AF, RF, JP, MBL, DK, MG

Project administration: SW, AF, JP

Funding Acquisition: None

Writing – original draft: SW, AF, JP

Writing – review and editing: SW, AF, JP

Conflicts of interest and funding

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Appendix A

Table 4. General Characteristics of Included studies

First Author, Year, country	Objective	Study Design	Sample Characteristics	Outcomes	
				Measure	Statistical significance
Randomised controlled trials					
Basch et al., (2021)	To evaluate a CBT-based stress-management group intervention	Design: RCT Sample size: 80 (40 per arm) Follow-up: 3 & 6 m Inclusion criteria: a) 13–18 years b) T1D > 1 year c) HbA1c > 7 %	IG: n = 20 Age 14.9 ± 1.8 yrs DD 7.9 ± 4.1 yrs HbA1c 7.7% ± 1.1% CG: n = 22 Age 14.7 ± 1.9 yrs DD 6.8 ± 3.8 yrs HbA1c 8.7% ± 2.4%	Clinical HbA1c(3m) Psychological Depression Diabetes Distress Coping Skills Anxiety Disordered Eating	+ + + + + +
Brorsson et al., (2019)	To evaluate a group-based intervention for adolescents and their parents.	Design: RCT Sample size: 71 Follow-up: 6 & 12m Inclusion criteria: a) 12–18 years b) HbA1c >56 mmol/mol	IG n=37 (20 F) Age: 14.8 (14.2–15.5) DD: 4.5 (3.3–5.7) HbA1c = 8.4% (8.0, 8.7) CG n = 34 (21 F) Age: 15.1 (14.5–15.6) DD: 5.6 (4.0–7.2) HbA1c = 9.8% (8.6, 9.4)	Clinical HbA1c (12m) Psychological Family conflict Quality of life Self-efficacy Self-perceived health	++ 0 0 0 0
Christie et al., (2014)	To evaluate a structured, multi-centre psycho-educational programme (CASCADE) for young people and their families	Design: RCT Sample size: 308 Follow-up: 12 & 24 m Inclusion Criteria: a) 8–16 years b) T1D >= 12 months c) Mean 12-month HbA1c >= 8.5mmol/l d) Under the care of a paediatric and/or adolescent diabetes clinic conducted by a specialist	IG n = 159 (91 F) Age: 13.1 (±2.1) DD: 5.7 (±3.2) HbA1c: 9.9% (1.5) Ethnicity: White British n = 133 (83.7%) Asian/Asian British n = 5 (3.1%) Black/Black British n = 5 (3.1%) CG n = 168 (90 F) Age: 13.2 (±2.1) DD: 6.1 (±3.3) HbA1c: 10.0% (1.5) Ethnicity: White British n = 129 (76.8%) Asian/Asian British n = 14 (8.3%) Black/Black British n = 6 (3.6%)	Clinical HbA1c (12m) HbA1c (24m) Psychological Quality of life Family responsibility Strengths and difficulties	0 0 0 ++ 0
Edraki et al., (2018)	To evaluate the effect of coping skills training on depression, anxiety, stress, and self-efficacy of adolescents with type I diabetes.	Design: RCT Sample size: 100 Follow-up: 1m Inclusion Criteria: a) 12–18 years	IG n = 50 (52% F) Age: 14.36 (±1.71) DD: 5.30 (±3.44) CG n = 50 (50% F) Age: 14.06 (±1.99) DD: 5.77 (±3.51)	Psychological Anxiety Depression Self-efficacy Stress	++ ++ ++ ++

Table 4. (Continued)

First Author, Year, country	Objective	Study Design	Sample Characteristics	Outcomes	
				Measure	Statistical significance
Esfahani et al., (2021)	To determine the effect of group hope therapy on the self-efficacy of adolescents with type 1 diabetes	Design: RCT Sample Size: 46 Follow-up: 2 months Inclusion Criteria: a) 13–19 years	Total sample n = 46 (F NR) Age: 16.36 (± 0.45) DD: 6.38 (0.86)	Psychological Child self-efficacy Diabetes self-efficacy	 ++ ++
Guo et al., (2020)	To determine the efficacy of a coping skills training program for Chinese youth with type 1 diabetes	Design: RCT Sample size: 102 Follow-up: 6 and 12m Inclusion Criteria: a) 8–20 years	IG n = 28 (56% F) HbA1c < 7.5% = 23 (46%), > 7.5% = 27 (54%), DD < 5y n = 29 (58%), > 5y n = 21 (42%) > 5y CG n = 32 (64%) HbA1c < 7.5% n = 20, > 7.5% n = 30 (60%) DD < 5y n = 37 (74%), DD > 5y n = 13 (26%)	Clinical HbA1c (12m) Behavioural Diabetes Problem-solving Diabetes Communication Diabetes Care activities Collaboration with parents Psychological Perceived Stress Negative Coping style Positive coping style Self-efficacy Quality of Life	 0 0 0 0 0 0 0 0 0 0 0 0 0
Hood et al., (2018)	To compare a distress and depression prevention program with a diabetes education program for adolescents with diabetes	Design: RCT Sample size: 264 Follow-up: 4, 8, 12, & 16m Inclusion Criteria: a) 14–18 years b) daily insulin dosing of ≥ 0.5 units/kg/day	Total sample n = 264 (158 F) Age = 15.7 (± 1.1) DD = 6.9 (± 4.0) HbA1c = 9.1% (± 1.9) Ethnicity White n = 173 (65.5%) African American n = 38 (14.4%) Hispanic n = 29 (11.0%) Asian or Pacific Islander n = 6 (2.3%) Native America n = 3 (1.1%) Other n = 15 (5.7%)	Clinical HbA1c (4m) Behavioural Diabetes Management Psychological Diabetes Distress Depression Resilience	 0 0 ++ 0 0
Kichler et al., (2013)	To determine the impact of the KIDS project intervention on improving psychosocial adjustment and diabetes management among adolescents with T1DM and their parents in an outpatient clinical mental health setting	Design: RCT with waitlist control Sample size: (n = 30) Follow up: post-treatment and 4 month post-treatment	Total sample N = 30 (16F) Age = 15.2 (± 1.3) DD = 5.6 (± 3.3), White (n = 23), Black (n = 6), mixed race (n = 1) HbA1c = 10.0% (± 2.1)	Clinical HbA1c (6m) Behavioural Healthcare Utilisation Psychological Paediatric Quality of Life	 0 0 ++

Table 4. (Continued)

First Author, Year, country	Objective	Study Design	Sample Characteristics	Outcomes	
				Measure	Statistical significance
Serlachius et al., (2016)	To evaluate a cognitive behaviour therapy-based programme to improve glycaemic control and psychosocial wellbeing in adolescents with type I diabetes	Design: RCT Sample size: (n = 147) Follow-up: 3 and 12 months Inclusion Criteria: a) 13–16 years	IG n = 73, (42 Female), Age = 14.4 (± 1.1), DD = 5.63 (± 3.3), HbA1c = 8.5% ($\pm 1.4\%$), MDI n = 50, CSII n = 23. CG n = 74 (37 Female) Age = 14.3 (± 1.1), DD = 6.1 (± 3.8), HbA1c = 8.6% (± 1.4), MDI n = 54, CSII n = 20.	Clinical HbA1c (3m) Psychological Psychosocial wellbeing	0 ++
Price et al., (2016)	To assess the effect of a 5-day structured education course on biomedical and psychological outcomes in young people with Type I Diabetes	Design: Cluster RCT Follow-up: 396 Inclusion Criteria: a) 11–16 years	IG N = 198 (53.8% F), Age = 13.71 (± 1.44), HbA1c = 9.3% (± 1.7) (78mmol/mol ± 19), White = 90.5% CG N = 194 (56.8% F), Age = 13.92 (± 1.63), HbA1c = 9.1% (1.6) (78mmol/mol ± 19),	Clinical HbA1c (24m) BMI Severe hypoglycaemia DKA Psychological Quality of Life Self-efficacy Fear of hypoglycaemia	0 0 0 0 ++ 0 0
Weigensberg et al., (2018)	To develop and pilot test an integrative group intervention based self-determination theory in young adults with T1D	Design: Non-randomised controlled pilot trial Sample size: 51 Follow-up: 6, 12 months Inclusion Criteria: NR	IG N = 9 (5 F) Age = 19.78 (± 1.09) HbA1c = 10.54% (± 2.51) Ethnicity: White = 1, Hispanic = 6 Non-Hispanic = 3 Black = 2 CG N = 28 Age = 19.54 (± 1.00) HbA1c = 9.15% (2.00) White = 4, Hispanic = 17 Non-Hispanic = 11, Black = 2	Clinical HbA1c (6m) Psychological Psychological Depression Perceived Stress Psychological Well-being Life Satisfaction	0 ++ ++ ++ 0

Table 4. (Continued)

First Author, Year, country	Objective	Study Design	Sample Characteristics	Outcomes	
				Measure	Statistical significance
Feasibility and pilot studies					
Boggiss et al., (2020)	To examine the feasibility and acceptability of a brief self-compassion intervention for adolescents with type 1 diabetes and disordered eating behaviour	Design: feasibility RCT Sample size: 19 Follow-up: 12 weeks after baseline Inclusion criteria: a) 12–16 years b) Disordered eating	IG n = 11 (7 F) Age: 14 (±1.2), DD: 8.7 (±3.7) HbA1c: 65mmol/mol (±12mmol/mol) DD: 8.7 (3.7) Ethnicity: European = 6 Samoan = 2 Maori = 1 Indian = 1 Other = 1 CG n = 8 (3 F) Age: 13.6 (±1.3) DD: 5.8 (4.0) HbA1c: NR Ethnicity: European n = 6 Indian n = 1 Other n = 1	Clinical HbA1c (post intervention) Behavioural Disordered eating Psychological Diabetes distress Self-care Self-compassion Stress	+ 0 - + + -
Ellis et al., (2019)	To evaluate the efficacy of mindfulness-based stress reduction on reducing stress and improving diabetes health outcomes in high-risk, urban young adults with poorly controlled diabetes	Design: pilot RCT Sample size: 48 Follow-up: after treatment and 3 months after treatment Inclusion criteria: c) 16–20 years	IG n = 16 (10 F) Age: 18.0 (±1.5) DD: 8.8 (5.2) HbA1c: 105mmol/mol ±18 CBT n = 16 (5 F) Age: 18.1 (±1.3) DD: 8.2 (4.0) HbA1c: 111 mmol/mol ±22 Diabetes Support Group CG n = 16 (9 F) Age: 18.5 (±1.6) DD: 7.3 (4.7) HbA1c: 115mmol/mol ±23	MBSR Group Clinical HbA1c (3m) Behavioural Frequency BGM DMS Adherence Psychological Perceived Stress Depression	+ 0 0 + 0
Viner et al., (2003)	To pilot a motivational and solution-focused therapy group intervention to improve glycaemic control in young people aged 11–17 years with poorly controlled Type 1 Diabetes (mean annual HbA1c >8.5%)	Design: Pilot non-randomized controlled trial Sample Size: 77 Follow-up: 4–6 months post-intervention Inclusion Criteria: a) 11–17 years HbA1c > 8.5%	IG N 21 (15 F) Mean Age = 13.0 (SD NR) DD = 6.2 years, CG N = 20 (8 F) Mean Age = 13.3 years (SD NR) DD = 15.7 years	Clinical HbA1c (4–6m) HbA1c (7–12m) BMI Behavioural Self-efficacy Psychological Distress	++ + 0 ++ 0

Table 4. (Continued)

First Author, Year, country	Objective	Study Design	Sample Characteristics	Outcomes	
				Measure	Statistical significance
Pre-post and qualitative studies					
Evcimen et al., (2021)	To investigate the effect of motivational interview based diabetes self-management educations DSME interviews on self-efficacy, healthy lifestyle behaviour development and A1c in adolescents with type I diabetes mellitus	Design: Pre-test/Post-test design Sample Size: 80 Follow-up: Feb 2017-July 2017 Inclusion Criteria: a) 11–18 years	N = 66 (37 F) Age = 14.75 (± 2.03), Diagnosed with diabetes in the last 4-6 years, n = 24	Clinical HbA1c (post intervention) Behavioural Healthy lifestyle behaviour Exercise Nutrition Psychological Self-efficacy Self-realization Health responsibility Stress Management Interpersonal Relationships	+ ++ ++ + ++ ++ ++ ++ +
Garcia-Perez et al., (2010)	To evaluate the effectiveness of a psychoeducational intervention implemented in a summer camp for children with type I diabetes	Design: Pre-test/Post-test design Sample Size (n = 57) Follow-up: 8 weeks and 20 weeks 3 months Inclusion Criteria: a) 11–18 year b) diagnosis of T1D	IG n = 34 (16 Female), Age = 13.79 (2.16), DD = 5.74 (3.39), HbA1c = 8.63% ($\pm 1.75\%$), 50% in lowest 3 socioeconomic classes CG n = 23 (7 F), Age = 13.61 (1.44), DD = 6.20 (4.10), HbA1c = 9.06% ($\pm 1.37\%$), 60% in lowest 3 socioeconomic classes.	Clinical HbA1c (3m) HbA1c (12m) BMI Behavioural Health Care Utilisation Psychological State Anxiety Trait Anxiety General Inability to Adapt	-- - - 0 0 0 ++
Greco et al., 2001	To implement a structured intervention for integrating peers into diabetes in a health and adaptive manner	Design: Pre-test/Post-test design Sample Size: 21 Follow-up: 4 week intervention Inclusion criteria: a) 10–18 years	N = 21 (10 F) Age = 13.1 (± 1.98) years DD = 8.43 months (4.62)	Psychological Peer-support Family Conflict Adjustment to Diabetes Self-perception Behavioural Adherence	++ ++ + ++ 0
Hains et al., 2000	To examine the effectiveness of a stress management training program in helping adolescents with diabetes cope with stress	Design: Pre-/Post-test design Control group consisted of wait-list for intervention Sample size: 14 Follow-up: Pre-test/post-test design Inclusion Criteria: a) 12–15 years b) HbA1c > 9.0% at clinic visit	IG N = 8 (no of females= 5) Mean Age = NR T1D duration = NR CG N = 7 (no of females = 3). Mean Age = NR T1D duration = NR	Clinical HbA1c (6m) Psychological Stress Symptoms Diabetes Self-care Psychological Distress Coping Strategies	++ ++ ++ ++ ++

Table 4. (Continued)

First Author, Year, country	Objective	Study Design	Sample Characteristics	Outcomes	
				Measure	Statistical significance
Rossello et al., 2006	To pilot a group CBT model which has been proven to be effective in treating depression in Puerto Rican adolescents, to treat depressive symptoms and improve glycaemic control in adolescents with diabetes	Design: Pilot pre-test/ Post-test design Sample size: (n = 11) Follow up: Not specified Inclusion Criteria: a) 13–17 years	N = 11 (9 female) Age = 14.1 (± 1.3) DD = 3.1 (± 2.8),	Clinical HbA1c (post intervention) Behavioural Self-care behaviours Psychological Depressive symptoms Self concept Diabetes self-efficacy Anxiety Hopelessness	0 0 ++ ++ ++ + +
Bakhach et al., (2019), USA	To assess the impact of a home telemedicine clinic model (CoYoTI Clinic) on psychosocial and behavioural outcomes designed for young adults with T1D	Design: Prospective cohort pilot study Sample size: 81 Follow-up: 12m (end of intervention) Inclusion criteria: a) 18–25 years	IG n = 42 (23 F) Age: 19.8 (± 1.7) DD: 8.2 (± 4.7) HbA1c: 8.7% ($\pm 1.7\%$) Ethnicity: African American n = 1; White n = 35; Other: n = 6 CG n = 39 (20 F) Age: 20.5 (± 1.9) DD: 11.7 (± 5.5) HbA1c: 8.7% ($\pm 1.8\%$) Ethnicity: African American: n = 2, White: n = 35, Other: n = 2	Psychological Depressive Symptoms Diabetes distress Self-efficacy Behavioural Self-Management Communication	0 ++ ++ 0 ++
Knight et al., 2003	To investigate the effect of a therapeutic group intervention for adolescents with poorly controlled diabetes	Design: Qualitative preliminary exploratory follow-up intervention study Sample size: 20 Follow up: Inclusion Criteria: a) 13–16 years	N = 20, no further information	Psychological (statistical significance NR) Anxiety Anger Depression Coping	- + + + +
Kortegaard et al., 2024 (Denmark)	To evaluate the effect of group ACT + CBT on reducing diabetes-related emotional distress	Design: Sample size: 45 Follow-up: 3 m Inclusion criteria: a) ≥ 18 years b) T1D > 1 year	IG: n = 21 (13F) Age = 21.7 $\pm$ 1.8 yrs DD 23.6 $\pm$ 2.4 yrs HbA1c 66.2mmol/mol $\pm$ 20.4mmol/mol CG: n = 24 (19F) Age 21.6 $\pm$ 1.8 yrs DD=10.6 $\pm$ 4.5 yrs HbA1c 67.0 mmol/mol $\pm$ 23.0 mmol/mol	Clinical HbA1c (3–6m) HbA1c (9–12m) Psychological Distress (1wk) Distress (6m) Well-being (1wk) Well-being (6m)	+ (NS) ++ ++ + + +

KEY: DD=Diabetes Distress, DS=Depressive Symptoms, DM=diabetes management, R=Resilience characteristics: Mastery and relatedness, Automatic thoughts, Coping efficacy, Diabetes resilience, Social problem solving

Age is reported as mean $\pm$ SD, median (IQR), or range, depending on availability.

Table 5. Quality Appraisal of Included Studies using JBI tool

Study	RCTs													Quality
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	
Serlachius, 2016	Y	U	Y	N	N	U	Y	Y	Y	Y	Y	Y	Y	Moderate
Brorsson, 2019	Y	Y	Y	N	N	U	Y	Y	Y	Y	Y	Y	Y	High
Christie, 2014	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	High
Edraki, 2018	Y	U	Y	N	N	Y	Y	Y	U	Y	Y	Y	Y	Moderate
Esfahani, 2021	Y	U	Y	N	N	U	Y	Y	U	Y	Y	Y	Y	Moderate
Guo, 2020	Y	Y	Y	N	N	Y	Y	Y	U	Y	Y	Y	Y	High
Hood, 2018	Y	Y	Y	N	N	U	Y	Y	Y	Y	Y	Y	Y	High
Kichler, 2013	Y	U	Y	N	N	U	Y	Y	Y	Y	Y	Y	Y	Moderate
Price, 2016	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	High
Weigensberg, 2018	U	N	Y	N	N	U	Y	Y	N	Y	Y	Y	U	Low
Basch, 2024	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	High
Non-RCTs														
Boggis, 2020	Y	Y	Y	Y	Y	Y	U	Y	U					Moderate
Ellis, 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y					Moderate
Viner, 2003	Y	Y	Y	Y	Y	U	Y	Y	Y					Moderate
Evcimen, 2021	Y	N	Y	N	Y	U	Y	Y	Y					Low
Garcia-Perez, 2010	Y	U	Y	Y	Y	U	Y	Y	Y					Moderate
Greco, 2001	Y	N	Y	N	Y	Y	Y	Y	Y					Moderate
Hains, 2000	Y	U	Y	Y	Y	Y	Y	Y	Y					Moderate
Rosello, 2006	Y	N	Y	N	Y	Y	Y	Y	Y					Moderate
Bakhach, 2019	Y	U	Y	Y	Y	U	Y	Y	Y					Moderate
Knight, 2003	Y	U	Y	Y	U	Y	U	Y	Y					Low
Kortegaard, 2024	Y	N	Y	N	U	Y	Y	Y	Y					Low

Table 6. Summary of Evidence

Author, Year, Country	Objective	Intervention/ Underlying Theory	Active Ingredients or Mechanism of Action	Major Findings
RCTs				
Basch et al., 2021, USA	To evaluate a CBT-based stress management intervention	Theory explicitly reported: Cognitive-Behavioural Theory and Social Learning Theory	Explicitly Identified: - CBT approaches - Stress Management - Relaxation - Coping - Goal-setting	There was no statistically significant difference between the mindfulness-based intervention (MBI: BREATHE-TID) and the health-education control (HE-TID) in any psychosocial or metabolic outcomes at 3 months. Non-significant trend towards greater reduction in depressive symptoms ($p = 0.056$) and HbA1c ($p = 0.061$) in the intervention group.
Brorsson et al. (2019), Sweden	To evaluate a group-based intervention for adolescents and their parents.	Theory explicitly reported: Guided Self-Determination: a person-centred communication, reflection and problem-solving model.	Explicitly identified - Problem-solving - Decision making - Enhancing motivation	There was a significant difference in HbA1c between IG and CG at 12 months (7.8% (SD 1.1%) vs 8.6% (SD 1.1%) (62 (SD 11.4) vs 70 (SD 12.1) mmol/mol, $P = .009$). No difference at 6 months or 12 months in any of the secondary outcomes – family conflict, HRQoL, burden of diabetes
Christie et al. (2014) & Sawtell et al. (2015)	To evaluate a structured, multi-centre psycho-educational programme (CASCADE) for young people and their families	Grounded Theory No explicitly reported theory MI and solution-focused brief therapy	Explicitly identified - Goal Setting CBT Approaches - Communication skills - problem-solving.	HbA1c did not improve significantly in the intervention group at 12 months (intervention effect 0.11, 95% CI -0.28 to 0.50, $p = 0.584$) or 24 months (intervention effect 0.03, 95% CI -0.36 to 0.41, $p = 0.891$). There were no significant changes in other outcomes including self-management skills and quality of life.
Edraki et al. (2018), Iran	To evaluate the effect of coping skills training on depression, anxiety, stress, and self-efficacy of adolescents with type 1 diabetes	Theory explicitly reported Coping Skills Training based on Social Cognitive Theory	Explicitly identified - Stress management - Communication skills training - Cognitive behavioural approaches - Problem solving - Coping skills - Relaxation techniques - Goal setting	Significant difference in mean scores for anxiety, depression and stress in the intervention group compared to control following the intervention. Significant difference in self-efficacy between the two groups 2 months post-intervention.
Esfahani et al. (2021), Iran	To determine the effect of group hope therapy on the self-efficacy of adolescents with type 1 diabetes	Theory explicitly reported Hope therapy based on Snyder's theory	Explicitly identified - Problem solving - Goal setting - CBT approaches	Significant improvement in self-efficacy in the intervention group compared to the control group 2 months postintervention. No effect of the intervention on blood glucose measurements.
Guo et al., 2020 & 2020	To determine the efficacy of a coping skills training program for Chinese youth with type 1 diabetes	Theory explicitly reported Coping Skills Training based on Social Cognitive Theory	Explicitly identified - coping skills - problem solving - communication skills - stress management - conflict resolution	There were no significant intervention effects of the CST programme on any primary or secondary outcomes at 12 months ($P > 0.05$). Outcomes measured included HbA1c, diabetes problem-solving, perceived stress and quality of life.

Table 6. (Continued)

Author, Year, Country	Objective	Intervention/ Underlying Theory	Active Ingredients or Mechanism of Action	Major Findings
Hood et al., 2018	To compare a distress and depression prevention program with a diabetes education program for adolescents with diabetes	No explicitly reported theory Promoting resilience adapted from University of Pennsylvania Penn Resilience Program PRP	Explicitly Identified - Cognitive-behavioral approaches - Problem-solving skills - Decision making - Seeking social support - Coping skills - Relaxation techniques	Diabetes distress significantly decreased from baseline to 1 year post-intervention. Diabetes management deteriorated over time in both the intervention and control group. No improvement was noted in HbA1c post-intervention
Kichler et al., 2013	To determine the impact of the KIDS project intervention on improving psychosocial adjustment and diabetes management among adolescents with T1DM and their parents in an outpatient clinical mental health setting	No explicit theory	Explicitly identified - Decision making - Goal setting - Communication - Problem solving - Role play and simulations - Team working	There was no significant difference in HbA1c from baseline to 6-months post treatment. Baseline HbA1c = 10.11%, SD = 2.09%, Range = 5.85% to 14.00%, 6 month HbA1c = 9.77%, SD = 2.19%, Range = 5.90% to 14.00%. There was also no significant difference in the frequency of healthcare utilisation.
Serlachius et al., 2016	To evaluate a cognitive behaviour therapy-based programme to improve glycaemic control and psychosocial wellbeing in adolescents with type 1 diabetes	Theory Explicitly Reported CBT-based "Best of Coping" programme, based on Beck's Cognitive theory	Explicitly identified - Coping skills training - Problem-solving - Cognitive behavioural approaches - Goal setting	There was no significant difference in HbA1c in the intervention group compared with the control group at the 3 month follow-up ($p = 0.597$). There was also no significant difference at 12 months ($p = 0.254$). The intervention group demonstrated higher self-efficacy scores at both 3 months and 12 months follow-up ($p < 0.05$). In the per protocol analysis, the intervention group had lower stress levels at 3 months follow-up ($p = 0.019$) but this difference was not sustained to 12 months.
Price et al., 2016	To assess the effect of a 5-day structured education course on biomedical and psychological outcomes in young people with Type 1 Diabetes	Not reported	Not reported	Rates of ketoacidosis and severe hypoglycaemia did not change significantly at 6, 12 or 24 months. When HbA1c data was subanalysed by baseline levels, those with lower and middle baseline HbA1c showed no significant change in HbA1c compared to controls. At 24 months, the intervention group with a baseline HbA1c > 80 mmol/mol showed a significant improvement in HbA1c. The intervention group had a significantly greater improvement in QoL total scores at 6 and 12 months than control group. However at 12 and 24 months, the control group showed significantly higher scores for adherence to treatment.
Weigensberg et al. 2018	To develop and pilot test an integrative group intervention based self-determination theory in young adults with T1D	Theory explicitly reported Self-determination theory	Explicitly Identified - decision making - communication skills	There were significant postintervention improvements in depression ($P = 0.04$), perceived stress ($P = 0.07$) and psychological well-being ($P = 0.06$) in the intervention group compared to control. The reduction in HbA1c noted in the intervention group compared to the control group was not significant ($P = 0.41$).

Table 6. (Continued)

Author, Year, Country	Objective	Intervention/ Underlying Theory	Active Ingredients or Mechanism of Action	Major Findings
Boggiss et al. (2020), New Zealand	To examine the feasibility and acceptability of a brief self-compassion intervention for adolescents with type 1 diabetes and disordered eating behaviour	Theory explicitly reported Self-compassion intervention, adapted from 'Making Friends with Yourself' programme	Explicitly identified - coping skills - mindfulness	No statistical tests reported for the quantitative outcomes. Qualitative outcomes also reported.
Ellis et al., 2019	To evaluate the efficacy of mindfulness-based stress reduction on reducing stress and improving diabetes health outcomes in high-risk, urban young adults with poorly controlled diabetes	No explicitly reported theory Family-centered therapy Multisystemic therapy incorporating: CBT, parent training and family systems therapy	Explicitly identified - Mindfulness - Relaxation technique	There was a significant reduction in stress immediately post intervention ($P = 0.03$, $d = -0.49$) and at 3 month follow up ($p = 0.01$, $d = -0.67$). There was no significant improvement in diabetes-related endpoints in the intervention group including diabetes management ($P = 0.19$, $d = -0.23$) and blood glucose monitoring ($P = 0.08$, $d = -0.37$). There was no significant improvement in HbA1c for the intervention group at the end of treatment $P = 0.26$, $d = 0.16$ or at 3 month follow-up $P = 0.27$, $d = 0.16$
Viner et al., 2003	To pilot a motivational and solution-focused therapy group intervention to improve glycaemic control in young people aged 11–17 years with poorly controlled Type 1 Diabetes (mean annual HbA1c > 8.5%)	Motivational solution-focused therapy CBT-based techniques	Explicitly identified - Problem solving - Enhancing motivation - Goal setting	There was a significant reduction in HbA1c in the intervention group at 4–6 months post-intervention ($F = 4.2$, $P < 0.05$) while the reduction in HbA1c in the control group was non-significant. The difference in HbA1c at 7–12 months between the two groups was not significant ($P < 0.06$).
Evcimen et al., 2021	To investigate the effect of motivational interview based diabetes self-management education DSME interviews on self-efficacy, healthy lifestyle behaviour development and A1c in adolescents with type 1 diabetes mellitus	No explicitly reported theory Motivational interviewing	Not reported	There was a non-significant decrease in mean HbA1c after the intervention ($p > 0.05$). A significant difference was observed in the intervention group pre-and post MI in the Healthy Lifestyle Behaviour Scale sub-dimensions of health responsibility, stress management, exercise and self-realization ($p < 0.05$) (all sub-dimensions of the Healthy Lifestyle Behaviour Scale Score). There was no significant difference between pre- and post-MI scores in the nutrition sub-dimension ($p > 0.05$).
Garcia-Perez et al., 2010	To evaluate the effectiveness of a psychoeducative intervention implemented in a summer camp for children with type 1 diabetes	No explicitly reported theory Psychoeducation	Non-Explicitly identified - Relaxation techniques - Psychoeducation	There was a non-significant worsening of annual average HbA1c in the year after the intervention. There was no significant improvement in diabetes-related knowledge following the intervention. There was no statistically significant improvement in anxiety in the intervention group. The psychological inability to adapt showed a statistically significant improvement ($P = 0.001$) at follow-up.

Table 6. (Continued)

Author, Year, Country	Objective	Intervention/ Underlying Theory	Active Ingredients or Mechanism of Action	Major Findings
Greco et al., 2001	To implement a structured intervention for integrating peers into diabetes in a health and adaptive manner	No explicitly reported theory Psychoeducation (not specified)	Explicitly identified - problem solving - stress management	Adolescents with diabetes showed a significant increase in knowledge about diabetes and support following the intervention ($p < 0.0001$). No significant change in adherence was noted postintervention, nor self-perception.
Haines et al., 2000	To examine the effectiveness of a stress management training program in helping adolescents with diabetes cope with stress	No explicitly reported theory Stress management	Explicitly reported - cognitive behavioural approaches - problem solving	In the intervention group, significant pre-test to post-test improvements were found on state anxiety ($P = 0.51$), diabetes related stress ($P = 0.18$) and negative coping ($P = 0.18$). Significant pretest to follow-up improvements were seen on trait anxiety ($P = 0.55$), diabetes-related stress ($P = 0.32$) and negative coping ($P = 0.19$).
Rossello et al., 2006	To pilot a group CBT model which has been proven to be effective in treating depression in Puerto Rican adolescents, to treat depressive symptoms and improve glycaemic control in adolescents with diabetes	No explicitly reported theory Cognitive behavioural therapy	Explicitly Identified - Goal setting - Communication skills - Time management - Coping skills - Cognitive Behavioural approaches - Social support networks	The intervention group's self-reported depressive symptoms, self-concept, anxiety and hopelessness significantly improved. No change in glycaemic control or self-care behaviours.
Bakhach et al., 2019, USA	To assess the impact of a home telemedicine clinic model (CoYoTI Clinic) on psychosocial and behavioural outcomes designed for young adults with T1D	No explicitly reported theory	Explicitly identified - stress management - peer discussion	Intervention participants reported significantly lower levels of distress compared to baseline while control group participants reported higher levels of distress than at baseline at the end of the study period ($P = 0.03$). Self-efficacy ($P = 0.01$) and self-management ($P = 0.04$) improved over the study year in the intervention group but decreased in the control group. Both the control and intervention group reported increased depressive symptoms over the study period but this was not significantly different in the intervention group compared to the control ($P = 0.07$).
Knight et al., 2003	To investigate the effect of group motivational interviewing and externalising conversations for adolescents with type 1 Diabetes	Transtheoretical model of behaviour change / motivational interviewing	No active techniques explicitly reported	
Kortegaard et al., 2024 (Denmark)	To evaluate the effect of group ACT + CBT on reducing diabetes-related emotional distress	Theory explicitly reported: Acceptance and Commitment Therapy (ACT) integrated with CBT	Explicitly Identified Goal-setting Communication training CBT approaches Stress Management Problem-solving	Following participation at the group-based intervention, diabetes distress scores significantly decreased at 1-week post intervention ($41.3 \pm 12.1 \rightarrow 29.1 \pm 15.4$; $p = 0.003$). No significant change was observed in psychological well-being at either short or long-term follow-up ($p > 0.05$).

Table 7. Overview of intervention delivery

First author, year	Intervention details	Facilitator, training and fidelity details
Basch et al., 2021	Sessions: 8 weekly × 1-h group sessions over 2 months. Participants: 6–8 adolescents per group. Location: Hospital behavioural health suite.	Facilitator: Clinical psychologist and assistant psychologist. Training: Manualised CBT protocol with two training sessions. Fidelity: Independent reviewer rated 20 % of sessions.
Brorsson, 2016	Sessions: All adolescents and parents attended group insulin pump introduction program held over 4 half days, followed by 7 sessions held over 5 months. These were face-to-face group sessions, 2 hours each. Participants: NR Location: Hospital	Group leaders Training: Non-specified group leader training. Fidelity: NR
Christie, 2014	Sessions: 4 face-to-face group sessions, once a month over a 4-month period, 120 minutes each. Participants: Groups of 3–4 families Location: Hospital	Paediatric diabetes specialist nurse Training: 2-day workshops training ≥ 2 educators per site (n = 14) in MI and SF principles as well as content and delivery of 4 modules. Fidelity: NR
Edraki et al, 2018	Sessions: 8 sessions held twice a week (over 4 weeks). Each session lasted 90 minutes Participants: Groups of 4–6 participants Location: NR	Intervention led by a paediatric nurse with MS degree Training: NR Fidelity: NR
Esfahani, 2021	Sessions: Eight 90-minute sessions held twice a week Participants: Each group consisted of 11–12 participants Location: NR	Interventionist: NR Training: NR Fidelity: NR
Guo, 2020 & 2020	Sessions: 2 day camp with 7 sessions based on CST. Each session lasted 60–90 minutes Participants: NR Location:	Interventionist: provided by four nurses Training: 3 day training program with practice and feedback. Fidelity: Maintained by having a trained research assistant assure that session components were completed in all sessions
Hood, 2018	Sessions: nine biweekly sessions lasting 90–120 min. Active treatment lasted ~4.5 months. Participants: group format (No information about how many people per group) Location: NR	Interventionist: Masters-level clinicians Training: Group leaders received extensive training on T1D, typical adolescent developmental demands, and active-listening skills. Fidelity: Audio recorded and supervised on 25% of randomly drawn sessions. They were supervised by the primary investigators at each site.
Kortegaard, 2024	Sessions: 8 weekly × 2-h group sessions over 2 months. Participants: Groups of 6–8 emerging adults. Location: Hospital outpatient psychology unit.	Facilitator: Two licensed clinical psychologists experienced in diabetes care. Training: ACT manual used; facilitators attended ACT refresher course. Fidelity: Sessions audio-recorded and reviewed using checklist.
Kichler, 2013	Sessions: 6 weekly sessions lasting approximately 1 hour Participants: NR Location: NR	Interventionist: Parent session led by a licensed psychologist and adolescent session led by a psychology graduate student trainee Training: NR Fidelity: NR
Serlachius, 2016	Sessions: 5 weekly face-to-face group sessions 2 hours each. Participants: groups of 5 Location: hospital premises	Health psychologist Training: NR Fidelity: NR
Price, 2015	Sessions: 5 day group education course Participants: Most Kick-Off groups were attended by 8 young people per group, 396 participants in total Location: 31 centres (17 Kick-Off Arm, 14 control)	Interventionist: Research educators and local educators Training: 5 day teaching skills course Fidelity: 7 courses were observed by educator teams who concluded that the curriculum was adhered to with fidelity. Trained research educators carried out independent education evaluation to reduce variation in course delivery.

Table 7. (Continued)

First author, year	Intervention details	Facilitator, training and fidelity details
Weigensberg, 2018	Sessions: 12 week programme with sessions being held every 3-4 weeks. Each session lasted 1.5 hours. Participants: 7 participants in the group in the first run of the intervention and 5 group participants in the 2 nd run Location: NR	Interventionist: NR 'Health professionals', no further information provided Training: NR Fidelity: NR
Boggiss, 2020	Sessions: 2 sessions (2.5h each in duration) delivered 1 week apart Participants: Group size NR Location: NR?	Sessions were facilitated by a trained "Making Friends with Yourself" teacher and supervised by a registered psychologist. Training: NR Fidelity: NR
Ellis et al, 2019	Sessions: Nine weekly sessions lasting 90-120 minutes Participants: 8 participants in each group Location: University Clinical Research Centre	Intervention led by trained MBSR therapist Training: Therapist trained in MBSR through attendance at a 7-day MBSR retreat offered through Omega institute. Ongoing supervision provided via monthly phone calls with a trained instructor from youth MBSR program. Fidelity: Treatment fidelity monitored by review of content checklists completed by therapist to ensure core content from each session was delivered as well as review of session audiotapes.
Viner, 2003	Sessions: 6 weekly face-to-face group sessions (duration NR) Participants: groups of 4 Location: NR	Interventionist: NR Training: NR Fidelity: NR
Evcimen, 2021	Sessions: 6 sessions (lasting 30-45 minutes each) of group MI-based DSME Participants: 66 Location: NR	Interventionist: Diabetes nurse researcher Training: NR Fidelity: NR
Garcia-Perez, 2010	Sessions: 8 days face-to-face. Participants: NR Location: Summer camp	1 physician, 4 nurse educators, and a psychologist Training: NR Fidelity: NR
Greco, 2001	Sessions: 4 2-hour education and support group sessions with 3-6 adolescent-peer pairs per group Participants: 3-6 adolescent Location: NR	Interventionist: Licensed psychologists Training: NR Fidelity: Treatment consistency maintained by phone calls between two group leaders prior to each group session.
Haines, 2000	Sessions: 6 session training programme, once a week, each session lasting 1 hour. Participants: 2 groups of 4 adolescents Location: Held in a classroom at the hospital	Interventionist: A doctorate-level psychologist and doctoral student in counselling psychology delivered the intervention. Training: Fidelity:
Rossello, 2006	Sessions: 12 2-hour group CBT sessions Participants: 16 participants started and 11 completed Location: University Center for Psychological Studies and Research	Interventionist: CBT co-led by two doctoral level psychologists using the adapted CBT treatment manual Training: NR Fidelity: All sessions were videotaped and 80% were evaluated for treatment integrity by and independent rater; integrity ranged from 82-92%
Bakhach, 2019	Sessions: completed over a 12-month period at 1 month, 3 months and 9 months. Sessions lasted 30 mins each Participants: 4-6 participants per session Location: Online	Discussions facilitated by a certified diabetes educator Training: NR Fidelity: NR
Knight, 2003	Sessions: 6 weekly 1 hour group sessions Participants: 6 Location: NR	Interventionist: Run by a senior registrar in child psychiatry and community psychiatric nurse Training: NR Fidelity: NR