REVIEW

Current recommendations and considerations for psychosocial and psychoeducational support of adolescents with Type 1 diabetes

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- Living with diabetes is a relentless balancing act for young people and their families.
- A key component of effective chronic care management involving young people and their families or carers is establishing and maintaining engagement with the adolescent.
- Most educational and psychosocial interventions only have small-to-medium beneficial effects on physical and psychosocial outcomes.
- There is a need for continuous support delivered as part of the care offered by the diabetes team.
- Most effective interventions include multiple components (e.g., emotional, social or family targets) in addition to a specific behavioral goal.
- Interventions are effective if they demonstrate the connection between the various aspects of diabetes management and the tasks of daily living.
- Cognitive behavior therapy can be helpful in the management of depression and anxiety in adults and adolescents.
- There is preliminary evidence to support the use of motivational interviewing and solution-focused therapy in pediatric healthcare including diabetes.
- Behavioral family systems therapy is an effective psychological intervention; however, it is resource intensive, which limits the feasibility of delivering it in everyday clinical practice.
- A ‘one size fits all’ intervention may not be the answer for everyone.
- Technological developments in insulin delivery and self-monitoring devices are paralleled by new technology-based interventions.
- Social media and the internet offer age-appropriate interventions designed to provide motivational support and information.

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**SUMMARY**

Living with diabetes requires an individual to follow a regimen that focuses on balancing diet, activity and medication 24 h a day 7 days a week. Reducing psychological distress associated with poor glycemic control has proven to be a challenge. Approaches that focus on increasing knowledge/skills, addressing psychosocial issues and improving self-management behaviors demonstrate modest short-term improvements. Multifaceted, individually tailored interventions that address the inter-relatedness of the various aspects of diabetes management and include multiple components (e.g., emotional, social and family targets alongside behavioral goals) appear to be the most effective. However, limited long-term changes suggest a need for continuous support delivered by a multidisciplinary diabetes team rather than the delivery of any particular one-off short-term intervention. This review describes individual, group and family psychosocial and psychoeducational interventions that address psychological wellbeing and glycemic control in adolescents living with diabetes.

Living with diabetes can be relentless. Young people must attempt a precarious balance managing their diet, activity and insulin replacement alongside negotiating the developmental tasks of adolescence [1]. The outcome of this balancing act is often an increased risk of developing psychological difficulties including depression, anxiety and eating disorders associated with increasingly poor glycemic control [2,3]. Other outcomes include increased levels of vigilance by parents and diabetes teams, higher levels of family conflict and increasing frustration with the impact diabetes has on a young person’s life. Difficulty understanding causality has led to a variety of approaches to address these concerns; an increased demand for structured education to ensure that young people know what they need to do is balanced by a search for interventions that encourage self-management through empowerment.

A key component of effective chronic care management involving young people and their families or carers, is establishing and maintaining engagement with the adolescent. Person-centered therapies, motivational interviewing (MI), positive reinforcement and behavioral contracts, communication skills training, negotiation of diabetes management goals, coping skills training, and collaborative problem-solving skills training have all been explored as potential approaches to improve glycemic control, decrease levels of emotional or behavioral disturbance and ultimately improve quality of life.

Delamater et al. argues for the efficacy of psychosocial therapies to improve regimen adherence, glycemic control, psychosocial functioning and quality of life [4]. However, the effectiveness of educational and psychosocial interventions has been limited, not only in Type 1 diabetes [5], but also in pediatric chronic illness in general [6]. Systematic reviews completed over the last decade have suggested that there is still limited evidence that psychological interventions have a significant effect on treatment adherence and glycemic control, with only small-to-medium effects on both physical and psychosocial outcomes reported [5,7]. In addition, interventions that result in modest improvements by focusing on increasing knowledge/skills, addressing specific psychosocial issues and addressing self-management behaviors are often not sustained. It can be argued that continuous support delivered by a multidisciplinary diabetes team may be as important as one-off interventions.

In a systematic review of psychological outcomes in adults, psychological interventions improved depression while quality of life improved following self-management interventions [8]. A more recent meta-analysis of 15 randomized control trials (RCTs) of adherence interventions in adolescents (997 adolescents with diabetes) found a small mean effect size of 0.11 (95% CI: -0.01–0.23) [9]. Modest improvements in glycemic control were found in interventions that included emotional, social or family targets, in addition to specific behavioral goals [9]. Delamater et al. argue that interventions are most likely to be effective if they help the adolescent connect the many different aspects of diabetes management with all aspects of daily living [10].

There is little evidence of effective sustainable clinic-based interventions that impact glycemic control. de Wit et al. found asking young people about their quality of life improved their reported quality of life and satisfaction with care, but had no effect on glycemic control [11,12].

This review diverges from and builds upon existing reviews; however, it takes a more descriptive and applied perspective when considering the effectiveness of approaches designed to directly address living with the demands of...
diabetes rather than a meta-analytic perspective. Approaches that will be discussed include stress management, peer support, coping skills training, collaborative problem-solving skills, positive reinforcement and behavioral contracts, as well as negotiation of diabetes management goals. Psychological interventions, with evidence supporting their use, will be described, including cognitive–behavioral therapy (CBT), MI and solution-focused therapy, as well as the diabetes adaptation of behavioral family systems therapy (BFST). Case management approaches and the use of technology are also briefly reviewed.

Managing the demands of a diabetes regimen

Stress management training programs using cognitive restructuring and problem-solving strategies have had limited success at improving adherence [13,14]. By contrast, individual and group interventions for young people focusing on peer group support, problem solving and coping skills have been shown to have positive effects on aspects of regimen adherence, including improved self-perception, increased knowledge about diabetes and a decrease in diabetes-related conflict [15,16]. However, there has been limited impact on short-term glycemic control. A diabetes education program focusing on problem-solving skills improved blood glucose monitoring, but failed to show improvements in problem solving or HbA1c compared with controls [17]. By contrast, coping skills training groups for children transferring to intensive diabetes regimens showed improvements in metabolic control and quality of life, which was maintained at the 1-year follow-up [18–20]. The coping skills training focused on social problem solving, social skills training, cognitive-behavior techniques and conflict resolution skills. The groups did not affect adverse outcomes of hypoglycemia, diabetic ketoacidosis or weight gain in boys, but decreased the incidence of weight gain and hypoglycemia in girls. Diabetes summer camps that offer peer interaction, sports and recreational activities alongside daily diabetes self-management training are highly valued by young people. However, they only show short-term changes in self-management and knowledge, and fail to demonstrate lasting improvements in HbA1c levels without ongoing support [21,22].

The groups described above are designed to address the relentless demands of living with a diabetes regimen and should, in an ideal world, be offered at different time points throughout a young person’s diabetes journey. However, timing of when interventions are best offered and which specific age groups should be targeted remain unclear. Practical issues such as finding appropriate rooms and time for nursing staff to run the groups are often basic but significant barriers. Therefore, what may be an effective intervention in the controlled environment of RCTs may be less easy to deliver and less effective in a busy clinic environment with a less selective population.

Case management/educational approaches

Other interventions have focused on case management and/or diabetes education, which are all deliverable within a standard clinic format. Svoren et al. found enhanced case management increased the frequency of visits to the clinic, reduced rates of hypoglycemia and hospital admissions, and improved glycemic control in ‘high-risk’ youths [23]. Education and telephone case management have also been explored and found to improve reported regimen adherence and self-efficacy, but again have little impact on HbA1c levels [24,25]. Despite the recommendation by NICE that structured education should be incorporated into clinical services as part of standard care, several recent multicentre RCTs have failed to show positive change [26–28].

The search for pragmatic, feasible and effective structured education programs that can be delivered within clinic settings to targeted groups and make a difference to both glycemic control and improved quality of life continues.

Psychological approaches

Cognitive–behavioral therapy

CBT is an approach that can only be delivered by practitioners with specific training, and usually requires six to 12 sessions for it to be effective. The practitioner encourages the client to look at the connections between thoughts, feelings and behaviors. This requires a degree of engagement and participation from the client, which can often be difficult to obtain from adolescents [29].

CBT groups are effective in decreasing depressive symptoms for up to 12 months in adults with Type 1 diabetes. Those adults with high levels of baseline depression also reduced their HbA1c up to 12 months after the intervention [30]. A recent study in adults found
increased depression and improved glycemic control following ten to 12 sessions of a CBT intervention [31]. While effective standardized interventions for behavior problems or depression in the adolescent population are available, no studies have targeted specific psychological disorders that are known to be increased in adolescents with diabetes. A review of psychological interventions by Northam et al. found nonstandardized approaches were used in groups of adolescents with diabetes [32].

- **Motivational interviewing**

  MI is a person-centered therapy that works collaboratively with clients to direct them to resolve ambivalence about behavior change [33]. It creates a shared agenda with clients at the beginning of the session, inviting the client to identify what aspects of their behavior they want to discuss. (e.g., young people may say they want to talk about problems at school while parents want to talk about blood tests.) The clinician negotiates how to explore these issues during the consultation. MI takes a position whereby the client is invited to be in charge of making changes. The clinician looks for statements indicating an intention to change and optimism about the future, and reflects these back to the client. The client is invited to identify how important change is, and express confidence in their ability to change and when change will be a priority.

  Over the last 30 years, MI has been used effectively in a range of physical health specialties, particularly in relation to chronic health conditions in adults [34–37]. The principles underlying the approach have been seen as key not just to mental health interventions, but also to other practitioner–patient relationships (e.g., nurse, doctor and dietitian) [38]. The potential for using MI in pediatric populations has been increasingly explored, taking into account potential modifications needed when working with young people and families [39–41].

  As with adults, early work with young people demonstrated the potential of MI to improve attendance and decrease harm-reduction behaviors using MI in relation to alcohol and polysubstance use [39,40]. Suarez and Mullins reported nine RCTs in health-related domains including diabetes, obesity, reproductive health and dental problems in which seven reported positive findings on the effectiveness of MI [39]. Most RCTs that have specifically addressed Type 1 diabetes have focused on the adolescent age group [39,40,42]. Two studies using MI alone found a significant reduction in HbA1c, reduced fear of hypoglycemia, and improvements in quality of life and positive well being [43,44]. Studies of MI combined with other therapeutic approaches such as dietary advice or CBT have reported reductions in HbA1c, a greater sense of control, an improved perception of their diabetes and improvements in self-esteem [45,46].

  Over the last few years, there has been a focus on incorporating MI principles into other formats, for example, a six-session ‘personal trainer’ intervention developed by Nansel et al. delivered by nonclinical practitioners [47]. This has shown promising results in relation to lowering HbA1c, particularly in older teenagers.

  One response to the scarcity of mental health resources in the UK has been to shift the focus away from individualized support outside clinic time, and to train staff and introduce components of successful interventions into routine consultations. Aspects of MI [47,48] and other brief therapy approaches have the potential to offer diabetes teams a way of communicating with young people who may be reluctant to engage with standard psychological approaches and encourage greater self-management [49,50]. However, a recent study that attempted to deliver components of MI as part of routine consultations with regular practitioners proved challenging to implement and had no impact on either HbA1c or psychosocial measures at the end of the intervention period [48–50].

- **Solution-focused brief therapy**

  Solution-focused brief therapy (SFBT) is an empirical approach that relies on the clinician noticing what works successfully during conversations with young people and families, and repeating this approach [49]. SFBT assumes that the client is the expert in their own situation, and invites them to describe their preferred future and to focus on what is already working. This gives them an opportunity to notice how small changes are already happening and what it is that they are doing to make this possible [51]. The client is invited to change their perspective and to consider how they are able to do things differently. The clinician does not attempt to find what caused ‘the problem’ and makes no attempt to ‘take the problem away’. In relation to diabetes, the clinician and family work collaboratively to find solutions that already exist, whether that be injections or finger pricks, or difficulties with
eating. They are invited to work together to stop diabetes getting in the way of family communication and find different ways to manage their emotions. Solution-focused therapies take the lead from the family in relation to ‘nonadherence,’ focusing on what is working for them. This means making the intervention fit the young person and family rather than shoehorning them into a standard intervention.

A large body of clinical research shows that SFBT is an effective approach for most clients, including those with severe and chronic problems. The latest review of SFBT outcomes considered 109 experimental studies, including two meta-analyses and 19 RCTs [101]. Nine RCTs showed that SFBT has a greater effect compared with other approaches (e.g., CBT). Of the comparison studies, 34 out of 43 favor SFBT. Evidence is also available from over 4200 case studies, with a success rate exceeding 60%, requiring an average of three to five sessions of therapy. SFBT combined with MI has been used successfully to reduce HbA1c in children and adolescents [101,46]. It has also been successfully integrated into clinical service delivery [49].

Clinical reports show that team members without a background in psychology can be trained to work using a solution-focused stance. Positive feedback from clinical teams suggest this approach is a powerful facilitator of change with increased engagement and communication. This way of working is increasingly relevant to the management of long-term chronic illness and models of empowerment. Solution-focused conversations create a different experience for families. Young people who have been blamed or criticized and described as nonadherent or manipulative “grow visibly taller in their chair” when given the opportunity to talk about their strengths and abilities, and describe the positive steps they are already taking to get their lives back on track [49]. Bowles et al. trained nurses in SFBT and found positive changes in nurses’ practice and an improved willingness to communicate with people who are troubled. Nurses were able to stop focusing just on problems, which also reduced emotional stress and their own feelings of inadequacy because they were unable to help [52]. Bowles et al. concluded “SFBT techniques may be relevant to nursing and a useful, cost-effective approach to the training of communication skills” and “provides a framework and easily understood tool-kit that are harmonious with nursing values” [52].

Family-based interventions

Family communication and conflict are associated with adherence to treatment for Type 1 diabetes and glycemic control [53]. Due to the complexity of diabetes management, family involvement and support is an important component of most interventions. Most interventions, therefore, include a family component. In a review of family interventions, Armour et al. found a positive effect of family interventions in five out of 19 RCTs and argued that interventions with families of people with diabetes may be effective in improving diabetes-related knowledge and glycemic control [54]. A teamwork intervention described by Laffel et al. increased both family involvement and prevented an expected deterioration in glycemic control [55]. However, the quality of family relationships may not be causally related to adherence; therefore, decreasing family conflict and improving parent–child relationships alone may not result in improved adherence or glycemic control.

Family therapy incorporating developmentally appropriate negotiated responsibility has been reported to be effective in improving metabolic control [56]. Multisystemic therapy, an intensive home and community family intervention, significantly improved adherence to blood glucose testing, improved metabolic control and decreased the number of inpatient admissions [57,58].

BFST is an approach developed for families of adolescents with clinically significant conduct-related problems [59]. The components of the intervention include cognitive restructuring of irrational beliefs and structural family interventions that target problematic family characteristics, as well as family communication and problem solving. Initial adaptations of BFST-based problem solving and communication training for children and families with diabetes addressed general developmental issues, such as managing curfews and chores, and focused less on diabetes treatment adherence or management [60–62].

In a series of studies, Wysocki and colleagues found BFST enhanced family communication, improved parent–adolescent relationships, and reduced behaviour problems, and general and diabetes-related family conflict [60–64]. The effects of psychological adjustment to diabetes and diabetic control depended on the adolescent’s age and gender, but overall there was little effect on adjustment to diabetes or diabetic control [60,61].
A revised model of BFST (BFST-D) integrated empirically supported intervention strategies focusing on specific behaviors as well as the social context of diabetes treatment-related behavior.

These BFST-D components are:

- Targeting at least two or more diabetes problems;
- Behavioral contracting [65];
- Self-monitoring blood glucose data [15, 66];
- Parental simulation of living with diabetes [56];
- Involving peers, siblings, teachers and running sessions in different locations.

The BFST-D demonstrated decreased family conflict as well as improvements in regimen adherence, as measured by parent and child interview. HbA1c was significantly reduced, particularly among adolescents with poor metabolic control. Changes in treatment adherence correlated significantly with changes in HbA1c at each follow-up [61, 63, 67].

While these multisystemic therapy approaches with families show encouraging results they are very resource intensive. They require highly skilled family therapy-trained practitioners who are able to travel into the family home and community. It is, therefore, an approach that, while potentially helpful, is unlikely to be something that could be easily incorporated into clinical practice at the current time until shown to be clearly cost effective.

**Technology**

Advancing technologies are providing promising results in adults. An example of this is the development of the artificial pancreas [68]. For adolescents with Type 1 diabetes, technological advances underpin increasingly sophisticated insulin delivery mechanisms and self-monitoring devices, for example, insulin pumps and continuous glucose monitors [68, 69]. A full description of these is outside the scope of this review; however, there are several recent reviews that have looked at the wide range of options that are currently being tested [70–75].

These technological developments are paralleled by technology-based interventions designed to provided engaging motivational support and interventions. They include digital devices, social networking and the internet as media for delivering age-appropriate interventions [76, 77]. These interventions are mostly offered at the individual level (e.g., playing a video game), but sometimes include a group component, such as an online chatroom or discussion forum [78–83]. The effect of these technologies on self-management are promising; although the effect on glycemic control for the majority of studies remains modest at present [78].

**Conclusion**

There is still insufficient evidence to recommend the adoption of a particular behavioral or educational approach to address all barriers to treatment adherence and glycemic control among children and adolescents with Type 1 diabetes.

However, evidence suggests that patient-centered collaborative approaches addressing patient wishes and needs are the most promising.

The marked variation in the influences on and barriers to treatment adherence and improving glycemic control has been shown to be difficult to address with a single intervention model. As long-term patterns of treatment adherence and glycemic control can be influenced by heterogeneous factors [6, 84], a ‘one size fits all’ model of individual or family intervention may not have powerful effects on treatment adherence. For some adolescents and their families, problematic communication and problem solving may be the primary influences on nonadherence to diabetes treatment. For others, maladaptive patterns of coping and behavior such as avoidance or skill deficits in diabetes management may be the most salient barriers to treatment adherence. To date, ways of identifying who needs what most remains elusive.

Living with diabetes is an ongoing challenge, creating numerous demands for families, children and young people striving to achieve regular developmental goals. The relentless daily demands of a diabetes regimen can easily hijack progress and knock young people and their families off track.

While integrated psychological support to pediatric and adolescent clinics remains limited, it is important to continue striving to identify different approaches that work for different families that can be delivered effectively and within resource-driven constraints.

**Future perspective**

The complexity of developmental stages, family systems and the demands inherent in integrating
all aspects of diabetes management must be acknowledged in the design of future interventions. Improved training of clinical staff for education and core management skills, and the development of specialist diabetes centers is a potential way forward. Clinics that are unable to deliver acceptable levels of metabolic control may not have a future. Mandatory training and demonstrable levels of competency in engagement and communication skills for all members of the diabetes team must be a goal for national diabetes care. A better understanding of what works for whom should encourage clinical researchers to create effective individualized interventions focused on the varying needs of different groups of children, young people and parents. Increased funding to improve resources will ensure teams are able to offer interdisciplinary support as part of standard care, enabling more support for children, young people and parents. The results of current research trials must inform our understanding of what needs to happen, in order to ensure that educational programs improve both knowledge and the application of self-management skills. Methodologies must be developed to allow delivery and evaluation of complex team-based systemic interventions, rather than relying on traditional RCTs that have assessed single-component interventions that have failed to deliver the intended results.

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