Published in final edited form as:

Curr Diab Rep. ; 20(1): 3. doi:10.1007/s11892-020-1290-7.

Small Interventions for Big Change: Brief Strategies for Distress and Self-Management Amongst Youth with Type 1 Diabetes

Samantha A. Barry-Menkhaus¹, David V. Wagner², Andrew R. Riley²

¹The Madison Clinic for Pediatric Diabetes and Benioff Children's Hospital, University of California, San Francisco, San Francisco, CA, USA

²Institute on Development & Disability, Department of Pediatrics, Oregon Health & Science University, 707 SW Gaines St., Portland, OR 97239, USA

Abstract

Purpose of Review—Diabetes self-management and diabetes distress are complex processes implicated in glycemic control and other health outcomes for youth with type 1 diabetes. Growing integration of medical and behavioral care provides opportunities for brief psychosocial interventions during routine diabetes care. This review focuses on interventions for self-management and diabetes distress that can be delivered alongside usual medical care or via a single-patient encounter.

Recent Findings—Recent research underscores the potential of brief interventions delivered by both medical providers and integrated behavioral health professionals, but little is known regarding the comparative effectiveness of different interventions or the factors that impact dissemination and implementation.

Summary—This article asserts that brevity is critical to maximizing the reach, scalability, and impact of psychosocial interventions for youth with type 1 diabetes. The authors review existing evidence for brief interventions, describe several untested clinical strategies, and make recommendations for accelerating the translational study of brief interventions.

Keywords

Type 1 diabetes; Youth; Diabetes distress; Self-management; Adherence; Brief intervention

Introduction

Fewer than 1 in 5 children and adolescents with type 1 diabetes (T1D) meet the American Diabetes Association (ADA) recommended HbA1c target (< 7.5%, 58 mmol/mol), and this

Andrew R. Riley rileyand@ohsu.edu.

Publisher's Disclaimer: The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.

Conflict of Interest The authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

number seems to be worsening despite medical and technological advances [1]. Glycemic control is complex and multi-faceted, but behavioral and psychological processes including diabetes self-management [2] and diabetes distress (DD) [3, 4] are known to be prominently related to diabetes health outcomes. Given the importance of self-management and DD to overall health, researchers have developed a number of interventions to target these constructs. Reviews and meta-analyses indicate that psychosocial interventions are effective in improving diabetes self-management and may also have positive effects on DD [5–7]; however, effect sizes are generally small with regard to glycemic control, significant variability in outcomes is observed across interventions and meta-analytic methods, and study of interventions targeting DD directly has been very limited.

Most T1D psychosocial interventions consist of multi-component treatment packages designed to be delivered over multiple sessions with youth and/or families. For example, the thirteen face-to-face interventions reviewed by Hood et al. [5] ranged from approximately 4 to 16 h of intended intervention, and most were designed to be delivered over the course of six or more sessions. Multi-component treatments often perform well in traditional randomized controlled trials (RCTs), regularly producing larger effect sizes than those targeting a single process [5]; however, doubts have arisen regarding how well such efficacy translates to “real-world” care settings [8]. In order to significantly impact population health, efficacious interventions must be adopted by health practitioners, implemented with sufficient fidelity, received by the intended patient populations (which likely vary in important ways from the samples of RCTs), and sustained within healthcare organizations (financially and otherwise). Behavioral and social scientists increasingly recognize the challenge of disseminating and implementing evidence-based treatments [9, 10], and the inherent complexity and lengthiness of many multi-component packages are important impediments [11]. It stands to reason that the more elaborate and protracted an intervention, the more expensive, disruptive to organizational practices, difficult to maintain with fidelity, and less fully received by patients it is likely to be.

The scalability of psychosocial interventions targeting self-management behaviors and DD amongst children and adolescents with T1D has not been systematically reviewed, but Hilliard et al. [12•] have noted that the time and resource-intensive nature of many T1D behavioral interventions may hinder translation to practice. This may be especially true of interventions designed for delivery by medical providers who are faced with the pressures of seeing a high volume of patients [13]. Behavioral health professionals are better equipped to deliver treatment packages, but a large proportion of pediatric diabetes clinics are not staffed by integrated behavioral health professionals. Amongst practices that do offer behavior therapies, a majority do not bill for those services [14], potentially limiting financial viability of more costly multi-component interventions. Even if multi-component interventions are assumed to be well implemented and maintained, there is doubt as to whether they are likely to fully reach their intended recipients. Disadvantaged groups are less likely to be enrolled and retained in clinical research, and clinical trials often lack the racial/ethnic and socioeconomic diversity necessary to generalize to the entire T1D population [15, 16]. Unfortunately, these underrepresented groups are precisely those individuals who have the poorest glycemic control [1], are at greatest risk of serious medical complications [17], and most likely to experience barriers to completing clinic-based

interventions in real-world settings (e.g., reliable transportation, cost of childcare and missed work, distance from clinic [18, 19]). Factors that influence engagement in T1D behavioral interventions are not well understood, but a review of attrition in trials of cognitive-behavioral interventions for pediatric chronic health conditions, including T1D, found that being too busy, perceiving the study as a hassle, necessitating traveling too far, and requiring too many appointments were amongst reported reasons for refusing to participate or dropping out of trials [20]. This is consistent with low engagement with available psychological services following T1D diagnosis [21] and utilization data from a large diabetes center indicating that amongst those patients who encounter co-located mental health staff, the most likely number of contacts is one [22]. It is reasonable to conclude the time and resource demands of intervention participation are important factors in families' abilities to engage with available treatments.

While multi-component, multi-session interventions remain an important and possibly necessary level of care for many children and adolescents with T1D, especially those with medical, mental health, and/or psychosocial complexity, barriers to widespread dissemination and patient engagement likely limit their impact on population health. Lower intensity interventions that target self-management and DD are therefore important to consider, as less resource-intensive approaches may ultimately prove more scalable and effective at reaching their intended recipients. In this article, we review the evidence for brief psychosocial approaches to improving T1D self-management and DD, suggest other promising techniques, and provide recommendations for advancing the study of brief T1D psychosocial interventions. For the purposes of this review, we consider "brief" to constitute interventions that can feasibly be delivered adjunct to usual medical care or in a single patient encounter of 60 min or less.

Educational Interventions

Diabetes self-management education (DSME), the ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care, is a first-line self-management intervention offered by multi-disciplinary pediatric diabetes clinics [23]. Educational interventions are meant to be integrated into regular diabetes care in both inpatient and outpatient settings, and are most effective when both parent participation and youth self-efficacy are supported [24]. While DSME is a feasible brief intervention and considered a standard of pediatric diabetes care [23], education alone is not sufficient to achieve glycemic targets in most cases and most effective when paired with behavioral interventions [6]. For this reason, prominent national and international diabetes organizations [25, 26] recommend the inclusion of behavioral/psychosocial strategies (e.g., action-oriented behavioral goal setting, cognitive-behavioral techniques, problem-solving, communication skill building, motivational interviewing, family conflict resolution, coping skill training, stress management techniques) in DSME programs. Most of the studies supporting these recommendations (e.g., [27–29]) demonstrate effectiveness over multiple sessions; however, the principles and strategies central to these interventions can feasibly be applied to routine visits to promote self-management. While further research is necessary to understand the impact of these interventions when applied to brief visits, traditional diabetes education

appears to be moving away from didactic-style education toward a collaborative, responsive approach with behavioral components.

Enhanced Medical Care Interventions

Medical providers (“providers” hereafter) are encouraged to incorporate behavioral strategies into their practice to promote self-management, but few interventions have been evaluated as augmentations of routine pediatric diabetes care. Those that have received some empirical attention include transdiagnostic approaches to enhancing patients’ self-determination and motivation by altering the pattern of provider-patient interactions. Motivational interviewing (MI), a communication-style intervention designed to elicit commitment to behavior change, can feasibly be applied in a variety of medical settings by various providers. As a stand-alone treatment, MI is associated with improvements to glycemic control and DD [30]; however, inclusion of MI in multi-component therapies has yielded mixed results [31–34]. MI appears especially effective when delivered by mental health professionals [34, 35•], but other providers can deliver MI successfully with high-quality training [36, 37]. Shared decision-making (SDM), a collaborative process that incorporates the patient and family as active partners in defining treatment goals and decisions, is a well-established method of promoting self-management in the broader pediatric literature [38] and demonstrates promise in improving pediatric diabetes care [39, 40]. Guided self-determination (GSD), another patient-centered approach, aims to collaboratively guide patients toward solutions that align with their values. Initial studies of GSD in routine pediatric diabetes care suggest improvements to motivation for self-management, but impacts on self-management behaviors have not yet been evaluated [41].

Interventions designed specifically for routine pediatric diabetes care remain rare, but emerging results are promising. For example, the Diabetes Strengths Study piloted a diabetes-specific, clinic-integrated intervention involving the assessment of diabetes-related strengths and self-management behaviors using the Diabetes Strengths and Resilience (DSTAR) measure and a subsequent physician- or nurse practitioner-led, strengths-based discussion centered upon youth and parent DSTAR reports. Preliminary results suggest improvements in adolescent self-management behaviors, adolescent- and family-provider relationships, and DD [42••], with qualitative responses indicating high acceptability by providers, parents, and adolescents for this 5–10 min intervention. Similarly, de Wit and colleagues [43, 44] found that clinic-integrated assessments and physician-led discussions of health-related quality of life during quarterly visits led to improvements in adolescent psychosocial health, behavior, mental health, self-esteem, and satisfaction with care at follow-up compared with controls. Additionally, a small pilot of the physician-delivered *Checking In* intervention demonstrated increased adolescent frequency of blood glucose level (BGL) checking by incorporating psychoeducation around the importance of collaborative parent involvement in BGL management into routine diabetes visits [45]. While this intervention did include a scripted protocol, handout materials, and weekly automated text-message or e-mail reminders for 12 weeks post-intervention visit, the intervention remained relatively resource-efficient.

While provider-led psychosocial interventions targeting self-management are not yet well-established in pediatric diabetes, the growing literature bodes promising for enhancing routine care [46]. However, less than 10% of self-management interventions are delivered by providers [13], representing a missed opportunity given the potential advantages (e.g., frequent contact, existing relationship, lack of stigma) of provider intervention delivery. The positive association between provider communication skills, a modifiable trait, and patient self-management [47] suggest the importance of developing and evaluating interventions that target provider behaviors.

Clinic-Integrated Quarterly Interventions

Other clinic-integrated interventions require the participation of a mental health professional or other specially trained personnel. For example, the *WE-CAN Manage Diabetes* intervention, which is designed to target self-management by facilitating problem-solving skills, communication skills, and appropriate responsibility sharing [48, 49], is delivered by trained non-professionals (i.e., “health advisors” with extensive on-site training and supervision in diabetes management and the intervention process) in 30-min sessions as part of quarterly diabetes visits. In a large multi-site RCT, WE-CAN produced superior changes in glycemic control compared with standard care at 24-month post baseline [49], but no differences with regard to family-reported self-management behaviors. Another promising clinic-integrated intervention that targets the family system [50] found that 20–30-min sessions before/after quarterly diabetes visits focused on promoting parent involvement and family “teamwork” (e.g., emphasizing multiple causes for BGLs, related expectations, and importance of family involvement in diabetes tasks without blaming the adolescent) were effective in preventing expected erosion in parental involvement in diabetes management during adolescence and improving glycemic control for a larger portion of the intervention group than control over a 12-month period. Similarly, a family teamwork coping program that addressed skill building (e.g., coping, problem-solving, conflict resolution), parental support, and cognitive reframing within 30–45 min, interventionist-led sessions before/after regularly scheduled diabetes appointments over a 12-month period demonstrated improved parent and adolescent quality of life and reduced self-management barriers, without increases to family conflict [51].

These family-based, clinic-integrated interventions demonstrate an ability to shift self-management behaviors and/or diabetes-related outcomes over time during brief, quarterly visits. However, while brief and low-intensity, these interventions were also led by “health advisors” (i.e., research assistants, and/or graduate-level interventionists), guided by detailed module procedures and written intervention materials, and required in-person, quarterly in-person follow-up for 12–21 months, suggesting the potential need for additional staff and/or resources to achieve these outcomes as well as substantial engagement and time commitments from both providers and families.

Single-Session Behavioral Interventions

In addition to interventions that are delivered adjacent to routine care, there is sparse evidence that single-contact behavioral interventions can impact self-management behaviors.

For example, Carney and colleagues [52] found that coaching parents to use contingent praise and a point system to reinforce the completion of specific self-management tasks led to sustained improvements of both glycemic control and frequency of BGL checking during the 4-month follow-up period. While decades old and small-scale, this study highlights the potential of utilizing fundamental behavioral principles (e.g., positive reinforcement) to develop simple and resource-efficient interventions, an approach that has proven to be effective across many health populations (e.g., HIV, type 2 diabetes) and behaviors (e.g., medical visit attendance, exercise) [53, 54]. More recently, researchers have demonstrated that monetary rewards effectively reinforce self-management behaviors (e.g., BGL checking, uploading meter), though whether these effects maintain following withdrawal of rewards is inconsistent [55, 56]. Finally, in an especially creative example of a single-session intervention, Maranda and colleagues [57] randomly assigned youth with T1D to receive fish care supplies, a \$5 gift card for a betta fish, and instructions regarding how and when to pair fish care tasks with self-management (e.g., check BGL during twice daily feeds, share BGLs with parents during weekly fish tank cleanings). Compared with usual care, those who received the intervention demonstrated significant improvement in HbA1c 3 months post-intervention. While simple to deliver, these interventions do require sustained effort from families between visits and potential resources from the clinical team (e.g., reinforcers, pet supplies), but the costs of such programs are relatively minor and could potentially be modified to address resource barriers (e.g., pairing care of an existing family pet with self-management).

Discrete Techniques for Brief Patient Encounters

In recent years, emphasis has been placed on the integration of behavioral and medical care in order to simultaneously improve cost-effectiveness [58] and health outcomes [59]. The resulting shift in care delivery models has created new opportunities for intervention via inpatient and outpatient brief consultation [60]. In the absence of rigorous trials evaluating brief consultative interventions, clinicians may employ theoretically driven clinical strategies that target established mechanisms of self-management and DD. Harris, Hood, and Weissberg-Benchell [61] detailed a number of techniques for reducing diabetes-related family conflict, a correlate of self-management and DD [62–64], that are feasibly delivered in just a few minutes, including the “CEO Model of Diabetes Management” metaphor to encourage adolescent independence with appropriate parental support and the “trading privacy for nagging experiment” to disrupt the negative cycle of miscarried helping. Weissberg-Benchell [65] has similarly described a “tape over the meter” technique to promote BGL checking while preventing negative reactions to BGLs being outside the desired range. Other strategies can be derived from single components of multi-component interventions. For instance, role-playing to improve communication and coping skills has been employed with both youth with T1D [66] and their parents [67]. In our experience, role-playing can be effectively utilized in brief encounters to prepare youth for difficult social interactions, such as disclosing diabetes status to peers. These brief techniques are summarized in Table 1.

The underlying logic of the strategies referenced above (i.e., targeting maladaptive processes via brief language- or experiential-based techniques) can be extended to other therapeutic

approaches. For example, acceptance/avoidance of diabetes is an important psychological process related to DD and self-management [68–70], and Acceptance and Commitment Therapy (ACT), an evidence-based therapeutic approach that is explicitly designed to promote acceptance and overall psychological flexibility, has been employed in a number of chronic illness populations [71]. In our experience, a number of ACT-derived experiential techniques can be adapted for delivery in brief interactions with youth with T1D. The “finger trap” metaphor [72], for instance, can be used to illustrate the paradoxical nature of diabetes burnout (see Table 2 for example dialogue): The more one avoids diabetes care (i.e., pulling out of the trap), the more interfering and distressing (i.e., tighter the trap) diabetes becomes. Only by accepting diabetes (i.e., pushing into the trap), can one loosen its grip. Whether such discrete techniques produce meaningful change in the context of T1D care is unclear, but 10–20 min acceptance-based interventions reduced distress more effectively than traditional cognitive-behavioral techniques in laboratory studies [72–74] and a recent trial of single-session ACT for adolescent health behavior change produced promising results [75•]. Other discrete techniques can be similarly adapted for brief consultation, and the broader behavior change literature offers numerous possibilities [76]. Which strategies are most likely to be effective for which patients under what circumstances remains undetermined.

Selecting an appropriate intervention in the absence of definitive evidence of comparative effectiveness requires collecting information to inform clinical decision-making. This is especially challenging under time-limited circumstances, as clinicians must efficiently gather the right information, formulate a conceptualization, and select a corresponding intervention with a level of precision. As the example interventions above illustrate, understanding the mechanisms driving maladaptive behavior patterns is essential to selecting a well-matched intervention. Just as an educational intervention will not be suited for a youth who understands how and why to perform diabetes tasks but struggles to implement them on a regular basis, habit-forming interventions (e.g., contingent praise, pairing pets with management) will not be suited for a youth whose self-management difficulties stem from a fear of hypoglycemia. As further illustration, consider the literature demonstrating that DD and depression are distinct but often muddled constructs [77] and that DD has stronger linkages with common diabetes self-management and psychosocial factors than depressive symptoms [78]. This subtle distinction holds significant implications for clinical decision-making, as the indicated interventions for one concern (e.g., antidepressants, psychotherapy for depression) will likely be ineffective for the other. While the ADA recommends regular psychosocial screening and assessment in a number of areas (e.g., DD, depression, eating disorders, self-care efficacy, anxiety, self-management; [79]) and established screening programs have found value in screening other domains (e.g., diabetes-related family conflict, social support [35•]), formal screening across all domains may be impracticable in brief encounters. Regardless, the comprehensiveness of these recommendations speaks to the variability of concerns to which youth with T1D are vulnerable, underscoring the essentialness of thoughtful assessment to inform clinical decision-making.

Other Intervention Formats

While not the focus of this review, growing evidence for resource-efficient behavioral interventions delivered in formats other than face-to-face encounters bears mentioning. These approaches leverage technology or other resources to deliver interventions beyond clinic visits, potentially reducing the burden on providers. For example, distal technologies (i.e., electronic systems designed to provide a service remotely) including automated text messaging systems [80, 81] and game-based support programs [82–84] have demonstrated promising results with regard to T1D self-management [85, 86]. However, similar to in-person intervention packages, those at greatest risk of poor diabetes outcomes are most likely to experience barriers to accessing and benefiting from these technologies [87]. Other studies have evaluated behavioral interventions delivered in group settings, finding that groups targeting psychoeducation and/or specific skills (e.g., coping, stress management, problem-solving) are associated with improvements to diabetes-related outcomes (e.g., self-management, glycemic control [88]). Furthermore, facilitating participation in evidence-based activities, like diabetes camps [89] and social support groups [90, 91], may be a relatively simple and resource-efficient strategy for improving both self-management and DD.

Advancing the Science of Brief Interventions

As we have reviewed, the existing T1D literature offers only nascent evidence of effectiveness for brief interventions. To significantly advance the science of time-limited interventions, innovative research methods will likely be required. The traditional method of studying treatment packages, the RCT, is a highly useful approach for determining the efficacy of multi-component treatments over control conditions that is nonetheless uninformative regarding which components drive outcomes for which participants. This is an important limitation, as treatment packages may include inactive components that needlessly increase cost and duration without providing additional benefit. Identifying “active ingredients” is essential to developing more potent brief interventions.

One approach for identifying active components is the “distillation and matching” meta-analytic strategy [92]. “Distilling” involves codifying treatment packages by their individual treatment components (e.g., does the treatment include a problem-solving skills element?) and other important study factors (e.g., participant or setting characteristics) that can then be “matched” to certain patient profiles. For example, when presented with a Black 14-year-old boy with an HbA1c of > 10.0%, a clinician could determine which treatment components are most common across successful therapies for similar individuals. Utilizing similar logic, Hilliard and colleagues [35•] identified common components of seven efficacious behavioral interventions for youth with T1D that can be delivered by a range of healthcare professionals. Continued synthesis of the literature in this manner may maximize the utility of existing data and help to identify especially potent interventions.

The traditional experimental approach to identifying active components is to conduct dismantling studies, in which one or more components of the treatment package is compared with the entire package. In a classic example, behavioral activation alone was as effective as

a full cognitive-behavioral therapy package that included behavioral activation for reducing depression in a randomized trial [93]. This method effectively isolates the effects of individual intervention components, but fully dismantling interventions with numerous components in this manner would require either extremely large or numerous RCTs to compare each possible combination of components, which may be cost-prohibitive. More recently, an alternative approach has been proposed as part of the Multiphase Optimization Strategy (MOST) methodological framework [94], in which potential intervention components are evaluated using alternative experimental methods (e.g., factorial trials and sequential multiple randomization trials) to identify which components should be included. The optimized interventions can then be evaluated in an RCT. Importantly, MOST is designed to develop interventions that produce “the best expected outcome obtainable within key constraints imposed by the need for efficiency, economy, and/or scalability [94].” For example, researchers could systematically identify the most effective combination of intervention components to be delivered in four 20-min consultations adjunct to usual medical care.

Developing interventions for maximal effectiveness within a set of constraints requires understanding those constraints from the perspectives of key stakeholders, including providers, practice managers, patients, families, allied and behavioral health professionals, payers, and policy makers. For example, providers in the Diabetes Strengths Study [42•] reported very positive experiences: high comfort with intervention delivery, perception that time spent intervening was valuable, and desire to integrate intervention into routine care. These findings are promising with regard to provider acceptance and adoption; however, providers were selected for the study based on their interest in behavioral research and often had more psychosocial training and longer appointment times than is typical. What criteria (e.g., level of training required, time to deliver, cost) would a prospective intervention need to meet in order to be adopted by a broader range of providers and implemented in diverse clinical settings? Answering such questions requires balancing rigorous experimentation of interventions with an appreciation of the pragmatic realities of settings for which those interventions are intended. Effectiveness-implementation hybrid designs, which sacrifice internal validity to varying degrees in order to enhance external validity [95], are one approach. As Price et al. [96•] recently detailed, utilization of established dissemination and implementation science frameworks such as the Consolidated Framework for Implementation Research [97] and RE-AIM [82] in the design and evaluation of T1D research may also enhance translational value. Regardless of the exact method, an overarching recognition of the need to produce “practice-based evidence” in addition to promoting evidence-based practice is likely essential to effective diffusion of clinical innovations [83].

Conclusion

The growing integration of medical and behavioral health services provides an unprecedented opportunity to better the lives of youth with T1D and their families through improved self-management and reduced DD. While the field attempts to accelerate the evidence base for easily accessible psychosocial interventions for T1D that fit into this multi-disciplinary framework, providers, clinics, and the broader healthcare system must

recognize the limitations to currently available research and invest efforts in further developing and evaluating interventions most likely to impact a patient in a single session. This is especially important for behavioral health providers, given the likelihood that any given contact may represent the only opportunity to create behavioral change [22]. Similarly, considering the number of sessions associated with changes in self-management for clinic-integrated quarterly interventions [49], and the low engagement in behavioral interventions evidenced even in heavily resourced healthcare systems [21], behavioral health specialists and medical providers should routinely incorporate interventions (e.g., MI) to improve retention. On a clinic level, investments in formal psychosocial screening systems, provider training in evidence-based communication styles, and technology-based behavioral health adjuncts, in addition to access to specially trained behavioral health providers [79] are recommended. Finally, for such practices to be sustained, healthcare systems should commit financial resources and infrastructure, including increased reimbursement for psychosocial screening and behavioral health services [84], consistent with recommendations for improving outcomes for youth with T1D that may reduce long-term financial burden [98]. While real-world providers and systems attempt to apply what is known to effectively combat the steady tide of difficulties experienced by youth with T1D, the field of psychosocial intervention has substantial room for growth in identifying pragmatic and efficient means of improving self-management and DD.

Funding Information

This manuscript was supported by grant number K12 HS022981 from the Agency for Healthcare Research and Quality (for ARR).

References

Papers of particular interest, published recently, have been highlighted as:

• Of importance

•• Of major importance

1. Foster NC, Beck RW, Miller KM, Clements MA, Rickels MR, DiMeglio LA, et al. State of type 1 diabetes management and outcomes from the T1D Exchange in 2016–2018. *Diabetes Technol Ther*. 2019;21(2):66–72. 10.1089/dia.2018.0384. [PubMed: 30657336]
2. Hood KK, Peterson CM, Rohan JM, Drotar D. Association between adherence and glycemic control in pediatric type 1 diabetes: a meta-analysis. *Pediatrics*. 2009;124(6):e1171–e9. [PubMed: 19884476]
3. Iturralde E, Rausch JR, Weissberg-Benchell J, Hood KK. Diabetes-related emotional distress over time. *Pediatrics*. 2019;143(6): e20183011 10.1542/peds.2018-3011. [PubMed: 31043453]
4. Hagger V, Hendrieckx C, Cameron F, Pouwer F, Skinner TC, Speight J. Diabetes distress is more strongly associated with HbA1c than depressive symptoms in adolescents with type 1 diabetes: results from Diabetes MILES Youth—Australia. *Pediatr Diabetes*. 2018;19(4):840–7. [PubMed: 29383803]
5. Hood KK, Rohan JM, Peterson CM, Drotar D. Interventions with adherence-promoting components in pediatric type 1 diabetes: meta-analysis of their impact on glycemic control. *Diabetes Care*. 2010;33(7):1658–64. [PubMed: 20587726]
6. Graves MM, Roberts MC, Rapoff M, Boyer A. The efficacy of adherence interventions for chronically ill children: a meta-analytic review. *J Pediatr Psychol*. 2010;35(4):368–82. 10.1089/dia.2018.0384 [PubMed: 19710248]

7. Pai AL, McGrady M. Systematic review and meta-analysis of psychological interventions to promote treatment adherence in children, adolescents, and young adults with chronic illness. *J Pediatr Psychol*. 2014;39(8):918–31. 10.1093/jpepsy/jsu038. [PubMed: 24952359]
8. Rothwell PM. External validity of randomised controlled trials: “to whom do the results of this trial apply?”. *Lancet*. 2005;365(9453): 82–93. [PubMed: 15639683]
9. Riley WT. Behavioral and social sciences at the National Institutes of Health: adoption of research findings in health research and practice as a scientific priority. *Transl Behav Med*. 2017;7(2): 380–4. [PubMed: 28229306]
10. Ghate D. From programs to systems: deploying implementation science and practice for sustained real world effectiveness in services for children and families. *J Clin Child Adolesc Psychol*. 2016;45(6):812–26. 10.1080/15374416.2015.1077449. [PubMed: 26566999]
11. Atkins MS, Rusch D, Mehta TG, Lakind D. Future directions for dissemination and implementation science: aligning ecological theory and public health to close the research to practice gap. *J Clin Child Adolesc Psychol*. 2016;45(2):215–26. 10.1080/15374416.2015.1050724. [PubMed: 26155972]
12. Hilliard ME, Powell PW, Anderson BJ. Evidence-based behavioral interventions to promote diabetes management in children, adolescents, and families. *Am Psychol*. 2016;71(7):590–601. 10.1037/a0040359 [PubMed: 27690487] This review outlines contemporary behavioral interventions, not limited to brief procedures, that promote optimal diabetes self-management in youth with T1D, summarizing the evidence base for established diabetes skills training programs, family interventions, and multi-systemic interventions.
13. Datye KA, Moore DJ, Russell WE, Jaser SS. A review of adolescent adherence in type 1 diabetes and the untapped potential of diabetes providers to improve outcomes. *Curr Diab Rep*. 2015;15(8):51 10.1007/s11892-015-0621-6. [PubMed: 26084580]
14. Guttmann-Bauman I, Thornton P, Adhikari S, Reifschneider K, Wood M, Hamby T, et al. Pediatric endocrine society survey of diabetes practices in the United States: what is the current state? *Pediatr Diabetes*. 2018;19(5):859–65. [PubMed: 29582520]
15. Rose M, Aronow L, Breen S, Tully C, Hilliard ME, Butler AM, et al. Considering culture: a review of pediatric behavioral intervention research in type 1 diabetes. *Curr Diab Rep*. 2018;18(4):16 10.1007/s11892-018-0987-3. [PubMed: 29473103]
16. Baxter J, Vehik K, Johnson SB, Lernmark B, Roth R, Simell T, et al. Differences in recruitment and early retention among ethnic minority participants in a large pediatric cohort: the TEDDY Study. *Contemp Clin Trials*. 2012;33(4):633–40. [PubMed: 22484339]
17. Semenkovich K, Berlin KS, Ankney RL, Klages KL, Keenan ME, Rybak TM, et al. Predictors of diabetic ketoacidosis hospitalizations and hemoglobin A1c among youth with Type 1 diabetes. *Health Psychol*. 2019;38(7):577–85. 10.1037/hea0000719. [PubMed: 30973748]
18. Strauss K, MacLean C, Troy A, Littenberg B. Driving distance as a barrier to glycemic control in diabetes. *J Gen Intern Med*. 2006;21(4):378. [PubMed: 16686817]
19. Lopez-Class M, Jurkowski J. The limits of self-management: community and health care system barriers among Latinos with diabetes. *J Hum Behav Soc Environ*. 2010;20(6):808–26. [PubMed: 21686047]
20. Karlson CW, Rapoff MA. Attrition in randomized controlled trials for pediatric chronic conditions. *J Pediatr Psychol*. 2009;34(7):782–93. 10.1093/jpepsy/jsn122. [PubMed: 19064607]
21. Schwartz DD, Cline VD, Axelrad ME, Anderson BJ. Feasibility, acceptability, and predictive validity of a psychosocial screening program for children and youth newly diagnosed with type 1 diabetes. *Diabetes Care*. 2011;34(2):326–31. 10.2337/dc10-1553. [PubMed: 21216856]
22. Markowitz JT, Volkening LK, Laffel LM. Care utilization in a pediatric diabetes clinic: cancellations, parental attendance, and mental health appointments. *J Pediatr*. 2014;164(6):1384–9. [PubMed: 24612905]
23. Chiang JL, Kirkman MS, Laffel LM, Peters AL. Type 1 diabetes through the life span: a position statement of the American Diabetes Association. *Diabetes Care*. 2014;37(7):2034–54. [PubMed: 24935775]

24. Murphy HR, Rayman G, Skinner TC. Psycho-educational interventions for children and young people with Type 1 diabetes. *Diabet Med.* 2006;23(9):935–43. 10.1111/j.1464-5491.2006.01816.x. [PubMed: 16922699]
25. Beck J, Greenwood DA, Blanton L, Bollinger ST, Butcher MK, Condon JE, et al. 2017 National standards for diabetes self-management education and support. *Diabetes Educ.* 2018;45(1): 34–49. 10.1177/0145721718820941. [PubMed: 30558523]
26. Phelan H, Lange K, Cengiz E, Gallego P, Majaliwa E, Pelicand J, et al. ISPAD Clinical Practice Consensus Guidelines 2018: diabetes education in children and adolescents. *Pediatr Diabetes.* 2018;19(S27):75–83. 10.1111/pedi.12762. [PubMed: 30175451]
27. Hill-Briggs F, Gemmell L. Problem solving in diabetes self-management and control. *Diabetes Educ.* 2007;33(6):1032–50. 10.1177/0145721707308412. [PubMed: 18057272]
28. Hampson SE, Skinner TC, Hart J, Storey L, Gage H, Foxcroft D, et al. Effects of educational and psychosocial interventions for adolescents with diabetes mellitus: a systematic review. *Health Technol Assess.* 2001;5(10):1–79.
29. Funnell MM, Tang TS, Anderson RM. From DSME to DSMS: Developing empowerment-based diabetes self-management support. *Diabetes Spectr.* 2007;20(4):221–6. 10.2337/diaspect.20.4.221.
30. Channon SJ, Huws-Thomas MV, Rollnick S, Hood K, Cannings-John RL, Rogers C, et al. A multicenter randomized controlled trial of motivational interviewing in teenagers with diabetes. *Diabetes Care.* 2007;30(6):1390–5. 10.2337/dc06-2260. [PubMed: 17351283]
31. Stanger C, Ryan SR, Delhey LM, Thrailkill K, Li Z, Li Z, et al. A multicomponent motivational intervention to improve adherence among adolescents with poorly controlled type 1 diabetes: a pilot study. *J Pediatr Psychol.* 2013;38(6):629–37. [PubMed: 23699750]
32. Gayes LA, Steele RG. A meta-analysis of motivational interviewing interventions for pediatric health behavior change. *J Consult Clin Psychol.* 2014;82(3):521–35. 10.1037/a0035917. [PubMed: 24547922]
33. Wang Y-C, Stewart SM, Mackenzie M, Nakonezny PA, Edwards D, White PC. A randomized controlled trial comparing motivational interviewing in education to structured diabetes education in teens with type 1 diabetes. *Diabetes Care.* 2010;33(8):1741–3. 10.2337/dc10-0019. [PubMed: 20484124]
34. Powell PW, Hilliard ME, Anderson BJ. Motivational interviewing to promote adherence behaviors in pediatric type 1 diabetes. *Curr Diab Rep.* 2014;14(10):531 10.1007/s11892-014-0531-z. [PubMed: 25142716]
35. Hilliard ME, De Wit M, Wasserman RM, Butler AM, Evans M, Weissberg-Benchell J, et al. Screening and support for emotional burdens of youth with type 1 diabetes: strategies for diabetes care providers. *Pediatr Diabetes.* 2018;19(3):534–43. 10.1111/pedi.12575 [PubMed: 28940936] This article reviews recommended practical strategies for providers to screen and support behavioral issues as part of routine care.
36. Robling M, McNamara R, Bennert K, Butler CC, Channon S, Cohen D, et al. The effect of the Talking Diabetes consulting skills intervention on glycaemic control and quality of life in children with type 1 diabetes: cluster randomised controlled trial (DEPICTED study). *BMJ.* 2012;344:e2359 10.1136/bmj.e2359. [PubMed: 22539173]
37. Söderlund LL, Madson MB, Rubak S, Nilsen P. A systematic review of motivational interviewing training for general health care practitioners. *Patient Educ Couns.* 2011;84(1):16–26. [PubMed: 20667432]
38. Wyatt KD, List B, Brinkman WB, Prutsky Lopez G, Asi N, Erwin P, et al. Shared decision making in pediatrics: a systematic review and meta-analysis. *Acad Pediatr.* 2015;15(6):573–83 10.1016/j.acap.2015.03.011. [PubMed: 25983006]
39. Miller VA, Jawad AF. Relationship of youth involvement in diabetes-related decisions to treatment adherence. *J Clin Psychol Med Settings.* 2014;21(2):183–9. 10.1007/s10880-014-9388-1. [PubMed: 24659299]
40. Wysocki T, Hirschfeld F, Miller L, Izenberg N, Dowshen SA, Taylor A et al. Consideration of insulin pumps or continuous glucose monitors by adolescents with type 1 diabetes and their parents: stakeholder engagement in the design of web-based decision aids. 2016;42(4):395–407 . doi:10.1177/0145721716647492. [PubMed: 27150606]

41. Husted GR, Thorsteinsson B, Esbensen BA, Glud C, Winkel P, Hommel E, et al. Effect of guided self-determination youth intervention integrated into outpatient visits versus treatment as usual on glycemic control and life skills: a randomized clinical trial in adolescents with type 1 diabetes. *Trials*. 2014;15(1):321. [PubMed: 25118146]
42. Hilliard ME, Eshtehardi SS, Minard CG, Wheat S, Gunn S, Sanders C, et al. Featured article: Strengths-based, clinic-integrated nonrandomized pilot intervention to promote type 1 diabetes adherence and well-being. *J Pediatr Psychol*. 2018;44(1):5–15. This study provides an example of a brief (5–10 min) clinic-integrated, provider-led intervention designed specifically for youth with T1D. Preliminary results suggest high acceptability by providers and families, as well as improvements to adolescent self-management behaviors and diabetes distress.
43. De Wit M, Delemarre-van de Waal HA, Bokma JA, Haasnoot K, Houdijk MC, Gemke RJ et al. Monitoring and discussing health-related quality of life in adolescents with type 1 diabetes improve psychosocial well-being: a randomized controlled trial. *Diabetes Care*. 2008;31(8):1521–6. [PubMed: 18509204]
44. De Wit M, Delemarre-van de Waal HA, Bokma JA, Haasnoot K, Houdijk MC, Gemke RJ et al. Follow-up results on monitoring and discussing health-related quality of life in adolescent diabetes care: benefits do not sustain in routine practice. *Pediatr Diabetes*. 2010;11(3):175–81. [PubMed: 19538516]
45. Monaghan M, Clary L, Mehta P, Stern A, Sharkey C, Cogen FR, et al. Checking in: a pilot of a physician-delivered intervention to increase parent–adolescent communication about blood glucose monitoring. *Clin Pediatr*. 2015;54(14):1346–53.
46. Wu YP, Pai AL. Health care provider-delivered adherence promotion interventions: a meta-analysis. *Pediatrics*. 2014;133(6):e1698–707. 10.1542/peds.2013-3639. [PubMed: 24799545]
47. Zolnieriek KB, Dimatteo MR. Physician communication and patient adherence to treatment: a meta-analysis. *Med Care*. 2009;47(8): 826–34. 10.1097/MLR.0b013e31819a5acc. [PubMed: 19584762]
48. Nansel TR, Thomas DM, Liu A. Efficacy of a behavioral intervention for pediatric type 1 diabetes across income. *Am J Prev Med*. 2015;49(6):930–4. 10.1016/j.amepre.2015.05.006. [PubMed: 26231856]
49. Nansel TR, Iannotti RJ, Liu A. Clinic-integrated behavioral intervention for families of youth with type 1 diabetes: randomized clinical trial. *Pediatrics*. 2012;129(4):e866–73. 10.1542/peds.2011-2858. [PubMed: 22392172]
50. Laffel LM, Vangsness L, Connell A, Goebel-Fabbri A, Butler D, Anderson BJ. Impact of ambulatory, family-focused teamwork intervention on glycemic control in youth with type 1 diabetes. *J Pediatr*. 2003;142(4):409–16. 10.1067/mpd.2003.138. [PubMed: 12712059]
51. Holmes CS, Chen R, Mackey E, Grey M, Streisand R. Randomized clinical trial of clinic-integrated, low-intensity treatment to prevent deterioration of disease care in adolescents with type 1 diabetes. *Diabetes Care*. 2014;37(6):1535–43. 10.2337/dc13-1053. [PubMed: 24623027]
52. Carney RM, Schechter K, Davis T. Improving adherence to blood glucose testing in insulin-dependent diabetic children. *Behav Ther*. 1983;14(2):247–54.
53. Petry NM, Rash CJ, Byrne S, Ashraf S, White WB. Financial reinforcers for improving medication adherence: findings from a meta-analysis. *Am J Med*. 2012;125(9):888–96. [PubMed: 22800876]
54. Stoeckel M, Duke D. Diabetes and behavioral learning principles: often neglected yet well-known and empirically validated means of optimizing diabetes care behavior. *Curr Diab Rep*. 2015;15(7):39. 10.1007/s11892-015-0615-4. [PubMed: 25957526]
55. Wagner JA, Petry NM, Weyman K, Tichy E, Cengiz E, Zajac K, et al. Glucose management for rewards: a randomized trial to improve glucose monitoring and associated self-management behaviors in adolescents with type 1 diabetes. *Pediatr Diabetes*. 2019.
56. Wong CA, Miller VA, Murphy K, Small D, Ford CA, Willi SM, et al. Effect of financial incentives on glucose monitoring adherence and glycemic control among adolescents and young adults with type 1 diabetes: a randomized clinical trial. *JAMA Pediatr*. 2017;171(12):1176–83. [PubMed: 29059263]
57. Maranda L, Lau M, Stewart SM, Gupta OT. A novel behavioral intervention in adolescents with type 1 diabetes mellitus improves glycemic control: preliminary results from a pilot randomized

- control trial. *Diabetes Educ.* 2015;41(2):224–30. 10.1177/0145721714567235. [PubMed: 25614529]
58. Unützer J, Harbin H, Schoenbaum M, Druss B. The collaborative care model: an approach for integrating physical and mental health care in Medicaid health homes. *HEALTH HOME, Information Resource Center* 2013:1–13.
 59. Bitsko MJ, Bean MK, Bart S, Foster RH, Thacker L, Francis GL. Psychological treatment improves hemoglobin A1c outcomes in adolescents with type 1 diabetes mellitus. *J Clin Psychol Med Settings.* 2013;20(3):333–42. 10.1007/s10880-012-9350-z. [PubMed: 23712594]
 60. Kichler JC, Harris MA, Weissberg-Benchell J. Contemporary roles of the pediatric psychologist in diabetes care. *Curr Diabetes Rep.* 2015;11(4):210–21.
 61. Harris MA, Hood KK, Weissberg-Benchell J. *Teens with diabetes: a clinician's guide.* Alexandria: American Diabetes Association; 2014.
 62. Ingerski LM, Anderson BJ, Dolan LM, Hood KK. Blood glucose monitoring and glycemic control in adolescence: contribution of diabetes-specific responsibility and family conflict. *J Adolesc Health.* 2010;47(2):191–7. [PubMed: 20638012]
 63. Hilliard ME, Wu YP, Rausch J, Dolan LM, Hood KK. Predictors of deteriorations in diabetes management and control in adolescents with type 1 diabetes. *J Adolesc Health.* 2013;52(1):28–34. 10.1016/j.jadohealth.2012.05.009. [PubMed: 23260831]
 64. Williams LB, Laffel LM, Hood KK. Diabetes-specific family conflict and psychological distress in paediatric type 1 diabetes. *Diabet Med.* 2009;26(9):908–14. 10.1111/j.1464-5491.2009.02794.x. [PubMed: 19719712]
 65. Weissberg-Benchell J. Personal communication. 11 15, 2019.
 66. Grey M, Berry D. Coping skills training and problem solving in diabetes. *Curr Diab Rep.* 2004;4(2):126–31. [PubMed: 15035973]
 67. Grey M, Jaser SS, Whittemore R, Jeon S, Lindemann E. Coping skills training for parents of children with type 1 diabetes: 12-month outcomes. *Nurs Res.* 2011;60(3):173. [PubMed: 21522034]
 68. Iturralde E, Weissberg-Benchell J, Hood KK. Avoidant coping and diabetes-related distress: pathways to adolescents' type 1 diabetes outcomes. *Health Psychol.* 2017;36(3):236–44. 10.1037/hea0000445. [PubMed: 27808528]
 69. Kamody RC, Berlin KS, Rybak TM, Klages KL, Banks GG, Ali JS, et al. Psychological flexibility among youth with type 1 diabetes: relating patterns of acceptance, adherence, and stress to adaptation. *Behav Med.* 2018;44(4):271–9. [PubMed: 28524766]
 70. Gillanders DT, Barker E. Development and initial validation of a short form of the diabetes acceptance and Action Scale: The DAAS-Revised (DAAS-R). *J Contextual Behav Sci.* 2019;14:20–8.
 71. Graham CD, Gouick J, Krahe C, Gillanders D. A systematic review of the use of Acceptance and Commitment Therapy (ACT) in chronic disease and long-term conditions. *Clin Psychol Rev.* 2016;46:46–58. [PubMed: 27176925]
 72. Hayes SC, Strosahl K, Wilson KG. *Acceptance and Commitment Therapy: an experiential approach to behavior change.* New York: Guilford; 1999.
 73. Campbell-Sills L, Barlow DH, Brown TA, Hofmann SG. Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behav Res Ther.* 2006;44(9):1251–63. 10.1016/j.brat.2005.10.001. [PubMed: 16300723]
 74. Eifert GH, Heffner M. The effects of acceptance versus control contexts on avoidance of panic-related symptoms. *J Behav Ther Exp Psychiatry.* 2003;34(3–4):293–312. 10.1016/j.jbtep.2003.11.001. [PubMed: 14972675]
 75. Barreto M, Tran TA, Gaynor ST. A single-session of Acceptance and Commitment Therapy for health-related behavior change: an open trial with a nonconcurrent matched comparison group. *J Contextual Behav Sci.* 2019;13:17–26. 10.1016/j.jcbs.2019.06.003 This study provides an example of a one-session intervention protocol using Acceptance Commitment Therapy to target health behavior change.
 76. Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W, et al. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an

- international consensus for the reporting of behavior change interventions. *Ann Behav Med*. 2013;46(1):81–95. 10.1007/s12160-013-9486-6. [PubMed: 23512568]
77. Fisher L, Gonzalez J, Polonsky W. The confusing tale of depression and distress in patients with diabetes: a call for greater clarity and precision. *Diabet Med*. 2014;31(7):764–72. [PubMed: 24606397]
 78. Fisher L, Skaff MM, Mullan JT, Areal P, Mohr D, Masharani U, et al. Clinical depression versus distress among patients with type 2 diabetes. Not just a question of semantics. *Diabetes Care*. 2007;30(3):542–8. 10.2337/dc06-1614. [PubMed: 17327318]
 79. Young-Hyman D, de Groot M, Hill-Briggs F, Gonzalez JS, Hood K, Peyrot M. Psychosocial care for people with diabetes: a position statement of the American Diabetes Association. *Diabetes Care*. 2016;39(12):2126–40. 10.2337/dc16-2053. [PubMed: 27879358]
 80. Mulvaney SA, Anders S, Smith AK, Pittel EJ, Johnson KB. A pilot test of a tailored mobile and web-based diabetes messaging system for adolescents. *J Telemed Telecare*. 2012;18(2):115–8. 10.1258/jtt.2011.111006. [PubMed: 22383802]
 81. Franklin VL, Waller A, Pagliari C, Greene SA. A randomized controlled trial of Sweet Talk, a text-messaging system to support young people with diabetes. *Diabet Med*. 2006;23(12):1332–8. 10.1111/j.1464-5491.2006.01989.x. [PubMed: 17116184]
 82. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health*. 1999;89(9):1322–7. 10.2105/ajph.89.9.1322. [PubMed: 10474547]
 83. Green LW. Making research relevant: if it is an evidence-based practice, where's the practice-based evidence? *Fam Pract*. 2008;25(suppl_1):i20–i4. [PubMed: 18794201]
 84. Yarbrow JL, Mehlenbeck R. Financial analysis of behavioral health services in a pediatric endocrinology clinic. *J Pediatr Psychol*. 2016;41(8):879–87. 10.1093/jpepsy/jsv109. [PubMed: 26611708]
 85. Raiff BR, Dallery J. Internet-based contingency management to improve adherence with blood glucose testing recommendations for teens with type 1 diabetes. *J Appl Behav Anal*. 2010;43(3):487–91. [PubMed: 21358907]
 86. Kumar VS, Wentzell KJ, Mikkelsen T, Pentland A, Laffel LM. The DAILY (Daily Automated Intensive Log for Youth) trial: a wireless, portable system to improve adherence and glycemic control in youth with diabetes. *Diabetes Technol Ther*. 2004;6(4):445–53. 10.1089/1520915041705893. [PubMed: 15320998]
 87. Duke DC, Barry S, Wagner DV, Speight J, Choudhary P, Harris MA. Distal technologies and type 1 diabetes management. *Lancet Diabetes Endocrinol*. 2018;6(2):143–56. [PubMed: 28867311]
 88. Plante WA, Lobato DJ. Psychosocial group interventions for children and adolescents with type 1 diabetes: the state of the literature. *Child Health Care*. 2008;37(2):93–111.
 89. Weissberg-Benchell J, Vesco AT, Rychlik K. Diabetes camp still matters: relationships with diabetes-specific distress, strengths, and self-care skills. *Pediatr Diabetes*. 2019;20(3):353–60. 10.1111/pedi.12836. [PubMed: 30793473]
 90. Litchman ML, Walker HR, Ng AH, Wawrzynski SE, Oser SM, Greenwood DA, et al. State of the science: a scoping review and gap analysis of diabetes online communities. *J Diabetes Sci Technol*. 2019;13(3):466–92. [PubMed: 30854884]
 91. Markowitz JT, Laffel LM. Transitions in care: support group for young adults with type 1 diabetes. *Diabet Med*. 2012;29(4):522–5. 10.1111/j.1464-5491.2011.03537.x. [PubMed: 22150392]
 92. Chorpita BF, Daleiden EL, Weisz JR. Identifying and selecting the common elements of evidence based interventions: a distillation and matching model. *Ment Health Serv Res*. 2005;7(1):5–20. [PubMed: 15832690]
 93. Jacobson NS, Dobson KS, Truax PA, Addis ME, Koerner K, Gollan JK, et al. A component analysis of cognitive-behavioral treatment for depression. *J Consult Clin Psychol*. 1996;64(2):295–304. 10.1037//0022-006x.64.2.295. [PubMed: 8871414]
 94. Collins LM. Optimization of Behavioral, Biobehavioral, and Biomedical Interventions Statistics for Social and Behavioral Sciences. Cham: Springer; 2018.
 95. Curran GM, Bauer M, Mittman B, Pyne JM, Stetler C. Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance

public health impact. *Med Care*. 2012;50(3):217–26. 10.1097/MLR.0b013e3182408812. [PubMed: 22310560]

96. Price J, Beidas RS, Wolk CB, Genuario K, Kazak AE. Implementation science in pediatric psychology: the example of type 1 diabetes. *J Pediatr Psychol*. 2019;44(9):1068–73. 10.1093/jpepsy/jsz030 [PubMed: 31045228] This article details how implementation science frameworks can be used to guide research to advance the practice of pediatric diabetes care.
97. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. 2009;4(1):50. [PubMed: 19664226]
98. Bismuth E, Laffel L. Can we prevent diabetic ketoacidosis in children? *Pediatr Diabetes*. 2007;8:24–33. [PubMed: 17727382]

Table 1

Examples of brief interventions for self-management and diabetes distress

Intervention	Patient/family characteristics	Target processes of change	Key elements
CEO Model of Diabetes Management [61]	<ul style="list-style-type: none"> Youth is either a non-participant in diabetes management or overly independent Parent has either abdicated responsibility for diabetes care or is highly controlling 	<ul style="list-style-type: none"> Promote adolescent autonomy while maintaining adequate parental support Reduce role confusion and family conflict 	<ul style="list-style-type: none"> Youth is described as the “CEO” of a diabetes “company” No one can run a company successfully by oneself Family, healthcare providers, teachers, and others in the youth’s life are potential “employees” in the diabetes company It is up to the CEO to decide who to hire, what tasks to assign them, and how to provide and solicit feedback
Trading Privacy for Nagging Experiment [61]	<ul style="list-style-type: none"> Frequent parent suggestions and questioning about T1D (e.g., what did you eat?) Youth experiences parental involvement as “nagging,” criticism, and/or distrust Youth responds with resistance 	<ul style="list-style-type: none"> Reduce negative parent-child communications surrounding diabetes self-management tasks Reinforce the youth behavior of sharing diabetes information with parents Promotes a calm parent response to youth self-management 	<ul style="list-style-type: none"> Youth’s perception of time spent in diabetes care (minutes) versus time being nagged about diabetes care (hours) is elicited Families try an experiment for 2 weeks in which the youth completes diabetes care tasks in front of their parents Youth agrees to give up some privacy Parents, in return, agree not to make comments related to diabetes care
Tape Over the Meter [65]	<ul style="list-style-type: none"> Youth is “shooting in the dark” (i.e., taking insulin without checking BGLs) BGLs judged as “good” or “bad” by youth or family High personal frustration and/or family discord when BGLs are out of range 	<ul style="list-style-type: none"> Reduce negative emotions and parent-child conflict associated with out of range BGLs Reinforce behaviors associated with using their glucometer (i.e., inserting test strip, pricking finger, massaging finger for blood, touching test strip to blood) regardless of current BGL 	<ul style="list-style-type: none"> Glucometer display is covered with tape so readout is not visible Youth is directed to use glucometer at appropriate times without reviewing BGLs Parents are directed to praise the behavior of glucometer use Once desired rate of glucometer use is established, tape is removed BGLs are valued as neutral data to inform decision-making rather than as “good” or “bad”
Role-playing to increase assertiveness [66]	<ul style="list-style-type: none"> Youth is hesitant to disclose diabetes status or to engage in diabetes care in certain social scenarios 	<ul style="list-style-type: none"> Reduce distress associated with difficult social scenarios via imaginal exposure Improve communication skills via rehearsal and feedback Reduce avoidance of diabetes care tasks in social scenarios 	<ul style="list-style-type: none"> Youth and provider mutually identify an appropriate communication strategy for the specified scenario Provider models appropriate communication Youth role-plays scenario with provider Youth provides self-feedback and receives feedback from provider

CEO, chief executive officer; *BGL*, blood glucose level; *T1D*, type 1 diabetes

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2**Example of a brief exchange to reduce diabetes distress: The Finger Trap Metaphor**

Provider: It sounds like you have really been struggling with your diabetes. It must be difficult.
Youth: Yeah, I'm really sick of it.
Provider: When there is something difficult or uncomfortable in your life, it's pretty natural to try to avoid it or even pretend like it is not there.
Youth: Yeah.
Provider: That reminds me of something. Do you know what a finger trap is? Maybe you got one as a party favor or a prize when you were younger.
Youth: Yeah, I know what those are.
Provider: Let us think about how a finger trap works. You put your fingers in and start to pull out, then what happens?
Youth: It grabs you.
Provider: Right! It grabs you. In fact, the harder you pull, the harder it grabs you and more it restricts your movements. The more you try to escape it, the more it controls you. Isn't that kind of how your diabetes works?
Youth: Hmmm
Provider: You did not choose to have diabetes, and if you could you would probably wish it away, but you cannot. It makes sense that you want to pull away from it, but when you do it with diabetes, it starts to take over your life; you do not feel as well, your parents are on your case, or maybe you end up in the hospital for DKA. It's a fight you cannot win.
Youth: I guess so.
Provider: Let me ask you this, how do you loosen up a finger trap?
Youth: Stop pulling?
Provider: Yeah, right. You would have to stop fighting with it. You might even need to push your fingers in. You need to go *into* the trap to loosen its grip on you! Notice when you push in that you are still in the trap. It did not go anywhere and neither will diabetes, but now at least it's not so restricting. You have space to move around. Maybe diabetes works the same way. If you can find a way to accept it — not like it, but be willing to work with it — maybe it will not feel like it's so restricting, and you can get back to what's important to you.

We tend to keep a stash of finger traps handy for just such an occasion, but the physical object is not essential to effectively deploying the technique. This technique was originally described by Hayes, Strosahl, and Wilson [72]