In Brief
The ability to self-manage diabetes is crucial for youths with type 1 diabetes and for the prevention of type 2 diabetes. However, such abilities are based not only in education but also in the acquisition of behavioral skills that assist with the application of such knowledge. This review describes a series of studies on a cognitive behavioral intervention called coping skills training, which is designed to enhance youths’ ability to manage diabetes.

Coping Skills Training for Youths With Diabetes
During the past 20 years, results of several major trials have demonstrated that intensive management of type 1 and type 2 diabetes can delay or prevent the onset and progression of many complications of the disease.\(^1\)\(^-\)\(^3\) It is also clear from such studies that achieving good glycemic control requires mastering complex self-management skills and behaviors.

In children and adolescents, mastery of such skills is often compromised by normal development. In adolescence, metabolic control tends to deteriorate as a result of the hormonal changes of adolescence associated with insulin resistance\(^4\) and adolescent autonomy associated with lower adherence to the treatment regimen.\(^5\) Adolescence is marked by rapid biological, physical, cognitive, emotional, and social changes.\(^6\)\(^,\)\(^7\)

Adolescents engage in experimentation and risk-taking behaviors that may adversely affect self-care and clinical outcomes.\(^8\) Previous studies have led to the conclusion that the period of adolescence is often associated with neglect of self-monitoring, nutrition therapy recommendations, and pharmacological treatments.\(^9\)\(^,\)\(^10\) Such neglect in self-management is usually not associated with a deficit in knowledge; rather, the cognitive and developmental characteristics of adolescence make appropriate decision making more complex.\(^11\)

Developmentally, adolescence is a time for identity formation and separation of self from families.\(^12\) The shift from parental support to peer support is normal during adolescence. However, it can place adolescents at increased risk for poorer diabetes and psychological adaptation.

Development of relationships with peers is complicated for adolescents who have type 1 diabetes or are at risk for type 2 diabetes. Early adolescents want to be seen as the same as their peers and not to be treated differently. There is a strong fear of non-acceptance by the peer group and exclusion from peer activities that may make adolescents reluctant to disclose their diagnosis.\(^13\) This fear often causes adolescents to deliberately miss blood glucose monitoring and insulin injections or boluses, as well as to eat additional foods without taking the appropriate insulin, all of which are associated with a decline in metabolic control.\(^14\) Although research has shown that friends provide valuable emotional support to adolescents with diabetes,\(^15\) many adolescents express apprehension about friends’ reactions to their diabetes-related self-management tasks.\(^16\)

Social competence has been identified as an area of particular vulnerability for adolescents with a chronic illness that may interfere with their ability to develop close peer relationships.\(^17\) In adolescents with or at risk for diabetes, social competence has been associated with better emotional well-being,\(^15\) better ability to manage stress, and better metabolic control.\(^18\)\(^,\)\(^19\)

Coping is a complex process that can be defined as “constantly chang-
ing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person. According to Lazarus and Folkman, the first step in coping is cognitive appraisal, which is crucial to the impact of a particular disease on a particular child. Having appraised the situation, individuals can implement coping behaviors to reduce distress or manage the problem.

Findings from studies in diabetes indicate that greater use of avoidant (or emotion-focused) coping strategies such as wishful thinking in response to stress is related to poorer metabolic control and poorer psychosocial outcomes, including lower reported quality of life, more depressive symptoms, and lower social competence. In contrast, greater use of approach (or problem-focused) coping strategies has been related to better metabolic control and better psychosocial adjustment in youths with type 1 diabetes. Similarly, greater use of avoidant coping and less use of approach coping has been related to poorer adherence to treatment regimen.

More recent research on coping in youths with other chronic conditions supports a developmentally appropriate model of stress and coping that differentiates between controlled/voluntary and automatic/involuntary responses to stress. This model expands previous conceptualizations of coping to include primary control engagement coping, secondary control engagement coping, disengagement coping, and involuntary engagement or stress reactivity (e.g., physiological arousal or rumination). Primary control engagement coping includes efforts to make a problem less stressful or eliminate one's response to it (e.g., problem solving or emotional expression); secondary control engagement coping includes attempts to adapt to the stressor (e.g., acceptance or distraction), and disengagement coping includes avoidance, denial, and wishful thinking. Previous research has shown, for example, that higher levels of secondary control engagement coping and lower levels of disengagement coping were more effective for coping with pain in a pediatric population.

Cognitive-behavioral interventions such as coping skills training focus primarily on improving behavioral skills necessary to self-manage and achieve better glycemic and psychosocial outcomes in patients with diabetes and in their family members.

Coping Skills Training
Bandura has suggested that individuals can actively influence many areas of their lives. When people can practice and rehearse a new behavior such as learning how to cope successfully with a problem situation, their self-efficacy or self-concept can be enhanced. Furthermore, by enhancing their self-efficacy, they may decrease problems with psychosocial well-being. When individuals cannot cope effectively with a problem situation, their confidence is decreased for dealing with the next problem, and they use less successful coping patterns. Originally developed for work with youths to prevent drug and alcohol use, training in the use of coping skills can teach personal and social behaviors that can assist individuals in dealing with potential stressors they encounter in their daily lives and the stress reactions that may result from these situations. In children and youths without diabetes, such interventions have been demonstrated to reduce substance abuse, improve social adjustment, prevent smoking, and reduce responses to stressors. The skills that are taught include social problem solving, communication skills training (e.g., assertiveness and social skills training), stress management, and cognitive-behavioral modification.

Social problem solving
Social problem solving is a process by which individuals learn to think through the steps of having a problem and reaching a decision about how to handle the problem. The process helps individuals look at all possible outcomes of situations and the possible consequences of their decisions. For youths who tend to view problems from a black-or-white perspective, learning social problem solving can help them see alternative solutions when they are faced with peer or family pressures or any situation in which they are confronted with a dilemma. Forman et al. identified six major problem-solving steps: 1) identify the problem, 2) determine goals, 3) generate alternative solutions, 4) examine consequences, 5) choose the solution, and 6) evaluate the outcome.

Communication skills training
Communication skills training aims to help individuals express themselves in ways that are clear, appropriate, and constructive. Two main skills are identified in communication skills training: social skills training and assertiveness training.

In social skills training, the aim is to teach individuals how to work with others in a way that will result in positive outcomes for all. Children and adolescents tend not to ask directly for what they need or want; often, they say only what they do not want (e.g., “Don’t nag me about doing my glucose tests.”) The steps used to teach social skills training are 1) provide concrete instructions on how to handle a social situation, 2) allow participants to witness a role-play of an appropriate model, 3) have participants practice their own role-play, 4) provide feedback on the participants’ role-play, 5) give participants real-life practice, and 6) carry out group follow-up.

Assertiveness training allows for communication in ways that are direct, honest, and appropriate. Working in a group setting allows participants to observe the behavior of others and to practice and obtain feedback on how effectively they communicate with the other members of the group.

Cognitive-behavioral modification
Cognitive-behavioral modification is focused on understanding one’s own thoughts and feelings and changing self-dialogue to more positive messaging. Children and adolescents use an imaginary audience and often think this audience is highly critical. The three steps of cognitive-behavioral modification—recognition of thoughts and feelings, problem solving, and guided self-dialogue—help youths to identify and change such thoughts. The first step is to work with individuals to reflect on how they think and respond to situations. The individuals’ thoughts are examined to consider whether the thoughts are based on fact or assumption. Once the thoughts are examined, the next step is to solve the social problem. The third step is to teach individuals to use their thoughts to help follow through on the decision they made in the previous step. The aim is to list negative thoughts and formulate alternate positive thoughts to counter them.
Stress management
Childhood and adolescence are stressful, and youths with diabetes report higher levels of stress than their peers without diabetes. Thus, it is important for them to learn stress management techniques. The first step in learning stress management is to be able to articulate the stressors in their lives. Once stressors are identified, the training involves choosing an area in which they can reallocate role responsibilities to others or eliminate unnecessary activities to reduce stress. Problem solving can be used for reducing stress by helping youths find time for themselves. Relaxation techniques are taught, including breathing techniques and guided imagery for altering mental images and emotional responses.

Conflict resolution
Conflict is a central feature of adolescent life and is exaggerated in youths with diabetes. Developmentally, although children and adolescents understand that there are consequences of not taking care of their diabetes, that knowledge is not central to their behavior. This sets up conflict between parents and youths over self-management behaviors.

Conflict resolution allows for the acquisition of skills necessary to resolve conflict in a positive manner. The first step in this training is to develop an understanding that, in any conflict, both parties can win and that every conflict should be approached in this manner. Individuals are helped to focus on clear communication and problem-solving skills. Once the conflict is identified, all possible outcomes and the consequences to these outcomes are explored. Role-playing can be used to model the appropriate behavior.

Evidence for Coping Skills Training With Children and Adolescents
In youths with type 1 diabetes, educational programs that emphasize factual knowledge about the disease process have had disappointing results in improving psychosocial and clinical outcomes when compared to behavioral interventions. 26 Coping skills training increases competence and mastery by retraining inappropriate or nonconstructive coping styles and patterns of behavior toward the development of constructive behaviors.

Using coping skills training for youths with type 1 diabetes was based on the hypothesis that improving coping skills would improve youths' ability to cope with the problems they face on a day-to-day basis in managing diabetes. In the early 1980s, a number of pre-experimental studies of coping skills training were conducted with 5–10 school-aged children and preadolescents. 19, 37, 38 These studies suggested that coping skills training increased appropriate verbal assertiveness and performance in social situations but did not improve self-management or glycemic control.

Several experimental pilot studies also supported the potential of this intervention to help children and adolescents manage diabetes. In one of these studies, 39 diabetes-specific stress was found to decrease significantly after stress management training, but glycemic control, coping styles, self-efficacy, and adherence to regimen remained unchanged.

Mendez and Belendez 36 compared the effect of adolescents receiving routine medical care (n = 19) to a behavioral intervention (n = 18) using a pre- and post-test design with a non-equivalent control group. The 12-week intervention included problem-solving strategies, role-playing, social skills training, exercise, diet, glucose testing, and insulin administration. The experimental group demonstrated significant improvement in barriers to adherence, severity of daily hassles, skill at and frequency of blood glucose testing, and degree of uneasiness in social interaction. These improvements were maintained during 13 months. Patients' knowledge of glucose testing, insulin administration, diet, and diabetes pathophysiology were also improved.

Grey et al. 40 reported the results of a prospective randomized clinical trial conducted to determine whether coping skills training would improve glycemic and psychosocial outcomes in adolescents with type 1 diabetes implementing intensive diabetes management. In these studies, subjects were randomly assigned to receive coping skills training or enhanced education in addition to intensive management of diabetes. The studies examined the short-term effects of coping skills training as an adjunct to intensive therapy in adolescents (n = 65) between the age of 13 and 20 years (mean 16.5 years) who elected to initiate intensive diabetes management. At 3 months, results demonstrated that adolescents who received coping skills training had lower A1C levels, better diabetes self-efficacy, and less distress about coping with their diabetes than adolescents receiving intensive management alone. In addition, adolescents who received coping skills training found it easier to cope with their diabetes and experienced less of a negative impact from diabetes on their quality of life than those who did not receive the training.

The long-lasting effects of coping skills training on glycemic control and quality of life for adolescents with type 1 diabetes were examined in the same cohort of subjects. 41 The question studied was whether the initial effects on glycemic control and quality of life associated with coping skills training combined with intensive diabetes management could be sustained for 1 year. The sample for this analysis included 77 subjects (43 females, 95% white) who were 12–20 years of age (mean 14.2 years) and had a mean duration of diabetes of 8.7 years. At the 1-year follow-up, subjects in the coping skills training group had significantly lower A1C levels, improved diabetes and medical self-efficacy, and a lower impact of diabetes on their quality of life than youths receiving routine diabetes care in the control group. In male subjects, coping skills training did not affect adverse outcomes such as hypoglycemia, diabetic ketoacidosis, or weight gain, but in female subjects, coping skills training decreased the incidence of weight gain and hypoglycemic episodes.

Building on this work, Grey et al. 42 studied whether providing coping skills training to preadolescent youths with type 1 diabetes would reduce problems as they enter adolescence. The purpose of this randomized trial (n = 82) was to determine the effects, mediators, and moderators of a coping skills training intervention for school-aged children compared to general diabetes education. Both groups improved over time, reporting lower impact of diabetes, better coping with diabetes, better diabetes self-efficacy, fewer depressive symptoms, and less parental control. Treatment modality (pump vs. injections) moderated intervention efficacy on select outcomes, with those on pumps who received coping skills training having lower A1C over time. The findings of this study suggested that group-based...
interventions may be beneficial for this age-group.

Although it is recognized that caring for a child with type 1 diabetes is stressful for parents, few interventions have been developed and tested for this population. Thus, the purpose of another study was to compare a group educational intervention for parents of children with type 1 diabetes to a coping skills training intervention. Parents (n = 181) were randomized to education or coping skills training conditions. Parents completed measures of family conflict, responsibility for treatment, coping, and quality of life at baseline, 3 months, 6 months, and 12 months after the intervention. Clinical data (i.e., A1C) were collected from children's medical records before and after the intervention. There were no significant treatment effects 12 months after the intervention, but parents in both groups reported significantly improved coping, less responsibility for treatment management, and improved quality of life. Although children's metabolic control worsened over time as would be expected with the onset of puberty, mean values at 12 months were still within the recommended levels (A1C > 8%). These results suggest that group-based interventions for parents of children with type 1 diabetes may lessen the negative impact of diabetes management as youths transition to adolescence.

More recently, in an effort to make the coping skills training program more accessible to youths, Whitemore et al. described the development of an Internet version of the program (TEENCOPE). Preliminary results suggest that multiethnic (n = 163, 48% male, 11.7% African-American, 27% Hispanic) teens aged 11–14 years (mean 12.2 years) found the program acceptable and participate at high rates. The participation rate was 85%, and there was 86% adherence to completion of all sessions of the intervention online. After 6 months, 79% of youths were retained, and 52% had participated in the discussion board. A multisite clinical trial is in progress in which TEENCOPE is being compared to a diabetes problem-solving Internet-based program.

Taken as a group, these studies suggest that in children and adolescents with type 1 diabetes, coping skills training increases the repertoire of skills that youths have to cope with diabetes. By doing so, better glycemic control and improved quality of life are possible through the improved ability to solve problems and maintain self-management behaviors.

Type 2 diabetes in youth is a relatively new phenomenon, but it represents an increasingly substantial proportion of youths newly diagnosed with diabetes. Although there have been few large-scale studies of type 2 diabetes prevention or management in youths with the exception of the TODAY study, our group recently conducted a smaller efficacy trial of a multifaceted, school-based intervention (nutrition and physical activity education and coping skills training) aimed at prevention of type 2 diabetes in a high-risk, minority population (n = 198, 55% African-American, 42% Hispanic) of adolescents at risk for type 2 diabetes by virtue of obesity and family history of diabetes.

In this study, schools were randomized to two intervention groups to avoid individual contamination: educational intervention with or without the addition of coping skills training and health coaching. Students were followed for 12 months. Results showed that students in both groups had some improvement in anthropometric measures, lipids, and depressive symptoms during 12 months. Students who received coping skills training had greater improvement on some indicators of metabolic risk as determined by oral glucose tolerance tests compared to students who received education only. Although more work is warranted, these data suggest that the use of coping skills training techniques may also be useful in developing self-management skills for prevention of type 2 diabetes in high-risk youths.

Discussion

The results of these studies of coping skills training interventions in children and adolescents with or at risk for diabetes have led to the conclusion that these interventions are effective in assisting youths to improve coping with diabetes and to achieve better diabetes outcomes. As more health care providers and patients aim for improved glycemic control and quality of life, the addition of coping skills training to usual diabetes self-management programs may be helpful in aiding children and adolescents as they strive to achieve and maintain treatment goals. In addition to providing coping skills training in groups, preliminary studies suggest that these techniques can be adapted not only to clinic and school settings, but also in Internet and social media formats that represent the way youths communicate. Such interventions are aimed at preventing serious problems that may emerge during early adolescence and are difficult to correct.

There are limitations to the literature on stress and coping in diabetes. Controversy surrounds the measurement of coping using global, retrospective questionnaires or real-time self-reports. There are also design issues in that most studies are cross-sectional and not longitudinal. Some experimental studies are not explicitly derived from a particular theoretical approach. Furthermore, the coping skills taught in the studies described here are based on the empirical literature involving cross-sectional and longitudinal studies, but they do not represent a unified theoretical approach to coping.

Although more experimental research is needed, especially in minority populations and on the efficacy and effectiveness of coping skills training delivered via social media, the addition of coping skills training interventions to the clinical care of children and adolescents with diabetes appears warranted. Such interventions can be incorporated into routine diabetes education programs or the content included in regular diabetes care visits.

Interventions using coping skills training and problem solving for children and adolescents and their families should be individualized to their lifestyle. A key element of using coping skills training in practice is to avoid telling youths what to do, but instead to help them develop alternatives with the clinician’s support. In the context of busy practice, such an approach takes more time but may support youths in making better decisions at home.

Behavioral theory should be used in the design of future studies to increase the understanding of behavior change in the self-management of diabetes. Behavioral interventions must be practically designed, be feasible in a variety of settings, reach multiethnic populations, measure long-term physiological and psychosocial outcomes, and be cost-effective. Future research must use high methodological quality, study diverse populations and settings,
and use interventions that are generalizable to test the effectiveness of interventions in relation to glycemic control, quality of life, and depression.

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