

MATERNAL OPTIMISM AND ITS RELATIONSHIP TO COPING AND
ILLNESS MANAGEMENT AMONG ADOLESCENTS WITH TYPE 1
DIABETES

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DEDICATION

I would like to dedicate this work to those who have encouraged, supported, and inspired me to pursue my dreams, and especially to my wife; she has been my cornerstone of support and inspiration.

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by

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The University of Texas Southwestern Medical Center at Dallas, 2010

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Optimism is an intriguing construct because of its relationships with positive physiological and psychological outcomes in times of adversity, including chronic illness. Coping styles often mediate significant relationships between optimism and these outcomes. Type 1 Diabetes can be difficult to manage for adolescents, and their mothers play important roles in helping and teaching them how to effectively manage their illness. Adolescents with Type 1 Diabetes often struggle with psychological adjustment,

treatment adherence, and maintaining healthy metabolic control. The relationships between one maternal personality trait, dispositional optimism, and these three key outcome variables with regard to the management of adolescent Type 1 Diabetes were investigated using the Revised Life Orientation Test, Children's Depression Inventory, Revised Self Care Inventory, and HbA1c. Adolescent coping style, assessed by a structured Stress and Coping Interview, was investigated as a possible factor mediating the proposed relationships between maternal optimism and the outcome variables. Participants were 130 mother-adolescent dyads. Adolescents were 14.5 years old, 56% female, 93% Caucasian, and 59% were using an insulin pump. Initial correlations revealed maternal optimism was associated with better adolescent adherence and metabolic control, and trended towards a relationship with fewer adolescent depressive symptoms. Relationships between maternal optimism and adolescent adherence and metabolic control remained significant when controlling for maternal trait anxiety and adolescent insulin pump status. However, adolescent coping styles were not found to mediate these relationships. The absence of a mediation role for coping styles may have reflected the presence of very low levels of avoidance coping in the sample. Exploratory analyses examined an alternative mediational pathway, and verified maternal and adolescent reports of adherence as indirect pathways between maternal optimism and adolescent metabolic control. These findings are the first to reveal associations between caregiver personality traits and the health outcomes in those for whom they care, and provide evidence of the potential processes involved. These findings suggest that maternal optimism may serve as a resource during a difficult time of development for adolescents with Type 1 Diabetes.

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CHAPTER ONE

Introduction

Type 1 diabetes mellitus is a serious illness with potentially grave side effects that impact children, adolescents, and adults. It was traditionally believed to have a childhood onset and has also been referred to as juvenile onset diabetes, but it can come about at any age. Diabetes is caused by the immune system's attack upon insulin producing pancreatic beta cells which results in the deregulation of the body's blood glucose levels. Insulin is necessary for providing the body energy through carbohydrate metabolism. Without insulin, the body becomes starved of energy, which can have serious consequences. Proper illness management requires continual monitoring of diet, exercise, and blood glucose levels, as well as administration of insulin to compensate for the body's lack of insulin production. Diabetes illness management is both demanding and challenging, and requires a certain amount of fortitude from adolescents and their families. Quality of illness management determines immediate and long-term health and psychosocial well-being. If mismanaged, deregulation of the body's blood glucose levels can directly result in serious consequences including hypoglycemia, hyperglycemia, diabetic ketoacidosis, brain damage, and even death (Desrocher & Rovet, 2004). Long-term complications of diabetes mismanagement include cardiovascular disease, retinopathy, neuropathy, nephropathy, and non-traumatic limb amputation (Deckert, Poulsen, & Larsen, 1978).

Managing diabetes can be difficult during any stage of life, but seems particularly problematic for adolescents. During this time, there is deterioration in metabolic control, adherence, and psychological adjustment which may be related to the

many physical and social-emotional changes of adolescence. Blood glucose levels during this time are poorly maintained relative to younger children with diabetes (Anderson, Auslander, Jung, Miller, & Santiago, 1990; Johnson, 1996; and Johnson et al., 1992) and poorer treatment adherence during adolescence is a well documented trend (Anderson et al., 1990; Jacobson et al., 1987; Johnson, Freund, Silverstein, Hansen, & Malone, 1990; Johnson, Silverstein, Rosenbloom, Carter, & Cunningham, 1986; Johnson et al., 1992; Kovacs, Goldston, Obrosky, & Iyengar, 1992; La Greca, Follansbee, & Skyler, 1990; Weissberg-Benchell et al., 1995). Adolescents with diabetes experience heightened psychological distress relative to younger children and adults (Blanz, Rensch-Rienmann, Fritz-Sigmund, & Schmidt, 1993; Kovacs, Goldston, Obrosky, & Bonar, 1997), and higher rates of Major Depression and Generalized Anxiety Disorder compared to the general population (Kovacs et al., 1997). Blood glucose levels, adherence, and psychological adjustment are thus considered important markers of illness management among adolescents with diabetes. Understanding factors that predict these markers during adolescence is important because patterns of diabetes management that emerge during adolescence are carried into adulthood and have been found to predict long-term adherence and metabolic control (c.f. Diabetes control and Complications Trial, 1994; Hamilton & Daneman, 2002).

The coping strategies that children and adolescents develop are important predictors of diabetes management. Negative emotion-focused coping strategies like avoidance and emotional ventilation have been associated with poorer blood glucose control, while active and problem-focused coping strategies have been associated with better blood glucose control and illness management (Band, 1990; Band & Weisz, 1990;

Graue, Wentzel-Larsen, Bru, Hanestad, & Søvik, 2004; Grey, Boland, Davidson, Li, & Tamborlane, 2000; Grey, Cameron, & Thurber, 1991; Hanson et al., 1989). Coping skills training interventions aimed at retraining non-constructive coping styles and creating positive and adaptive coping styles in adolescents with diabetes have been shown to improve metabolic control, self efficacy, and quality of life over a one-year period when added to an intensive diabetes management regimen (Grey et al., 2000). Coping styles may become increasingly important as the adolescent assumes independent diabetes management responsibilities. The transference of illness management responsibilities from parent to child is associated with poorer metabolic control, especially if the child is not ready to assume those responsibilities (La Greca et al., 1990, Palmer et al., 2004; Palmer et al., 2009; Wysocki et al., 1996). Maladaptive coping may be one sign that an adolescent is not equipped to manage diabetes independently.

Parents play a significant role in the development of children's and adolescents' coping, such that parental personality factors and coping styles have become areas of important investigative focus. Past research has suggested that personality factors contribute to both parenting behaviors (Dix, 1991) and parental illness management styles (Cameron, Young, & Wiebe, 2007). Parents influence child and adolescent coping through social mechanisms such as modeling and coaching, and by contributing to the quality of the stressors to which their children are exposed (Kliewer, Fearnow, & Miller, 1996). This may be particularly true for mothers, given that positive maternal coping strategies such as active problem-focused and support-seeking coping are more strongly associated with those of their children compared to paternal coping strategies (Kliewer et al., 1996). Such findings suggest that parents play a crucial role in both helping and

teaching their children to manage their illness. Considering how this happens is important in understanding illness management and health outcomes for adolescents with diabetes.

One personality trait that is of considerable interest is Dispositional Optimism (referred to as “optimism” from this point forward) because it has been associated with improved adjustment to a variety of stressors including chronic illness, and may be important for developing adaptive coping in adolescents with diabetes. Optimism has been found to have considerable impact upon illness management, and psychological and physical health outcomes. It has been suggested that the benefits of optimism are mediated by specific coping styles characterized by active problem-focused coping and positive emotion-focused coping strategies (Scheier & Carver, 1987; Ironson et al., 2005). Therefore, the associations of optimism with health behaviors and coping styles are likely to be particularly well-suited to the ongoing demands of an illness like type 1 diabetes. Optimism’s role in the dynamic relationship between maternal and child coping becomes intriguing in the study of illness management styles because of the role mothers play in helping their children initially manage their illness. It is also interesting because of the developmental stage of adolescence, when youth are learning and establishing the illness management habits and coping styles they will carry on into adulthood. Thus, comprehension of the roles that maternal personality traits and adolescent coping styles play in this development may facilitate interventions aimed at preventing future health declines.

The goals of this study were fourfold. The first was to determine the relationship between maternal optimism and adolescent health outcomes as measured by metabolic

control, adherence, and psychological adjustment. The second was to investigate the relationship between maternal optimism and adolescent coping styles. The third was to examine the relationship between adolescent coping styles and their own health outcomes. The final goal was to determine whether adolescent coping profiles mediated the relationships between maternal optimism and adolescent health outcomes.

CHAPTER TWO
Review of the Literature
DISPOSITIONAL OPTIMISM

Optimism

Optimism, which is a propensity to foster positive expectations for the future, is conceptually based on Scheier and Carver's (1985) model of coping and behavioral self-regulation. Because of optimism's unrestricted, broad, and stable nature, optimistic beliefs are thought to influence behavior in the service of goal pursuit and achievement, and to act as a mechanism by which individuals are able to self-regulate their behavior. Optimism provides motivation for goal pursuit, which is demonstrated by continued effort to actively and adaptively manage behavior both in daily living and during stressful situations. For example, optimistic mothers of children admitted to a Neonatal Intensive Care Unit and optimistic pregnant mothers demonstrated active and cognitive coping strategies such as problem solving, constructive thinking, planning ahead, and positive reinterpretation when dealing with stressful situations (McIntosh, Stern, & Ferguson, 2004; Park, Moore, Turner, & Adler, 1997). Adaptive coping strategies lay the foundation for tenacious goal pursuit which is believed to confer a variety of benefits, particularly when people face challenging circumstances such as those posed by chronic illness management.

Benefits of Dispositional Optimism

High optimism is associated with several positive physiological outcomes among adults coping with illness. For example, in patients recovering from coronary artery bypass surgery, optimism has been associated with quicker recovery, less pain, and fewer re-hospitalizations (Mahler & Kulik, 2000; Scheier et al., 1989; Scheier et al., 1999). Middle aged women high in optimism demonstrated little to no progression of carotid atherosclerosis across a three year time period (Matthews, Raikonen, Sutton-Tyrell, & Kuller, 2004). Optimism was also associated with greater success in lowering saturated fat levels, body fat, global coronary risk, and increased aerobic capacity in an outpatient cardiac rehabilitation program (Shepperd, Maroto, & Pbert, 1996). In patients suffering from head and neck cancers, high levels of optimism were associated with reports of less fatigue prior to treatment, less pain before and after treatment, and increased odds for survival one year post diagnosis (Allison, Guichard, Fung, & Gilain, 2003; Allison, Guichard, & Gilain, 2000). In HIV/AIDS patients, high optimism has been associated with delayed symptom onset, slower disease progression, and decreased mortality (Ironson, Balbin, Stuetzle, Fletcher, O'Cleirigh et al. 2005; c.f. Reed, Kemeny, Taylor, & Visscher, 1999; c.f. Reed, Kemeny, Taylor, Wang, & Visscher, 1994). In a longitudinal study, high optimism was also predictive of lower all-cause mortality in the elderly (Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004).

High optimism is also associated with improved psychosocial outcomes among adults suffering from a variety of illnesses and major life changes. For example, optimism has been associated with increased levels of psychological well-being and less depression in the elderly (cf. Reker & Wong, 1983). Optimistic students experienced

smaller increases in distress and depression, and better adjustment to college life during their first semester of college compared to less optimistic students (Aspinwall & Taylor, 1992; Brissette, Scheier, & Carver, 2002). In health related contexts, high optimism in adults with diabetes was associated with less depression and anxiety over 12 months (de Ridder, Fournier, & Bensing, 2004; Fournier, de Ridder, & Bensing, 2002). In participants recovering from coronary artery bypass surgery, high optimism was associated with several positive psychological outcomes ranging from fewer negative mood states, satisfaction with their medical care, and satisfaction with their quality of life after surgery (Fitzgerald, Tennen, Affleck, & Pransky, 1993; King, Rowe, Kimble, & Zerwic, 1998; Scheier et al., 1989). Similar findings have also been reported in cancer and HIV+ populations, ante- and post-partum mothers, mothers with infants with health problems, and mothers of children with behavioral problems (Allison et al., 2000; Baker, Blacher, & Olsson, 2005; Carver & Gaines, 1987; Carver et al., 1993; Carver et al., 2005; Fontaine & Jones, 1997; Given et al., 1993; Ironson et al., 2005; Johnson, 1996; McIntosh et al., 2004; Milam, Richardson, Marks, Kemper, & McCutchan, 2004; Park et al., 1997; Taylor et al., 1992; Trunzo & Pinto, 2003).

There are a handful of studies showing associations between optimism and positive psychological outcomes in caregivers of individuals with chronic illness. For example, optimistic spousal caregivers of those with Alzheimer's disease and Parkinson's disease experience less depression and stress (Hooker, Monahan, Shifren, & Hutchinson, 1992; Lyons, Stewart, Archbold, Carter, & Perrin, 2004). Optimistic family caregivers of individuals with cancer report similar benefits and experience less negative effects on their own health related to caregiving (Given et al., 1993). Despite such findings, no

studies have been published in which the associations between caregiver optimism and caregivee physiological or psychological outcomes were examined. One of the main goals of the present study was to extend this line of research to examine the associations of caregiver optimism on caregivee physiological and psychological outcomes.

DOES COPING MEDIATE OPTIMISM BENEFITS?

Optimism developed out of models of stress, coping and self-regulation. According to Folkman and Lazarus (1980), psychological stress occurs when a situation is evaluated to have the potential for actual threat or loss, particularly in light of the limited resources one has to manage such threats. Coping is defined as any psychological or behavioral effort used to master, tolerate, or reduce internal or external demands or to manage threats that are taxing one's resources (Folkman & Lazarus, 1980). These coping strategies have commonly been structured around one of two superordinate categorical models (Folkman & Moskowitz, 2004; Solberg Nes & Segerstrom, 2006). The first involves problem-focused and emotion-focused coping, while the second involves approach and avoidance coping. Problem-focused coping reflects efforts to manage the external demands of the stressor (e.g., seeking out information, instrumental social support, problem solving, and increasing effort to achieve a desired outcome). Emotion-focused coping aims to reduce the internal demands of the stressor (e.g., accepting the situation, using humor, positive re-framing, and denial). Approach coping involves efforts to control, minimize, or discontinue the internal or external demands of a stressor, while avoidance coping involves efforts to ignore, avoid, or withdraw from the stressor

(Carver et al., 1993; Folkman, 1997; Folkman & Lazarus, 1980; Folkman & Moskowitz, 2004; King et al., 1998; McIntosh et al., 2004; Park et al., 1997; Peterson et al., 1998; Roesch & Weiner, 2001; Scheier et al., 1986, 1989; Solberg Nes & Segerstrom, 2006; Stanton & Snider, 1993; Wanberg, 1997).

The health benefits of optimism have been theorized to reflect more adaptive patterns of coping with stress, and a recent meta-analysis demonstrated associations between optimism and both of these superordinate coping categories (Solberg Nes & Segerstrom, 2006). Optimism was associated with higher problem-focused coping and lower emotion-focused coping, and with higher approach coping and lower avoidance coping. Importantly, however, when the superordinate categories were combined, it became evident that optimism was positively associated with approach coping within both problem-focused and emotion-focused domains, and negatively associated with avoidance coping within both problem-focused and emotion-focused domains. This is consistent with hypotheses that optimists' positive expectations about the future enable them to actively strive toward goals even in the face of adversity, rather than to disengage and give up. Such findings also argue for the importance of examining coping from a perspective that includes both problem vs. emotion focused coping and approach vs. avoidance coping strategies. The present study examined whether maternal optimism is associated with diabetes outcomes via an optimistic coping profile characterized by higher levels of both problem and emotion approach coping, and lower levels of problem and emotion avoidance coping. Table 1 illustrates the types of strategies associated with each of these four coping categories (adapted from Solberg Nes & Segerstrom, 2006).

The use of problem and emotion approach coping has been associated with positive outcomes across health contexts. Such coping styles predict slower clinical progression of HIV over 12 months (Mulder, Antoni, Duivenvoorden, Kauffmann, & Goodkin, 1995), and have been associated with slower advancement towards the development of AIDS (Vassend & Eskild, 1998). Emotion approach coping strategies also predicted preservation of CD4+ counts over a four year period (Ironson, Stuetzle, & Fletcher, 2006) and were associated with lower distress among women who were diagnosed with and treated for breast cancer (Carver et al., 1993).

Problem approach and emotion approach coping strategies have the potential to facilitate adjustment to stressful situations, particularly when there is a good match between coping strategies and the nature of the stressor. Studies have shown that people often use problem approach coping strategies when managing stressors that are more controllable, like when the stressor is work or school related; emotion approach coping strategies tend to be used more frequently in situations that are less controllable, such as in the context of medical or health related stressors (Band & Weisz, 1988; Folkman & Lazarus, 1980). Solberg Nes and Segerstrom (2006) also evaluated the relationship of optimism with coping in the context of different stressful situations. Optimism was associated with more problem approach coping in controllable situations (e.g., academic stressors), while emotion approach coping was more common in uncontrollable situations (e.g., cancer diagnosis and recovery from heart surgery).

Although such studies provide evidence supporting the associations between optimistic coping profiles and positive health outcomes, only a few have directly addressed the issue of mediation. Ironson and colleagues (2005) investigated the role of

coping as a mediator and found that the associations between high optimism and slower declines in CD4+ counts were mediated by problem and emotion approach coping strategies such as information seeking, changing health behaviors, and seeking medical care or another physician's opinion. Optimistic coping profiles have also been found to mediate the relationship between optimism and physiological and psychological positive health outcomes among women during pregnancy, annual well-women exams, breast biopsies, diagnosis and treatment of breast cancer, and when confronted with Neonatal Intensive Care Unit hospitalizations of their newborn infants (Antoni & Goodkin, 1988; Carver et al., 1993; McIntosh et al., 2004; Park et al., 1997; Stanton & Snider, 1993).

Diabetes requires continued active engagement to facilitate better illness management and is considered to be a controllable illness, although adjusting to its course and enduring impact on one's lifestyle is akin to less controllable illnesses. Therefore, the use of problem approach coping strategies in addition to emotion approach coping strategies is likely to be ideal for maintaining one's health and facilitating adaptive adjustment to the illness and its sequelae. In the present study, the types of stressful situations that adolescents with diabetes encounter were coded, and to account for adolescents' appraisals of stress and controllability, such situational determinants of coping styles were assessed.

COPING AND DIABETES MANAGEMENT DURING ADOLESCENCE

Diabetes is a controllable illness that requires active engagement in its management and generally responds positively to such efforts, and coping styles have

been shown to be critical to the health of children and adolescents with diabetes.

Adolescents with diabetes have been shown to use both problem and emotion approach, as well as problem and emotion avoidance coping strategies, such as utilizing personal and interpersonal resources, emotional ventilation, and avoidance when managing illness-related stressors (Grey et al., 2000; Hanson et al., 1989; Seiffge-Krenke & Stemmler, 2003). Emotion avoidance coping strategies have been found to be correlated with poorer treatment adherence and metabolic control in adolescents with diabetes (Graue et al., 2004; Grey et al., 2000; Grey et al., 1991; Hanson et al., 1989; Seiffge-Krenke & Stemmler, 2003). Interestingly, among youth suffering from different types of chronic illness, those with diabetes were found to rely upon avoidance coping techniques less frequently than those with other illnesses (Peterson, Schmidt, Bullinger, & the DISABKIDS Group, 2006). Such a finding suggests that adolescents coping with diabetes-related stressors may rely upon emotion avoidance coping strategies less, and may potentially rely on problem and emotion approach coping strategies more often than adolescents with other pediatric conditions. This may be due to the nature of diabetes related stressors as they may require more approach coping strategies to be resolved. Furthermore, problem approach coping strategies have been associated with better metabolic control when youth have been provided with coping skills training interventions aimed at retraining non-constructive coping styles and creating positive and adaptive coping styles (Grey et al., 2000), and with better adjustment to diabetes when provided with diabetes related knowledge (Band, 1990; Band & Weisz, 1990).

Varied coping skills appear to develop at different rates across childhood and adolescence. It is believed that problem approach coping strategies develop primarily

during childhood because they are easier to observe, and then remain fairly stable during the adolescent years. In contrast, emotion approach and emotion avoidance coping strategies develop over a longer period of time and gain prominence during adolescence (Band & Weisz, 1988, 1990; Compas, Orosan, & Grant, 1993; Skinner & Zimmer-Gembeck, 2007). This may be due to the observable nature of problem approach coping strategies, allowing them to be more easily adopted into one's coping repertoire. In adolescence, the use of problem and emotion approach coping have been associated with positive psychological and physiological adjustment, while the use of emotion avoidance coping strategies are associated with poorer psychological adjustment and increased physical symptomology (Compas et al., 2006; Jaser et al., 2005; Wadsworth & Compas, 2002; Wadsworth, Raviv, Compas, & Conner-Smith, 2005). These findings are largely consistent with the literature on adult coping in chronic illness, and with the benefits associated with using coping strategies similar to those identified in an optimistic coping profile.

Coping strategies are important in diabetes management and psychosocial adjustment because the demands of diabetes care require ongoing and active engagement, while simultaneously necessitating adaptation to its chronicity and biopsychosocial implications. Band (1990) found that adolescents demonstrated poorer adjustment to diabetes compared to children. The poorer metabolic control displayed by older participants was argued to be due to the addition of emotion avoidance coping strategies to their coping repertoires. These findings suggest that reliance upon emotion avoidance coping strategies as primary methods of dealing with stress may limit optimal health outcomes for adolescents with diabetes. In the present study, participants were between

12 and 17 years of age, and were expected to have both problem and emotion approach and problem and emotion avoidance coping strategies in their repertoires. It was thus expected that more optimistic coping profiles would be associated with better metabolic control and adherence, and lower depressive symptoms, regardless of age.

MATERNAL OPTIMISM AND ADOLESCENT COPING

Parental Socialization of Children's Coping

In the present study, we examined whether maternal optimism is associated with their children's coping profiles, as well as children's psychological and physiological well-being. The development of child and adolescent coping is likely to be multiply determined. According to social learning theory (see Bandura, 1977), cognitive and behavioral learning occurs in part by observing how others behave when managing situations. Social learning is likely to contribute to the development of coping styles in children through parental modeling (Hasan & Power, 2002; Jackson, Pratt, & Pancer, 2005; Peterson, 2000; Scalzo, Williams, & Holmbeck, 2005; Steinberg, 2001). Specifically, as children observe both how their parents cope and the consequences of their parents' actions, they begin to develop and adopt their own coping profiles. For example, increased levels of parental problem and emotion avoidance coping strategies have been associated with child avoidant coping (Kliewer & Lewis, 1995).

Parental coaching is also likely to contribute to the development of adolescent coping profiles as parents directly provide suggestions to and coach their children on how

to manage stressful situations. Kliewer and colleagues (1996) reported that children's coping was associated with parental coaching and modeling. Specifically, problem and emotion approach coping strategies in children were predicted by maternal factors, including coaching. Furthermore, problem approach coping in sons and daughters was predicted by similar strategies in mothers. Maternal coaching and modeling was also more frequently associated with children's coping compared to paternal coaching and modeling. This finding is important because it illustrates that maternal influences may be more pronounced than those of fathers in the development of coping. Because mothers tend to also be more involved in diabetes illness management, the present study examined maternal optimism associations with adolescent coping, diabetes management, and psychological adjustment.

Maternal coping may play an additional role in the development of child/adolescent coping by affecting the type, duration, and severity of stressors to which children are exposed (Skinner & Zimmer-Gembeck, 2007). Kliewer et al. (1996) indicated that parental coping strategies likely impact the family structure and environment, which in turn influence the coping mechanisms used by the parent and child. Therefore, maternal coping likely plays a critical role in the development of coping styles in children as it can impact the type and severity of the stressors to which their children are exposed, as well as the strategies suggested to and modeled for them when dealing with those stressors. Understanding the type and severity of the stressors to which adolescents are exposed is thus important when considering the influences of maternal coping. In the present study, we examined whether maternal optimism was

associated with the type and severity of stressors by coding the stressful events reported by the mother-child dyads.

Given that it is likely that parents influence the development of coping in their children through multiple social mechanisms, similarities between child/adolescent coping profiles and those of their parents are not surprising, and such associations may be important for illness management. For example, maternal modeling of problem approach coping strategies appeared to help children with asthma think about their illness in more adaptive and constructive ways (Sales, Fivush, & Teague, 2008). Positive correlations have also been found between parental problem approach coping styles and the coping styles of their children and adolescents suffering from Sickle Cell Disease (Gil, Williams, Thompson, & Kinney, 1991). Furthermore, parental problem approach coping efforts were negatively correlated with the presence of negativistic thinking in their children.

SUMMARY AND GOALS OF THE STUDY

Compelling evidence demonstrates that optimism is associated with physiological and psychological benefits in the face of adversity. Coping styles have been hypothesized to mediate these relationships with an optimistic coping profile characterized by the primary reliance upon problem and emotion approach coping strategies and decreased reliance upon problem and emotion avoidance coping strategies. The present study examined whether these characteristics of optimism in mothers may carry over to the social lives of their adolescents. Among children and adolescents with diabetes, mothers play a primary role in helping them to manage their illness, and it is

believed that adolescents are likely to adopt coping profiles similar to their mothers through socialization mechanisms. No research to date has focused on the relationships between maternal optimism, adolescent coping styles, and the three markers of diabetes health outcomes: HbA1c levels, adherence to the treatment regimen, and psychological adjustment. The primary aims of the proposed study were to examine such associations.

Aim One

The first aim was to examine whether maternal optimism is associated with better adolescent diabetes management as indexed by metabolic control, regimen adherence, and symptoms of depression.

Aim Two

The second aim was to explore whether maternal optimism is associated with adolescent coping styles. Adolescents of more optimistic mothers were expected to exhibit coping profiles characterized by the reliance upon problem and emotion approach coping strategies. A secondary aim was to determine whether coping style associations with maternal optimism occur independently of the types of stressors adolescents with diabetes report.

Aim Three

The third aim of the proposed study was to determine whether adolescent coping profiles characterized by problem and emotion approach coping strategies are associated

with the three primary indices of diabetes management (metabolic control, medical regimen adherence, and psychological adjustment).

Aim Four

Finally, the fourth aim examined whether adolescent coping profiles mediate the hypothesized relationships between maternal optimism and the three primary indices of diabetes management.

CHAPTER THREE

Methodology

Participants

The study was approved by the appropriate Institutional Review Boards and is part of a larger study based in Salt Lake City, Utah. Participants included 130 adolescent-mother dyads who had completed wave five of a three year longitudinal study by February 28, 2009. In the larger study, adolescents diagnosed with type 1 diabetes and their mothers and fathers were assessed every six months. Participants were recruited from a university/private partnership clinic (85%) and a community-based private practice (15%) that followed similar treatment regimens and clinic procedures for diabetes. Mothers gave written informed consent and adolescents gave written assent.

Eligibility criteria during the initial wave of data collection required that adolescents were between 10 and 14 years of age, had diabetes more than 1 year ($M = 4.13$ years, $SD = 2.98$), and were able to read and write either English or Spanish. For each adolescent, one mother and one father were eligible to participate. Adolescents were required to be living with their participating mother because a major goal of the larger project was to identify changes in mother-child relationships over time. Step-mothers or adopted mothers were eligible if they had lived with the adolescents for at least one year. Exclusion criteria included the presence of mental illness or co-morbid health problems that would prohibit completion of the study. The present study examined only mothers' optimism scores (rather than fathers' optimism) because mothers are the primary caregivers and have the strongest influence on the socialization of child

coping (Kliwer et al., 1996). At the time of the current and fifth wave of data collection, participants were between 12 and 17 years old. By age 12, children are responsible for many diabetes management tasks making it likely that adolescent coping is an important component of diabetes management for all subjects in the studied range.

As noted in Table 2, the present sample was primarily Caucasian and well-educated with an average yearly household income of \$50,000 or more. Adolescent participants were, on average, 14.5 years old, 43.8% male and 56.2% female, and had been diagnosed with type 1 diabetes for an average of over six years. More than half of the adolescents in this sample were on an insulin pump, with the rest prescribed multiple daily injections.

Because the present study used a subsample of participants from the larger study ($N = 252$), we examined whether participants in the present study differed from non-participants. Current participants displayed better metabolic control at enrollment compared to non-participants $M = 8.02$ vs 8.72 , $t(201) = -3.61$, $p < 0.01$, and were more likely to be using an insulin pump $\chi^2(1, N = 250) = 4.075$, $p < 0.05$. However, there were no differences between subgroups on other important variables including age, gender, household income, illness duration, maternal and adolescent reports of adherence, levels of adolescent depressive symptomology, and maternal trait anxiety, p values > 0.11 .

Procedure

Participants were mailed a packet of questionnaires and were scheduled for a two hour lab visit that occurred within two weeks of a routine clinic visit. During the clinic

visit, metabolic control levels were tested as a part of their routine check-up. In the lab visit, participants completed additional questionnaires, and a structured interview from which our measures of stress and coping were derived.

Measures

Copies of all measures can be found in Appendix A.

Dispositional Optimism

Maternal optimism was measured using the Revised Life Orientation Test (LOT-R), the most current and widely used measure of dispositional optimism. The Life Orientation Test (LOT) and the LOT-R were developed to create a standardized and reliable framework from which to evaluate the presence of optimism (Scheier & Carver, 1985; Scheier, Carver, & Bridges, 1994). The original LOT contains 12 items, four keyed in a positive direction and four keyed in a negative direction, plus four filler items used to disguise the purpose of the test. Items are scored on a five-point Likert-scale ranging from 0 = *strongly disagree* to 4 = *strongly agree*, with higher scores indicating more optimistic orientations.

The LOT-R differs from the LOT in that two test items were removed. The deleted items measured similar constructs but were not specific to optimism (benefit finding and positive reinterpretation). One new positively keyed item was added, and one negatively keyed item was deleted to ensure that there were equal numbers of items. Consequently, the LOT-R has 10 items, three positively keyed items, three negatively

keyed items, and four filler items. Like the LOT, participants indicate how much they agree with each statement on the following scale: 0=*strongly disagree*, 1=*disagree*, 2=*neutral*, 3=*agree*, and 4=*strongly agree* (Scheier et al., 1994); overall scores can range from 0-24. In principal component factor analysis, Scheier et al. (1994) found all six items of the LOT-R yielded one factor accounting for 48.1% of the variance, with factor loadings of at least 0.58. The LOT-R has sufficient internal consistency (Cronbach's $\alpha = 0.78$), test-retest reliability as administered between four and 28 months apart (0.68-0.79 respectively), and convergent (0.95 with the LOT) and discriminant validity (-0.36 with the neuroticism subscale of the Eysenck Personality Questionnaire and -0.52 with the State-Trait Anxiety Inventory; Scheier et al., 1994).

There has been considerable debate about the conceptual uniqueness of optimism compared to other positive constructs such as self-efficacy and hope, and whether optimism is statistically different from other measures assessing more negative constructs such as neuroticism and trait anxiety. For example, hope, like optimism, encompasses the concept of positive expectations for goal attainment, but also includes a sense of agency and pathway creation throughout the process of goal pursuit. Optimism does not include a pathway of action. An extensive discussion about these issues and their implications for the present study is provided in Appendix B.

Questions have been raised regarding whether the LOT and LOT-R scales are unidimensional or have distinct subscales for optimism and pessimism. When the LOT was developed, the creators reported that interpretation of the LOT was somewhat ambiguous, but argued for a unidimensional interpretation based on principal components

analysis (Scheier, & Carver, 1985). However, ambiguity about the interpretation of the LOT persists despite such findings (i.e., Baker, 2007; Chang, D’Zurilla, & Maydeu-Olivares, 1994; Mahler, & Kulik, 2000; Marshall et al., 1992; Robinson-Whelen, Kim, MacCallum, & Kiecolt-Glaser, 1997; Scheier et al., 1994). For example, Marshall and colleagues reported that optimism and pessimism are statistically and empirically differentiable, but remain related to each other, while Scheier and colleagues (1994) argued for the single factor solution.

A principal component factor analysis of the LOT-R items in the present study was conducted to discern whether a unidimensional score should be computed. A clear single factor solution was evident with one eigenvalue > 1.0 (eigenvalue = 3.33) accounting for 55% of the variance, and factor loadings greater than 0.61. Internal consistency across the six optimism items was high, further supporting a unidimensional construct (Cronbach’s $\alpha = 0.83$). Thus, a single optimism score was computed, with higher scores indicating a more optimistic orientation.

Adherence

Adherence was measured with a revised version of the Self Care Inventory (SCI; La Greca, 1992). The 16-item self-report scale measures how frequently youth completed various tasks of diabetes care in the past month as reported by adolescents and mothers (e.g., blood glucose monitoring, insulin and diet regulation, exercise, and emergency precautions). Response options ranged from *1=Never do it* to *5= Always do this as recommended without fail*. The SCI has good internal consistency with a Cronbach’s α of 0.80 or higher, and test-retest reliability of 0.77 over a two to four

week period (Davis et al., 2001; Delamater et al., 1997; La Greca, Swales, Klemp, Madigan, & Skyler, 1995), and predicts metabolic control as expected (La Greca et al., 1995). The SCI was adapted for the current study with the assistance of a certified diabetes educator and a patient with type 1 diabetes by updating the wording of stems and adding two items reflecting current standards of diabetes care (e.g., calculating insulin doses based on carbohydrate content of meals or snacks). The modified scale had good internal consistency in the present sample (mother, Cronbach's $\alpha = 0.85$; adolescent, Cronbach's $\alpha = 0.88$).

Psychological Adjustment

The Children's Depression Inventory (CDI; Kovacs, 1985) is a 27-item questionnaire that assesses the cognitive, affective, and behavioral signs of depression. Response options range from 0 to 2 with scores of 0 indicating the absence of symptoms, 1 indicating mild symptoms, and 2 indicating definite symptoms. Total scores can range from 0 to 54. The CDI has demonstrated acceptable internal consistency with Cronbach's α ranging from 0.71-0.89 and test-retest reliability ranging from 0.74 to 0.83 over the course of two to three weeks (Pearson Assessments, 2009). In the present sample, reliability was high (Cronbach's $\alpha = 0.89$).

Metabolic Control

Metabolic control was measured with glycosylated hemoglobin (HbA1c) levels obtained from medical records. HbA1c provides information on average blood glucose levels over the preceding three or four months, and is the current standard to index

whether diabetes treatment goals are being achieved (higher levels indicate poorer blood glucose control). Current standards for HbA1c suggest a target value of less than 7.5% in adolescents who are between the ages of 13 and 19 (American Diabetes Association, 2010). At all clinics, HbA1c was obtained using the Bayer DCA2000 by clinic staff with expertise in its use. Participant authorization provided access to adolescent's medical records to obtain other pertinent illness information (e.g., duration of diabetes, pump vs. non-pump treatment, etc.).

Maternal Trait Anxiety

Maternal trait anxiety was assessed to evaluate the extent to which associations between maternal optimism, coping, and outcomes were independent of neuroticism (see Appendix B for discussion). Mothers were given the trait items from Spielberger's State-Trait Anxiety Inventory (20 items; Spielberger, 1983). These items were rated on a 1 to 4 scale. Validity and reliability of this widely used scale are well-established (Spielberger, 1983). These items demonstrated good internal consistency in the present sample (Cronbach's $\alpha = 0.93$).

Adolescent Coping Styles

Audio taped structured interviews regarding the experience of diabetes stress and coping responses were completed individually with mother and adolescent. Participants first wrote down on a one-week calendar one thing that they did each day to remind them of the week's events. Adolescents were then asked to report the most stressful episode of the past week regarding their diabetes (Beveridge, Berg, Wiebe, & Palmer, 2006; Wiebe

et al., 2005). They were asked to “describe the event in detail from beginning to end so that someone who has never experienced the event would understand what happened.” If adolescents could not think of a stressful event dealing with diabetes, they were prompted with examples (e.g., an adolescent who had asthma and some of the stressful events that happened to him/her); if they still could not think of a diabetes event, they were asked to describe the most stressful event of the week in general. Adolescents then rated how stressful the event was (*1 = not at all bad* to *5 = as bad as it can get*), how much control they had over the event (*1 = none* to *5 = a lot*), and how well they managed the event (*1 = very bad* to *5 = very good*). Adolescents were then asked to describe three things that they thought, did, or felt to deal with the stressful event in order to assess their coping strategies. These procedures were then repeated for the second most stressful event of the week. Therefore, two stressful events (i.e., Stressors 1 and 2) and three coping strategies used to deal with each event, were generated from the interview.

Qualitative Coding of Stressful Events and Coping Strategies

A qualitative coding system was developed for the present study to identify the types of stressful events and coping strategies adolescents reported. The coding system was developed through an iterative process where we initially read and discussed the literature on problems in adolescent diabetes management and lifespan views of stress and coping (e.g., Aldwin, Sutton, Chiara, & Spiro, 1996; Beveridge et al., 2006; Folkman & Maskowitz, 2004), as well as models of coping in the context of adolescent development (e.g., Skinner & Zimmer-Gembeck, 2007) and of dispositional optimism

(e.g., Solberg Nes & Segerstrom, 2006). Stressful events and coping strategies were then drawn from a random sampling of three males and three females in each age group (i.e., ages 12 to 17) and transcribed onto cards. The events were independently read and re-read by two coders and sorted into content domains. Coders then met with a third researcher to compare, define, and revise the content codes as necessary. This process of sorting, comparing, defining, and revising the content domains was repeated to reach saturation in content and adequately define the domains. Each stressful event and coping strategy for the full sample was then coded independently by both coders (i.e., the author of this study and a fellow graduate student), who met weekly with the primary investigator to reconcile disagreements and to ensure coding was reliable and valid. Interrater reliability was checked on a regular basis to ensure consistency in the use of the system across coders. The final coding system with complete descriptions and examples of each content code can be found in Appendix C.

Stressful Events

The codes for diabetes stressors reflected problems across seven domains. Each Stressor (1 and 2) could receive up to four different domain codes, depending on the complexity of the event. Thus, in addition to coding the content of each event, we counted the number of codes each event received to capture the complexity of the stressor. Complexity scores could range from 1 to 4, with higher numbers reflecting diabetes problems that cut across more problem areas and presumably created more complex coping challenges for participants. For example, the following Stressor “I was high while at school because I was angry that I got a B+ on a math test instead of

an A” would receive three domain codes, one reflecting the high blood glucose level, one reflecting that this occurred when away from home, and a third reflecting the subject’s negative affect that contributed to the stressor. Table 3 demonstrates the categories devised for coding diabetes related stressful events and the interrater reliability for each (i.e., Kappa). Reliability was high for events that occurred frequently, but some codes occurred rarely (i.e., interpersonal conflict) which resulted in lower reliability.

Coping Strategies

We initially attempted to code each coping strategy into specific subcategories theorized to occur within each of the four broad domains that capture the coping profiles of optimists (e.g., different codes for different types of problem approach coping, different types of emotion approach coping, etc) (Solberg Nes & Segerstrom, 2006). However, it was difficult to establish reliability between coders, potentially because this approach resulted in numerous infrequent codes. We subsequently coded each strategy into one of the four broad coping domains described previously. As displayed in Table 4, interrater reliability was high for the more common strategies of problem and emotion approach coping, but was quite low for the avoidance coping categories. This likely reflects the very low frequency of avoidance coping, as discussed further below. Coping scores were computed by calculating the proportion of strategies assigned to each of the four coping domains for each stressful event. Scores could range from 0 to 1.

Analysis Plan

In the following sections, we initially provide descriptive information on adolescents' stress and coping experiences to understand the context in which maternal optimism was theorized to work. We then report correlations to explore associations among optimism, diabetes stress and coping, and outcomes, and to examine the need to covary neuroticism, illness and/or demographic variables in subsequent analyses. Primary aims were examined using: a) regression analyses to discern whether maternal optimism was associated with adolescent diabetes outcomes, independent of covariates; and b) mediation analysis to discern whether coping mediated associations between maternal optimism and outcomes. Verification of the mediating effects of adolescent coping was examined by performing a formal confirmatory test of the indirect effect with the bootstrapping procedure recommended by Preacher and Hayes (2004). A 95% confidence interval was used to assess mediation. If the confidence interval did not contain zero, then the indirect effect was significantly different from zero and an effect of mediation was verified (Preacher & Hayes, 2004). This method is preferable to the Baron and Kenny (1986) approach as it more directly addresses the question of mediation through testing the indirect effect, and decreases the risk of Type I and II errors.

CHAPTER FOUR

Results

THE STRESS AND COPING CONTEXT OF ADOLESCENTS WITH DIABETES

Descriptive information on the types of stressors adolescents experienced, and the types of coping strategies utilized, was initially examined for three primary reasons: a) to understand the stress and coping context in which maternal optimism was theorized to occur; b) to identify the need to consider additional covariates or moderating variables in the primary analyses (e.g., is age systematically related to different types of stressors or strategies?); and c) to evaluate whether stressors and strategies for Stressors 1 and 2 are related at a level that would allow us to combine scores across the two events.

Stressful Events

A frequency histogram displaying the types of stressful events participants experienced for each stressor can be found in Figure 1. Participants largely reported problems related to behaviorally managing their diabetes and to dealing with high and low blood glucose levels, especially when away from home.

Participants reported fairly complex events that reflected experiencing multiple problems simultaneously. On average, participants received two codes per event, $M (sd) = 2.06 (0.97)$ and $1.96 (0.80)$ codes for Stressors 1 and 2, respectively. Chi-square analyses revealed that problems related to management behaviors were less likely to be mentioned when problems with low blood glucose (BG) were described (stressor 1, $\chi^2(1,$

$N = 128$) = 3.958, $p < 0.05$; stressor 2, $\chi^2(1, N = 128) = 18.597$, $p < 0.01$) and, for Stressor 1, when problems with high BG were described, $\chi^2(1, N = 128) = 7.173$, $p < 0.01$. This is consistent with the possibility that management behaviors can be a source of stress or hassle, even if they minimize problems with BG fluctuations. Hassles related to management behaviors were more common when stressors occurred away from home (Stressor 1, $\chi^2(1, N = 128) = 7.014$, $p < 0.01$), and when related to interpersonal conflict (Stressor 2, $\chi^2(1, N = 128) = 7.263$, $p < 0.01$). Stressors that occurred away from home were less common with emotionally arousing events (Stressor 1, $\chi^2(1, N = 128) = 6.016$, $p < 0.05$). Not surprisingly, problems with high BG were unlikely to co-occur with low BG problems (stressor 1, $\chi^2(1, N = 128) = 17.765$, $p < 0.01$; stressor 2, $\chi^2(1, N = 128) = 20.232$, $p < 0.01$), although some participants did describe single stressors that involved both types of BG problems (e.g., Having high BG, but then over-correcting by taking too much insulin, resulting in low BG). No other associations were significant, $p > 0.072$.

Correlations were run to determine whether different types of stressors were appraised as more or less severe, controllable, and manageable. Correlations were run between type of event (0 = absent, 1 = present for each content code), the event complexity (number of content codes assigned), and the three stress appraisal items. Problems with high BG were appraised as more severe (Stressor 1, $r = 0.234$, $p < 0.01$; Stressor 2, $r = 0.211$, $p < 0.05$), and controllable (Stressor 1, $r = 0.179$, $p < 0.05$), but less effectively managed (Stressor 2, $r = -0.335$, $p < 0.01$). Problems with low BG were appraised as less controllable (Stressor 1, $r = -0.183$, $p < 0.05$), but more effectively managed (Stressor 2, $r = 0.186$, $p < 0.05$). Interestingly, problems with negative emotions were viewed as poorly managed for Stressor 1 ($r = -0.193$, $p < 0.05$), but better managed

for Stressor 2 ($r = 0.210$, $p < 0.05$). Family conflict was also viewed as poorly managed (Stressor 1, $r = -0.219$, $p < 0.05$). No other associations were significant, $-0.171 < r < 0.145$, $p > .10$.

Associations of the content codes with the following illness and socio-demographic variables were also examined: adolescent age, gender, illness duration, pump status, and maternal education and reported income. For Stressor 1, low BG problems were more common among those with longer illness duration ($r = 0.200$, $p < 0.05$), and who were on an insulin pump $\chi^2(1, N = 118) = 3.995$, $p < 0.05$. Participants on an insulin pump were also more likely to report problems away from home $\chi^2(1, N = 118) = 4.100$, $p < 0.05$, and less likely to describe diabetes-related family conflict, $\chi^2(1, N = 118) = 6.038$, $p < 0.05$. Analyses of Stressor 2 revealed fewer significant relationships, although older participants did report fewer problems with high BG ($r = -0.196$, $p < 0.05$), as well as more problems managing diabetes away from home ($r = 0.327$, $p < 0.01$).

Coping Strategies

Figure 2 illustrates the average scores on coping strategies for each event. Participants largely relied upon problem and emotion approach coping strategies to deal with their stressors, and rarely used problem and emotion avoidance strategies. Specifically, out of 351 strategies coded for Stressor 1, problem avoidance coping was coded nine times and emotion avoidance coping was coded three times. For Stressor 2, out of 318 strategies coded, problem avoidance coping was coded 14 times and emotion avoidance coping was coded twice. Given the infrequency of avoidant coping, and the

poorer interrater reliability established with these coping codes, the avoidant strategies were not evaluated further. Correlations between appraisals of Stressor 1 and coping scores for Stressor 1 revealed problem approach coping was associated with higher perceived coping effectiveness ($r = 0.259, p < 0.01$), while emotion approach coping was associated with lower perceived coping effectiveness ($r = -0.215, p < 0.05$). These associations were not present for Stressor 2, and all other correlations between coping and stress appraisals (i.e., appraisals of severity and control) were not significant, $-0.168 < r < 0.148, p > 0.13$. There were no associations between coping scores and demographic or illness information (i.e., adolescent age, gender, illness duration, pump status, or maternal education and income).

Relationships between Stressful Events and Coping Strategies

As displayed in Table 5, correlations revealed some evidence that coping strategies differed as a function of the type of stressor experienced. Participants who experienced low BG problems were more likely to rely on problem approach coping and less likely to rely on emotion approach coping. In contrast, participants reported more emotion approach coping and less problem approach coping when dealing with family conflict. These associations were modest, but more consistently evident for the most stressful event (i.e., Stressor 1).

To explore the feasibility of combining coping scores for Stressors 1 and 2, correlations between coping scores across stressors were conducted (e.g., problem approach coping for Stressor 1 correlated with problem approach coping for Stressor 2).

Coping scores for Stressor 1 were significantly correlated with their counterparts for Stressor 2 ($r = 0.273$ to 0.378 , $p < 0.01$), suggesting that participants who used a particular coping approach for Stressor 1 were more likely to use that same approach for Stressor 2. Composite scores for coping strategies were created by averaging scores across the two stressful events.

MATERNAL OPTIMISM, COPING, AND DIABETES OUTCOMES

Table 6 illustrates correlations among primary study variables. As expected, maternal optimism was associated with better adherence and metabolic control, and trended towards significance with adolescent reports of less depressive symptomology ($p = 0.068$). In contrast to expectations, there were no associations between maternal optimism and adolescents' coping strategies, and coping strategies were not associated with depressive symptoms, adherence, or metabolic control. Furthermore, maternal optimism was not associated with the types of stressors adolescents reported ($p > 0.122$), their complexity ($p > 0.368$), or adolescents' stress appraisals ($p > 0.168$).

Correlations revealed a need to consider several covariates in subsequent analyses. Maternal optimism was associated with maternal trait anxiety, which in turn was associated with adolescent depression and treatment adherence. Thus, maternal trait anxiety was statistically controlled in subsequent analyses to determine the independent associations of maternal optimism with the dependent variables. Adolescents' pump status was also found to be associated with metabolic control, such that those on an

insulin pump displayed better (lower) metabolic control than those on MDI. Pump status was covaried in subsequent analyses.

Regression analyses were conducted to examine whether maternal optimism continued to be associated with the dependent variables after statistically controlling for maternal trait anxiety and adolescent pump status. All variables were simultaneously entered into the regression equation, with separate regressions conducted for each dependent variable. As shown in Table 7, maternal optimism did not predict a significant amount of variance in adolescent reports of depressive symptoms $t(113) = -0.792$, $p = 0.430$, or mother's reports of adolescent adherence $t(104) = 1.178$, $p = 0.242$, after trait anxiety and pump status were statistically controlled. However, maternal optimism continued to predict a significant amount of variance in adolescent reports of adherence $t(110) = 2.131$, $p < 0.05$, and metabolic control $t(110) = -2.759$, $p < 0.01$, accounting for 3.7%, and 6.1% of the variance, respectively.

Coping as a Mediator of Associations between Maternal Optimism and Outcomes

Although the pattern of correlations presented thus far is not consistent with mediation (i.e., the mediator was not associated with the predictor or the outcome variables), additional mediation analyses were conducted because indirect effects can occur in the absence of significant correlations among independent, dependent, and mediation variables (Preacher & Hayes, 2004; Shrout & Bolger, 2002). Thus, the possibility that adolescent coping represented an indirect pathway through which optimism was associated with diabetes management was examined further following

bootstrap procedures recommended by Preacher and Hayes (2004). Coping strategies did not mediate any of the relationships between maternal optimism and the dependent variables. Specifically, neither the indirect effect through problem approach coping, Sobel $z < 0.159$, $p > 0.87$, 95% confidence interval ranging between -0.035 and 0.34, nor through emotion approach coping, Sobel $z < 0.181$, $p > 0.86$, 95% confidence interval between -0.029 and 0.028, was significant for any dependent variable.

SUPPLEMENTAL ANALYSES

Additional exploratory analyses were conducted to better understand the findings presented thus far. First, we examined an alternative explanation for why maternal optimism was not related to coping strategies. Second, we examined an alternative mediation model linking maternal optimism with metabolic control through adolescent adherence.

Maternal Optimism, Adolescent Stress Appraisals, and Coping

One possible explanation for why optimism was not associated with coping strategies is that this association is moderated by other variables. Optimists are more adept at discerning controllable situations from uncontrollable situations, and then base their coping strategies on those stress appraisals (Aspinwall & Richter, 1999; Solberg Nes & Segerstrom, 2006). For example, optimists were quicker to disengage from unsolvable tasks, reengage in solvable tasks, and exhibit superior performance on

solvable tasks compared to pessimists (Aspinwall & Richter, 1999). This suggests that optimists may have a capacity for distinguishing the controllability of a situation and then adjusting the extent to which they continue to engage in problem approach actions. Such a possibility could explain why maternal optimism was not related to a particular type of coping. That is, optimism may not predict more problem approach coping in general, but does so when events are perceived as more amenable to such coping efforts.

We examined whether adolescents' perceptions of the controllability of the stressor moderated associations between maternal optimism and adolescent coping. Specifically, optimism and control appraisal scores were centered on their mean, and entered as main effects on Step 1; the cross-product of centered optimism and control appraisal scores was entered on Step 2 to test the optimism X control appraisal interaction term. The interaction term was not significant in any analysis (Stressor 1 problem approach coping $t(110) = -1.174$, $p = 0.243$; Stressor 1 emotion approach coping $t(110) = 1.414$, $p = 0.160$; Stressor 2 problem approach coping $t(100) = 0.409$, $p = 0.684$; Stressor 2 emotion approach coping $t(100) = -0.402$, $p = 0.689$).

Adherence Mediates Associations between Optimism and Metabolic Control

We also examined an alternative mediation model to explain associations between maternal optimism, adolescent adherence, and metabolic control. Regression analyses revealed that maternal optimism remained significantly associated with adolescent adherence and metabolic control after controlling for maternal anxiety and adolescent pump status, and adolescent adherence was significantly correlated with

metabolic control. This pattern raises the possibility that adolescent adherence mediates the relationship between maternal optimism and adolescent metabolic control.

Adherence to the diabetes regimen bears similarities to coping in that following the treatment regimen serves as a way of managing numerous diabetes problems, and prior research supports the possibility that optimism promotes better illness management through adherence behaviors (Milam et al., 2004; Ironson et al., 2005; Robbins, Spence, & Clark, 1991). Using the bootstrap approach, the Sobel test was significant for both adolescent reports of adherence (Sobel $z = -2.55$, $p = 0.011$, 95% confidence interval between -0.069 and -0.009), and maternal reports of adolescent adherence (Sobel $z = -2.22$, $p = 0.026$, 95% confidence interval between -0.069 and -0.004), supporting the possibility that adherence is an indirect path between maternal optimism and adolescent metabolic control.

CHAPTER FIVE

Conclusions and Recommendations

DISCUSSION

The present study is the first to demonstrate that optimism in caregivers of patients with chronic illness is associated with how those patients manage their illness. Specifically, maternal optimism was associated with better metabolic control among adolescents with diabetes, and this association was mediated by adolescent adherence. Associations were independent of mother's trait anxiety scores, suggesting findings cannot easily be attributed to overlap between high optimism and low neuroticism, and were found across objectively measured signs of illness management (HbA1c) and multiple reports of adherence. Taken together, findings provide fairly compelling evidence that maternal optimism may be a resource that facilitates how children and families manage diabetes during the challenging phase of adolescence.

Maternal Optimism was Associated with Adolescent Diabetes Illness Outcomes

Consistent with expectations, maternal optimism was associated with the three markers of adolescent diabetes management. Initial correlations revealed that maternal optimism is related to better adolescent adherence, metabolic control, and trended towards fewer adolescent depressive symptoms. This latter association was eliminated when trait anxiety was controlled; however, maternal optimism continued to be significantly related to adolescent treatment adherence and metabolic control. This is interesting because it suggests a level of specificity between optimism and markers of

illness management in which associations were present only for variables that had a clear behavioral regulation component (i.e., adherence and metabolic control).

Maternal optimism associations are consistent with prior findings that optimism may facilitate adherence in chronically ill patients (Ironson et al., 2005; Milam et al., 2004). This may reflect that optimism promotes persistence and continued striving when confronted with adversity. This orientation may be helpful in maintaining the continuously demanding tasks of diabetes management; optimistic mothers may model and teach this perspective to their children, thus facilitating better adherence and metabolic control. Additionally, optimistic mothers may create family environments that are more structured and supportive towards meeting important goals related to their child's diabetes management, which can facilitate adolescent adherence and metabolic control. There is good evidence, for example, that family environment plays an important role in illness management and diabetes outcomes for adolescents, and that maternal factors contribute to that environment (e.g., Hanson et al., 1989; Liakopoulou et al., 2001). The lack of association between maternal optimism and types of stressors, stress appraisals, and stressor complexities suggest there were not obvious differences in the daily lives of adolescents of mothers with different level of optimism. However, there may be unmeasured domains that could be important in fleshing out these relationships.

Coping did not Mediate Maternal Optimism Associations with Diabetes Outcomes

It was hypothesized that coping would mediate the relationships between maternal optimism and illness outcomes; however, coping was not found to mediate the relationships between maternal optimism and any outcome variable. It is important to consider why associations between maternal optimism and diabetes management outcomes were not mediated by coping, particularly given the extensive literature suggesting that optimists engage in more problem-focused coping (Carver et al., 1993; Muldre et al., 1996; Solberg Nes & Segerstrom, 2006; Vassend & Eskild, 1998) and the importance of problem- versus emotion-focused coping for adolescent diabetes management (e.g., Grey et al., 2000; Graue et al., 2004; Hanson et al., 1989; Seiffge-Krenke & Stemmler, 2003). The most plausible explanation for the present findings is that the diabetes-related stressors that our participants described strongly elicited problem-approach coping, resulting in too little variability in the coping variables to detect optimism effects. The vast majority of coping strategies reflected problem-approach and emotion-approach coping, with very few examples of avoidance coping. Avoidance coping was expected to be rare primarily when maternal optimism was high, but to occur and undermine illness management when maternal optimism was low. The relative absence of avoidance coping for all participants may have precluded a thorough evaluation of this hypothesis.

The lack of avoidance coping may reflect the general context of diabetes management. Past research (Peterson et al., 2006) has shown that adolescents with type 1 diabetes rely upon avoidance coping strategies less than adolescents facing other chronic

pediatric conditions, which suggests that aspects of the diabetes experience and the types of coping challenges this illness creates may influence approach oriented coping. This would suggest that, relative to other illnesses, there is something inherent about the diabetes experience that predisposes coping styles. Factors such as this may have played a role in the types of coping styles observed in the present study and limited the analysis of maternal optimism effects.

The procedures that were used to measure coping may also have limited the occurrence of avoidance coping. The coding of the coping styles may have served as a stricture in analyzing maternal optimism effects. Our method used a “bottom-up” approach in which we requested participants explain how they coped with a stressor by reporting up to six coping strategies, and then we attempted to impose coping styles upon their descriptions. Alternative methods of obtaining this type of information include “top-down” approaches in which predetermined scales, categories, or coping checklists are presented to participants, who then endorse the coping strategies they used to deal with their stressors (Folkman & Lazarus, 1988; Kovacs, Brent, Feinberg, Paulauskas, & Reid, 1986; Peterson, Schmidt, Bullinger, & the DISABKIDS group, 2004; Rosentiel & Keefe, 1983). Typically, such methods allow participants to report on more than six strategies permitting more variability in reports of coping strategies. Furthermore, avoidant coping strategies are included among a variety of options that participants can endorse. This method enables participants to decide what types of coping strategies were used, as opposed to the research team attempting to determine which strategies were used based on recollections of events. Checklists or categories may also serve to remind participants of coping strategies they may have used during a stressor, potentially

enabling the report of more strategies based on exposure to specific cues as opposed to spontaneous recall of the event without generalized cues. Another possible explanation for the limitations in the current coding system is that participant's reports were not detailed enough to provide meaningful variations in their coping styles, thus limiting the variability in their reports of coping. Social desirability may be another factor influencing the report of avoidance coping, such that adolescents were less likely to report avoidance coping face to face with another person, whereas coping checklists permit a degree of anonymity in reporting coping strategies, and minimizing such effects.

There may be additional explanations for why maternal optimism was not associated with adolescent coping strategies. First, we considered the possibility that maternal optimism was not associated with adolescents' problem approach coping regardless of the stress context, but rather with adolescents' better matching of such strategies to controllable stressors. This possibility was tested by examining whether maternal optimism interacted with child reports of the controllability of the stressor to predict coping strategies, but was not supported. Second, we may not have measured the most proximal variables in the model linking maternal optimism to the socialization of adolescent coping. It is conceivable, for example, that mother's optimism would be more strongly associated with measures of her coaching advice for how her child should manage diabetes stress rather than with children's coping, or that adolescents' levels of optimism would be more strongly related to their own reports of coping. Although plausible and in need of future research, these alternative explanations do not explain why coping was unrelated to diabetes management, suggesting that the measure of coping was not sensitive to adolescent reports of avoidant coping.

The Stress and Coping Context of Adolescent Diabetes

Participants primarily reported experiencing stressors that were related to behaviors geared towards managing their illness, especially away from home, and dealing with high and low blood glucose fluctuations. Examples of these stressors included dealing with management behaviors and/or blood glucose fluctuations while at school, visiting friends, and participating in extra-curricular activities. Findings such as these replicate previous findings from an independent sample in which very few child and adolescent participants were using an insulin pump (Beveridge et al., 2006). Surprisingly, participants rarely reported experiencing stressors that were related to interpersonal and familial conflict.

There was some evidence that coping strategies matched the stress context. Participants were more likely to deal with high and low blood glucose levels using more problem approach coping and less emotion approach coping. This finding is likely to be related to the nature of diabetes illness management, as the proscribed protocol for dealing with a “low” is to take action and eat food or fast acting carbohydrates and rest. Interestingly, participants reported more emotion approach coping and less problem approach coping for stressors related to management behaviors. This may be because the demands of diabetes management generate stress and negative emotions that need to be addressed. Not surprisingly, adolescents were more likely to rely upon emotion approach coping when dealing with family conflict. Also, participants who used problem approach coping strategies viewed their coping as more effective, while those who used emotion approach coping viewed their efforts as less effective when addressing their problems.

These findings suggest the stress and coping interview generated meaningful information, but it should be noted that associations were modest in strength and the patterns were not always consistent across stressors.

Limitations

There are several limitations to the present study that should be considered in future research. First, data were cross-sectional and correlational, and causal relationships cannot be inferred. It is possible, for example, that mothers are more optimistic when their child is more adherent and has better metabolic control, or that associations between maternal optimism and adolescent management reflected associations with a third variable such as paternal personality traits or the quality of alliance with the primary treating physician. Second, the method by which coping styles were measured may have limited our ability to find expected associations. It is possible that the nature of diabetes illness management and related stressors are inherently more controllable and predispose patients towards problem and emotion approach coping, precluding reliance upon problem and emotion avoidance coping. Furthermore, problem and emotion avoidance coping are not necessarily conducive to good diabetes management as past research has shown that the use of avoidance coping strategies are related to poorer metabolic control and adherence (Hanson et al., 1989; Graue, Wentzel-Larsen, Bru, Hanestad, & Søvik, 2004; Grey et al., 1991; Seiffge-Krenke, & Stemmler, 2003). Assuming this were the case, this would inherently limit the variability in coping strategies, subsequently restricting possible analyses and findings.

Another limitation is the absence of an adolescent measure of optimism.

Although one exists (Youth Life Orientation Test, YLOT; Ey et al., 2005), it was not included in this study. Inclusion of such a measure would have provided the opportunity to examine associations between adolescent and maternal optimism. This may have provided more fruitful findings regarding relationships between maternal and adolescent optimism, and a role of mediation for adolescent coping styles.

An additional limitation of this study is that the findings may not generalize to other populations. First, the participants in this study were largely Caucasian, middle class, and well educated, and it is unclear if these results are applicable to more diverse samples. The measure of optimism used in the present study has been shown to have less robust effects in non-English speaking populations (Solberg Nes & Segerstrom, 2006), which suggests the findings from the current study may not be transferable to such populations. Second, comparisons between participants and non-participants indicated that the present sample may have been highly motivated to manage diabetes, as evidenced by their better metabolic control and use of an insulin pump at the time of enrollment. This selection bias is likely to have worked against the primary hypotheses of the study, particularly if the full ranges of coping strategies and poor management were not obtained. Although adolescent participants in this study had better metabolic control levels compared to non-participants, it is important to remain aware of the fact that their HbA1c levels were above the current standard set by the American Diabetes Association. Finally, the findings from the current study regarding adherence as a mediator model for maternal optimism and adolescent metabolic control were examined

post-hoc, and should be interpreted with caution. Future research should attempt to replicate such findings in an independent sample.

Implications and Future Recommendations

Findings of this nature can have practical clinical applications. Screening mothers of teens with type 1 diabetes for optimism may provide clinicians with important information about who they should target for more intensive treatment interventions. It is possible that fostering more optimistic attitudes in mothers may facilitate better adherence from their teens by enabling mothers to more positively support their teens, ultimately improving metabolic control. Groups directed at the development of optimistic attitudes may provide such results. For example, interventions with adolescents with diabetes geared towards developing positive and adaptive coping skills have had promising results with improving metabolic control (Grey et al., 2000); interventions such as this coupled with optimism training may provide optimal results for families with adolescents with diabetes.

Understanding levels of adolescent optimism in the context of chronic illness will be important in future studies because it may shed more light on the relationships between maternal and adolescent optimism, how optimism develops, and if it plays a role in the management of chronic illness. If results from these studies reveal significant relationships between parental and adolescent optimism, the next step would be to look at the relationship that adolescent optimism has with different outcomes for youth. It might also be beneficial to use a previously established measure of diabetes coping, such as the

Issues in Coping with IDDM-Child scale (ICC; c.f. Kovacs, Brent, Feinberg, Paulauskas, & Reid, 1986), to re-evaluate coping in adolescents with type 1 diabetes and determine if coping mediates maternal optimism and adolescent health outcomes. Also, it would be prudent to perform such research on more diverse samples of participants to be able to extend the finding to the general population. Research of this kind would enable deeper understanding of the development of optimism and its important implications for managing diabetes in this vulnerable population.

FIGURES

Figure 1
Frequencies of Stressful Event Types for Stressful Events 1 and 2

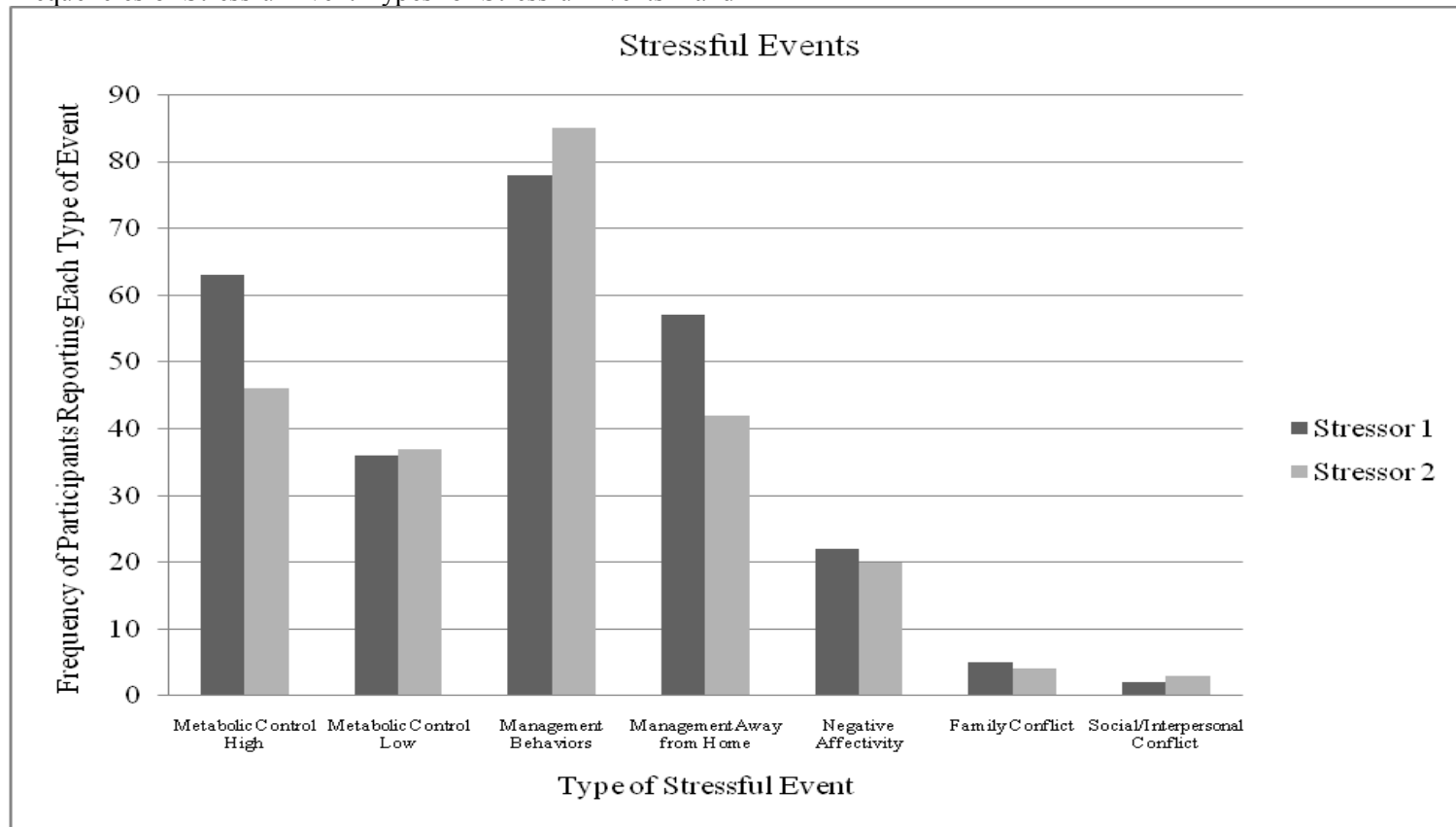
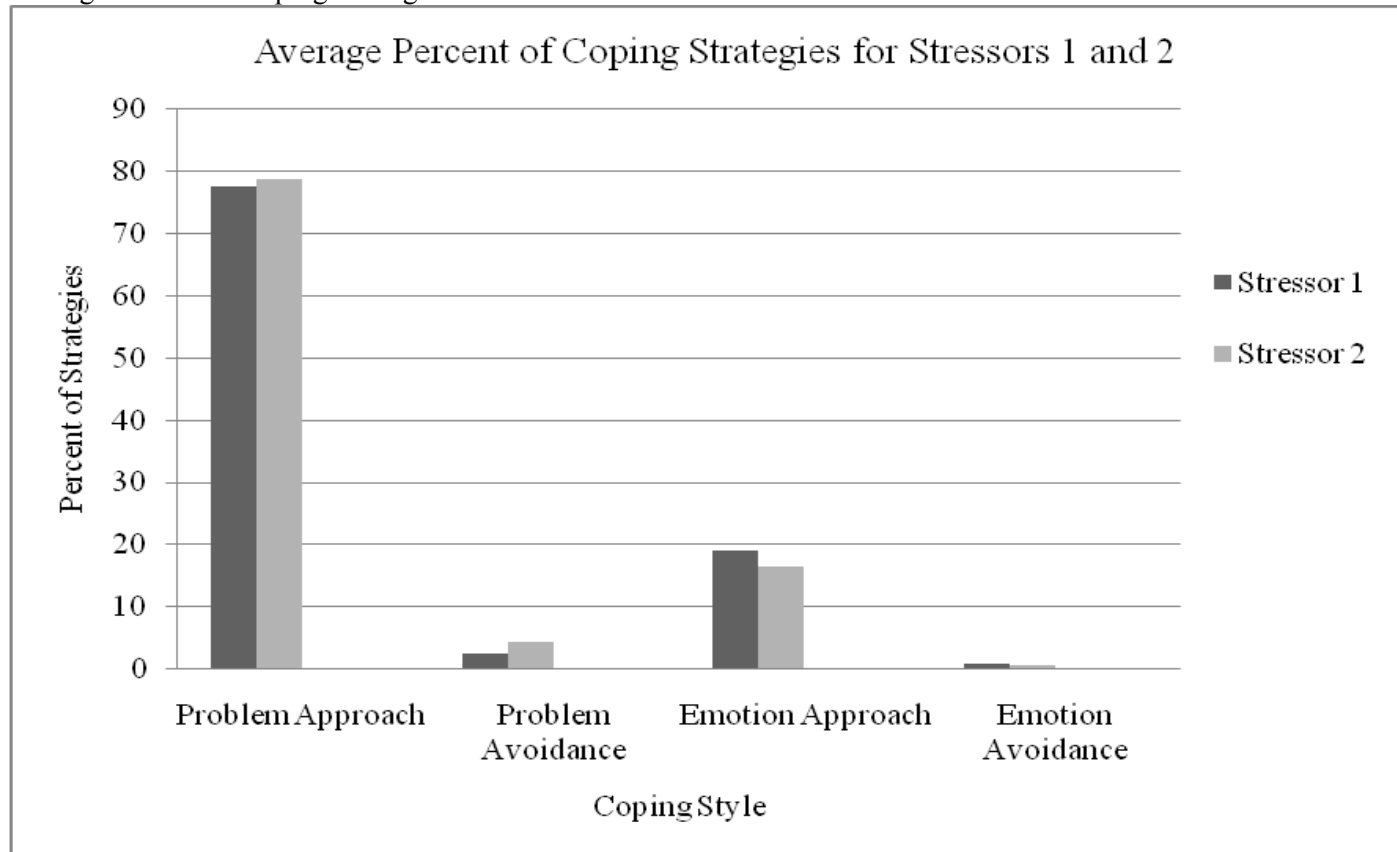


Figure 2
Average Percent of Coping Strategies for Stressors 1 and 2



TABLES

Table 1
Examples of Problem/Emotion Approach and Problem/Emotion Avoidance Coping Strategies

	<i>Problem</i>	<i>Emotion</i>
Approach	Active/Instrumental Problem Solve/Analyze the Problem Planning/Priority Setting Seeking Information and Advice Seeking Instrumental Support Restrained Action Confrontive coping	Emotional Regulation Actions Acceptance Positive Re-Interpretation and Growth Venting Emotions/Emotional Expression/Whining Seeking Emotional/Interpersonal Support Cognitive Restructuring/Downplaying Importance Religion/Spirituality
Avoidance	Behavioral Avoidance/ Distraction Coping/Competing Activities Disengagement Avoiding People/Withdrawal from an Unsupportive Context	Denial Mental Withdrawal/Mental Disengagement Wishful Thinking/Fantasy/Escapism Alcohol or drug use Blaming others/Disclaiming Responsibility Humor

Table 2
Sample Characteristics and Descriptive Information

Characteristic	Mean (sd)
N	130
Age	14.54 (1.50)
Gender (%)	
Male	43.8
Female	56.2
Race (%)	
Caucasian	93.80
Hispanic/Latino	5.40
Pacific Islander	0.80
Pump Status (%)	59.80
Illness Duration (years)	6.54 (2.91)
Maternal Education (%)	
Some High School	1.5
High School Graduate	13.8
Some College	27.7
Associate/Vocational Degree	24.6
Bachelor's Degree	26.9
Master's Degree/M.D./Ph.D.	5.4
Income (mother report; %)	
Less than 5,000	0.80
5,000-9,999	0.80
10,000-14,999	0.80
15,000-24,999	6.30
25,000-49,999	16.40
50,000-74,999	32.80
75,000 and above	42.20
Maternal Optimism	18.06 (4.57)
Maternal Trait Anxiety	1.80 (0.50)
Depression	5.79 (6.12)
Adherence, Teen report	3.75 (0.62)
Adherence, Mother report	3.39 (0.56)
HbA1c (%)	8.82 (1.57)
Problem Approach	0.78 (0.23)
Problem Avoidance	0.04 (0.10)
Emotion Approach	0.18 (0.20)
Emotion Avoidance	0.01 (0.04)

Table 3
Categories for Coding Diabetes Related Stressful Events and Interrater Reliability

Category	Kappa Stressor 1 Stressor 2	Description and Example
High Blood Glucose	0.94 0.95	Problems related to having high blood glucose or poor metabolic control (e.g., <i>I woke up in the middle of the night and was high</i>).
Low Blood Glucose	0.94 0.94	Problems related to having low blood glucose (e.g., <i>I felt shaky when in the middle of the night and I was low</i>).
Management Behaviors	0.80 0.70	Issues related to diabetes management or mismanagement (<i>I forgot to test all day yesterday; I had to sit out of the basketball game because I was low</i>).
Management Away from Home	0.81 0.74	Problems related to managing diabetes when away from home (<i>I was at school and realized I left my test strips at home</i>).
Negative Affect	0.75 0.82	Problems related to negative emotions and blood glucose fluctuations (<i>Math tests stress me out and I go high when I worry</i>).
Family Conflict	1.00 0.56	Problems related to family conflict (<i>My mom got mad at me because I keep forgetting to check my blood glucose</i>).
Social Conflict	0.49 0.80	Problems related to interpersonal conflict (<i>I was embarrassed to check my blood glucose in front of my friends</i>).

Table 4
Interrater Reliability for Coping Codes (Kappa)

Problem	Stressor 1			Stressor 2		
	Strategy 1	Strategy 2	Strategy 3	Strategy 1	Strategy 2	Strategy 3
Approach	0.82	0.94	0.80	0.66	0.72	0.86
Avoidance	0.66	-0.01	-0.02	0.23	-0.01	0.31
Emotion						
Approach	0.80	0.94	0.86	0.78	0.72	0.84
Avoidance	--	--	0.32	--	--	-0.02

Note: Kappa could not be computed for several items due to infrequent or non-occurrence of the code.

Table 5
Correlations between Stressful Events, Coping Strategies, and Appraisals of Severity, Controllability, and Perceived Coping Effectiveness Stressors 1 and 2

	Stressor 1		Stressor 2	
	Prob. Ap.	Emo. Ap.	Prob. Ap.	Emo. Ap.
High BG	0.208*	-0.205*	0.161	-0.123
Low BG	0.214*	-0.215*	0.269**	-0.249*
Management Behaviors	-0.271**	0.255**	-0.099	0.075
Management Away from Home	-0.031	0.051	0.025	-0.103
Negative Affect	-0.330**	0.345**	-0.042	0.117
Family Conflict	-0.401**	0.333**	-0.217*	0.205*
Social/Interpersonal Conflict	0.029	-0.014	-0.078	0.045
Severity	0.066	-0.055	0.021	-0.054
Controllability	-0.030	0.079	0.097	-0.079
Perceived Coping Effectiveness	0.259*	-0.215*	-0.048	0.148

n=115, *p<0.05, **p<0.01; BG = Blood Glucose, Prob. Ap. = Problem Approach, Emo. Ap. = Emotion Approach

Table 6
Correlations among Independent, Dependent, and Demographic Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Maternal Optimism	-	-.501**	.006	-.044	-.012	.123	-.160	.250**	.230*	-.221*	.029	-.097	.040	-.037
2. Trait Anxiety (Mother)		-	-.044	-.011	.074	-.090	.220*	-.231**	-.350**	.028	.010	-.103	-.074	.028
3. Problem Approach			-	-.420**	-.875**	-.265**	-.078	.013	.024	.086	-.054	-.055	.148	-.186
4. Problem Avoidance				-	-.030	.127	.104	-.001	.154	-.053	-.176	.109	-.159	.068
5. Emotion Approach					-	.024	.036	-.024	-.102	-.074	.144	.022	-.095	.198
6. Emotion Avoidance						-	.015	.046	.003	.007	.006	-.054	.017	-.147
7. Depression							-	-.416**	-.241**	.229**	.078	.053	-.092	.031
8. Adherence (Teen)								-	.452**	-.432**	-.092	.019	.067	-.157
9. Adherence (Mother)									-	-.447**	-.106	-.025	-.033	-.128
10. Metabolic Control										-	.049	.052	-.021	.250**
11. Adolescent Age											-	-.097	.137	.059
12. Adolescent Gender ^a												-	-.061	.045
13. Illness Duration													-	-.073
14. Pump Status ^b														-

*p<0.05, **p<0.01, ^a1 = Male, 2 = Female, ^b1 = Pump, 2 = Multiple Daily Injections

Table 7
Regression Analyses Controlling for Maternal Trait Anxiety and Adolescent Insulin Pump Status

	Depression	Adherence		HbA1c
	b	Adolescent b	Mother b	b
Step 1:				
Maternal Trait	2.54	-0.25	-0.45	-0.002
Anxiety	-0.08	-0.21	-0.15	0.77
Insulin Pump Status				
Step 2:				
Maternal Optimism	-0.05	-0.03*	0.02	-0.10**
Change in ΔR^2	0.5%	3.7%	1.1%	6.1%

*p<0.05, **p<0.01

APPENDIX A STUDY MEASURES

Dispositional Optimism – The Revised Life Orientation Test (LOT-R)

Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no "correct" or "incorrect" answers. Answer according to your own feelings, rather than how you think "most people" would answer.

0 = I disagree a lot

1 = I disagree a little

2 = I neither agree nor disagree

3 = I agree a little

4 = I agree a lot

	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
1. In uncertain times, I usually expect the best.	0	1	2	3	4
2. It's easy for me to relax.	0	1	2	3	4
3. If something can go wrong for me, it will.	0	1	2	3	4
4. I'm always optimistic about my future.	0	1	2	3	4

5.	I enjoy my friends a lot.	0	1	2	3	4
6.	It's important for me to keep busy.	0	1	2	3	4
7.	I hardly ever expect things to go my way.	0	1	2	3	4
8.	I don't get upset too easily.	0	1	2	3	4
9.	I rarely count on good things happening to me.	0	1	2	3	4
10.	Overall, I expect more good things to happen to me than bad.	0	1	2	3	4

Maternal Trait Anxiety - Spielberger State Trait Anxiety Inventory (STAI)

Instructions: A number of statements which people have used to describe themselves are given below. Please read each statement and circle the number which indicates **how you feel generally about yourself**. For example, circle 1 if you almost never feel this way, and circle 4 if you almost always feel this way.

1 = Almost never

2 = Sometimes

3 = Often

4 = Almost always

	Almost never	Sometimes	Often	Almost always
1. I feel pleasant.	1	2	3	4
2. I feel nervous and restless.	1	2	3	4
3. I feel satisfied with myself.	1	2	3	4
4. I wish I could be as happy as others seem to be.	1	2	3	4
5. I feel like a failure.	1	2	3	4
6. I feel rested.	1	2	3	4
7. I am "calm, cool, and collected."	1	2	3	4
8. I feel that difficulties are piling up so that I cannot overcome them.	1	2	3	4
9. I worry too much over something that really doesn't matter.	1	2	3	4
10. I am happy.	1	2	3	4
11. I have disturbing thoughts.	1	2	3	4

12. I lack self-confidence.	1	2	3	4
13. I feel secure.	1	2	3	4
14. I make decisions easily.	1	2	3	4
15. I feel inadequate.	1	2	3	4
16. I am content.	1	2	3	4
17. Some unimportant thoughts run through my mind and bother me.	1	2	3	4
18. I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
19. I am a steady person.	1	2	3	4
20. I get in a state of tension or turmoil as I think over my recent concerns and interests.	1	2	3	4

Adolescent Adherence – Self Care Inventory (SCI-C)

Instructions: Please rate each of the items according to **how well you followed your recommended regimen for diabetes care in the past month**. Use the following scale:

- 1 = Never did it
- 2 = Sometimes followed recommendations; mostly not
- 3 = Followed recommendations about 50% of the time
- 4 = Usually did this as recommended; occasional lapses
- 5 = Always did this as recommended without fail
- NA = Not applicable to my regimen

In the past month , how well have you followed recommendations for:	Never	Sometimes	50% of the Time	Usually	Always	NA
1. Checking blood glucose with monitor?	1	2	3	4	5	NA
2. Glucose recording?	1	2	3	4	5	NA
3. Checking ketones in blood or urine when blood glucose level is high?	1	2	3	4	5	NA
4. Administering correct insulin dose?	1	2	3	4	5	NA
5. Administering insulin at right time?	1	2	3	4	5	NA
6. Adjusting insulin intake based on blood glucose values?	1	2	3	4	5	NA

7.	Eating the proper foods or counting all carbohydrates eaten?	1	2	3	4	5	NA
8.	Eating meals/snacks on time?	1	2	3	4	5	NA
9.	Carrying quick-acting sugar to treat reactions?	1	2	3	4	5	NA
10.	Coming in for appointments?	1	2	3	4	5	NA
11.	Wearing a medic alert ID?	1	2	3	4	5	NA
12.	Exercising regularly?	1	2	3	4	5	NA
13.	Reading food labels?	1	2	3	4	5	NA
14.	Treating low blood glucose?	1	2	3	4	5	NA
15.	Counting carbohydrates correctly?	1	2	3	4	5	NA
16.	Calculating insulin doses based on carbohydrate content of meals or snacks?	1	2	3	4	5	NA

Maternal Report of Adolescent Adherence – Self Care Inventory (SCI-P)

Instructions: Please rate each of the items according to **how well your child followed his/her recommended regimen for diabetes care in the past month**. Use the following scale:

- 1 = Never did it
- 2 = Sometimes followed recommendations; mostly not
- 3 = Followed recommendations about 50% of the time
- 4 = Usually did this as recommended; occasional lapses
- 5 = Always did this as recommended without fail
- NA = Not applicable to my child's regimen

In the past month , how well has your child followed recommendations for:		Never	Sometimes	50% of the Time	Usually	Always	NA
1.	Checking blood glucose with monitor?	1	2	3	4	5	NA
2.	Glucose recording?	1	2	3	4	5	NA
3.	Checking ketones in blood or urine when blood glucose level is high?	1	2	3	4	5	NA
4.	Administering correct insulin dose?	1	2	3	4	5	NA
5.	Administering insulin at right time?	1	2	3	4	5	NA

6.	Adjusting insulin intake based on blood glucose values?	1	2	3	4	5	NA
7.	Eating the proper foods or counting all carbohydrates eaten?	1	2	3	4	5	NA
8.	Eating meals/snacks on time?	1	2	3	4	5	NA
9.	Carrying quick-acting sugar to treat reactions?	1	2	3	4	5	NA
10.	Coming in for appointments?	1	2	3	4	5	NA
11.	Wearing a medic alert ID?	1	2	3	4	5	NA
12.	Exercising regularly?	1	2	3	4	5	NA
13.	Reading food labels?	1	2	3	4	5	NA
14.	Treating low blood glucose?	1	2	3	4	5	NA
15.	Counting carbohydrates correctly?	1	2	3	4	5	NA
16.	Calculating insulin doses based on carbohydrate content of meals or snacks?	1	2	3	4	5	NA

ADOLESCENT DEPRESSION – CHILDREN’S DEPRESSION INVENTORY

CDI

Kids sometimes have different feelings and ideas.

This form lists the feelings and ideas in groups. From each group of three sentences, pick one sentence that describes you *best* for the past two weeks. After you pick a sentence from the first group, go on to the next group.

There is no right answer or wrong answer. Just pick the sentence that best describes the way you have been recently. Put a mark like this **✕** next to your answer. Put the mark in the box next to the sentence that you pick.

Here is an example of how this form works. If you read books a lot, you would probably check the first sentence, like this.

Example:

<input checked="" type="checkbox"/>	I read books all the time.
<input type="checkbox"/>	I read books once in a while.
<input type="checkbox"/>	I never read books.

Remember, in each box, pick out the one sentence that describes you best in the PAST TWO WEEKS.

Item 1

- ☐ I am sad once in a while.
- ☐ I am sad many times.
- ☐ I am sad all the time

Item 2

- ☐ Nothing will ever work out for me.
- ☐ I am not sure if things will work out for me.
- ☐ Things will work out for me O.K.

Item 3

- ☐ I do most things O.K.
- ☐ I do many things wrong.
- ☐ I do everything wrong.

Item 4

- ☐ I have fun in many things.
- ☐ I have fun in some things.
- ☐ Nothing is fun at all.

Item 5

- ☐ I am bad all the time.
- ☐ I am bad many times.
- ☐ I am bad once in a while.

Item 6

- ☐ I think about bad things happening to me once in a while.
- ☐ I worry that bad things will happen to me.
- ☐ I am sure that terrible things will happen to me.

Item 7

- ☐ I hate myself.
- ☐ I do not like myself.
- ☐ I like myself.

Item 8

- ☐ All bad things are my fault.
- ☐ Many bad things are my fault.
- ☐ Bad things are not usually my fault.

Item 9

- ☐ I do not think about killing myself.
- ☐ I think about killing myself but I would not do it.
- ☐ I want to kill myself.

Item 10

- ☐ I feel like crying every day.
- ☐ I feel like crying many days.
- ☐ I feel like crying once in a while.

Item 11

- ☐ Things bother me all the time.
- ☐ Things bother me many times.
- ☐ Things bother me once in a while.

Item 12

- ☐ I like being with people.
- ☐ I do not like being with people many times.
- ☐ I do not want to be with people at all.

Item 13

- ☐ I cannot make up my mind about things.
- ☐ It is hard to make up my mind about things.
- ☐ I make up my mind about things easily.

Item 14

- ☐ I look O.K.
- ☐ There are some bad things about my looks.
- ☐ I look ugly.

Item 15

- ☐ I have to push myself all the time to do my schoolwork.
- ☐ I have to push myself many times to do schoolwork.
- ☐ Doing schoolwork is not a big problem.

Item 16

- ☐ I have trouble sleeping every night.
- ☐ I have trouble sleeping many nights.
- ☐ I sleep pretty well.

Item 17

- ☐ I am tired once in a while.
- ☐ I am tired many days.
- ☐ I am tired all the time.

Item 18

- ☐ Most days I do not feel like eating.
- ☐ Many days I do not feel like eating.
- ☐ I eat pretty well.

Item 19

- ☐ I do not worry about aches and pains.
- ☐ I worry about aches and pains many times.
- ☐ I worry about aches and pains all the time.

Item 20

- ☐ I do not feel alone.
- ☐ I feel alone many times.
- ☐ I feel alone all the time.

Item 21

- ☐ I never have fun at school.
- ☐ I have fun at school only once in a while.
- ☐ I have fun at school many times.

Item 22

- ☐ I have plenty of friends.
- ☐ I have some friends but I wish I had more.
- ☐ I do not have any friends.

Item 23

- ☐ My schoolwork is alright
- ☐ My schoolwork is not as good as before.
- ☐ I do very badly in subjects I used to be good in.

Item 24

- ☐ I can never be as good as other kids.
- ☐ I can be as good as other kids if I want to.
- ☐ I am just as good as other kids.

Item 25

- ☐ Nobody really loves me.
- ☐ I am not sure if anybody loves me.
- ☐ I am sure that somebody loves me.

Item 26

- ☐ I usually do what I am told.
- ☐ I do not do what I am told most times.
- ☐ I never do what I am told.

Item 27

- ☐ I get along with people.
- ☐ I get into fights many times.
- ☐ I get into fights all the time.

APPENDIX B

Conceptual and Methodological Issues of the LOT

Optimism presents as similar to other personality constructs including self-efficacy and hope, but remains conceptually unique both from these constructs and others to which it has also shown statistical overlap including hardiness, optimistic attributional style, neuroticism, and trait anxiety.

Self-efficacy is similar to optimism in that it is a reflection of one's expectations of being able to successfully accomplish various tasks or behaviors (Bandura, 1977). Scheier and Carver (1992) noted two distinct conceptual differences between self-efficacy and optimism. First, self-efficacy's primary emphasis is on agency, while optimism deemphasizes the importance of agency and focuses primarily upon outcome expectations. Second, self-efficacy's expectancies are specific, while optimism's expectations are general.

Hope is different than dispositional optimism because it encompasses the concept of positive expectations for goal attainment and a sense of agency and pathway creation throughout the process of goal pursuit (Snyder, Ilardi, Cheavens, Michael, Yamhure, et al., 2000). Although dispositional optimism and hope appear similar, dispositional optimism does not emphasize the importance of pathway development or identification, its emphasis is simply on the expectation of good outcomes.

Conceptually, hardiness is based on the dimensions of commitment, control, and challenge and past research has shown that measures assessing hardiness, like the Alienation Test (cf. Maddi, Kobasa, & Hoover, 1979), have a high correlation with the LOT (Scheier & Carver, 1985). Despite their statistical overlap, optimism and hardiness

are conceptually different, but likely contribute to positive coping and health outcomes in similar ways.

Attributional style has also been identified as a construct similar to optimism (Scheier, & Carver 1992) because appraisals of events can either be optimistic or pessimistic (Peterson, & Seligman, 1984). Conceptually, attributional style refers to one's habitual manner of explaining the cause of negative events. Optimistic explanatory styles are characterized by appraising the causes of negative events as external, unstable, and specific, and have been associated with similar coping styles as optimism. The crucial difference between the two constructs is that attributional styles evaluate one's judgment about the cause of an event, while optimism focuses on future expectations. Furthermore, Scheier and Carver (1992) reported minimal overlap between correlations of LOT scores and attributional measures. Optimism and explanatory style are conceptually separate and statistically unique based on comparisons of their respective accepted gold standards of measurement.

It has been argued that measures of optimism (e.g., the LOT) are not distinct from traits such as neuroticism and trait anxiety, due to evidence that neuroticism diminishes the influence of optimism on health outcomes (Smith et al., 1989). Neuroticism reflects a stable dimension of personality that consists of chronic negative emotions ranging from sadness, anxiety, and guilt to anger, low self-esteem, and emotional lability (Scheier et al., 1994; Smith et al., 1989). Investigations of convergent and discriminant validities of the LOT revealed that LOT scores correlated more strongly with measures of neuroticism than with another measure of optimism-pessimism (Smith et al., 1989; e.g., Generalized Expectancy for Success Scale; cf. Fibel & Hale, 1978).

Such findings raise questions of whether the LOT measures the presence of optimism or the absence of neuroticism. Scheier and Carver (1992), however, argue that neuroticism-related constructs overlap with pessimism, rather than with unique aspects of optimism. Several studies support this claim and demonstrate that optimism impacts psychological and physical health independently of neuroticism and negative affectivity (i.e., Chang, Maydeu-Olivares, & D’Zurilla, 1997; Mroczek, Spiro, Aldwin, Ozer, & Bossé, 1993; Plomin et al., 1992; Scheier et al., 1999). Given such questions regarding the construct validity of optimism measures, it is prudent to consider the role neuroticism plays when analyzing the observed relationships involving optimism. Trait anxiety, serving as a proxy for neuroticism, was controlled in the current study when analyzing the main effects of optimism and the three primary dependent variables.

APPENDIX C Coding Protocol

Coding Protocol for A.D.A.P.T. Teen Stress and Coping Interviews

Coding the Stressful Event:

Below you will find a list of “types of problems” which are grouped by problem domain. These problem domains will be used to code each stressful event (SE).

- First, record the subject ID# in the Subject ID# column on the Score Sheet.
- Read the SE.
- SEs can be either diabetes related or non-diabetes related. If the event is diabetes related, please record the SE using the following steps.
- SEs are coded by marking the appropriate box for the stressful themes that are present in the event reported. The categories are specific descriptors of the content of the stressful event and include Metabolic Control High (MCH), Metabolic Control Low (MCL), Management Behaviors (MBS), Management Away from Home (MAFH), Transfer of Responsibility (TOR), Negative Affects (NA), Family Conflict (FC), and Social/Interpersonal Conflict (SIC).
- If the event does not fit into one of these, please record it in the comment box and it will be discussed at the weekly lab meeting.
- If the SE is not diabetes related, please record the SE using the following steps.
- If applicable, each SE can have up to four different codes to best represent the nature of the SE. However, it is necessary to try to limit the number of four digit codes for each SE to one or two. The goal here is to not be expansive, but instead specific.
 - Example- “I was high while at school because I was angry that I got a B+ on a math test instead of an A.”
 - This event would be coded as follows on the Score Sheet because they were “high” while “at school” and they were “angry”:

Subject ID#	SE	MCH	MCL	MBS	MAFH	NA	FC	SIC	Comments
Ex. 399-1-5	1	X			X	X			

- If the subject reports no problems, write ‘999’ in the SE column on the Score Sheet.
- If you can’t decide where an SE falls, code it in the comment box and we can discuss it at the weekly meeting. Be sure to write down the SE so that we can discuss it at the meeting.

Diabetes Related Sub-Domains and Event Types:

Numerous stressors reflect blends of the following event types. Record blends by coding up to four event types and/or sub-domains. There is no rank order for recording primary, secondary, tertiary, and quaternary codes.

Although blends are likely, try to capture the stressor with the fewest possible event types.

1. **Metabolic Control High (MCH):** Stressors related to problems with high BG or metabolic control. This reflects both BG levels from daily monitoring, symptoms that they believe reflect highs, and A1c or ketones (e.g., When I was sick with the flu, I had really high ketones). Highs = high sugar, hyperglycemia, went high, had ketones, bad number, high A1c.
 1. High BG or A1c or ketones
 2. High BG at night
2. **Metabolic Control Low (MCL):** Stressors related to problems with low BG or metabolic control. This reflects both BG levels from daily monitoring, symptoms that they believe reflect low BG or A1c. Lows = low sugar, low glucose, went low, hypoglycemic, sugar attack, diabetes attack, etc.
 1. Low BG or A1c
 2. Low BG at night
3. **Management Behaviors (MBS):** This includes both *management and mismanagement behaviors*. **Management behaviors** are stressors related to the things participants need to do to correctly manage diabetes (e.g., not being able to eat pizza at my friend's party; pain related to injections; having to sit-out of sports because BG is low). Examples of management behaviors are: Food Management- good food management includes not eating things when they know it would be bad for their diabetes management or would avoid high or low events; Exercise Management- not exercising or being active when they know it would be bad for their diabetes management to be active; Testing/BG recording/Records, Injections- remembering to do these things when they are supposed to or as recommended; Broken Supplies/Technology Glitches-these are problems with their diabetes supplies that are out of their control, for example if the pump broke or was clogged; Diabetes Clinic Appointments- going to clinic appointments when it is disruptive to normal schedule; the process of attending the clinic appointment is the source of the stressor , not necessarily just being at the clinic or stressors that occur at the clinic. **Mismanagement behaviors** are stressors related to the things participants need to do to manage diabetes and they are done incorrectly or against the doctor's recommendation (e.g., eating pizza at my friend's party even though I didn't have any insulin; not giving injections because of pain related to injections; choosing to not sit-out of sports because BG is low; I forgot to check my BG before leaving home). Examples of mismanagement behaviors include: Food Management-bad

food management include not eating things when they know it would be bad for their diabetes management or that lead to high or low events; Exercise Management- exercising or being active when they know it would be bad for their diabetes management to be active; Testing/BG recording/Records, Injections- not remembering to do these things when they are supposed to or as recommended; Forgetting/Loosing Supplies- not being prepared for diabetes related problems like not having enough insulin/sugar to correct for a high or low or not having batteries on hand for pump when battery dies; Misuse of Technology- not knowing how to use diabetes related instruments like a pump or blood checker.

1. Food Management
2. Exercise Management
3. Testing/BG recording/Records
4. Injections
5. Broken Supplies/Technology glitches (out of one's control)
6. Forgetting/Loosing supplies
7. Misuse of Technology (within one's control)
8. Diabetes Clinic Appointments

4. **Management Away from Home (MAFH):** Stressors related to having to manage diabetes when the child is away from home, and may have occurred or been more problematic because the child is away from home (e.g., I was at my friend's house and ran out of insulin in my pump. I had to hurry home to get more insulin; I was camping with friends, they didn't know I had diabetes, and I couldn't figure out how to test in private; I didn't want to check before the basketball game, because other people stare at me; Thursday at Lagoon, I couldn't go on a ride that I wanted to because I was low. I had to wait and my friends went on the ride without me). This category does **not** include diabetes clinic appointments.
 1. School (in-session or in class)
 2. Church
 3. Friends
 4. Relatives
 5. School related events or activities
 6. Recreational or extracurricular activities
5. **Negative Affect (NA):** Stressors that include problems where negative emotions cause BG changes (e.g., I had a test in math that made me really nervous, and my BG goes high when I'm nervous), and where negative emotions are caused by diabetes management activities (e.g., I was worried that I would forget to pack my supplies for my Florida trip). This category does **not** include physical pain related to injections or bolus sites.
 1. NA (e.g., anxiety, stress, sadness, etc) causes BG changes
 2. Diabetes related activities or issues cause NA
6. **Family Conflict (FC):** Stressors that involve interpersonal conflict with family members related to diabetes management (e.g., my sister got mad because she had to

wait while I got all my supplies before school) or mismanagement (e.g., I got a lecture from dad after I forgot my glucometer when we went to grandma's house for dinner).

1. Mother
2. Dad
3. Sibling(s)
4. Other family member

7. **Social/Interpersonal Conflict (SIC):** Diabetes stressors that involve conflict with people who are not family (e.g., one of my friends makes a big deal out of my diabetes whenever we go out together. I wish she'd just let me be).

1. Medical Team
2. Friends
3. Peers/classmates

Coding the Reported Coping Strategies:

Once the SE has been coded, it is time to code the coping strategies reported by that subject. Coping strategies will be coded on one level: **General Coping Categories**.

- **General Coping Categories:** (1) *Problem Approach*, (2) *Problem Avoidance*, (3) *Emotion Approach*, and (4) *Emotion Avoidance*. This should be recorded on the Score Sheet. Additional information including definitions and examples of each category can be found on the next page in the “General Coping Categories” section. Review it before coding the coping strategies.
 - If the strategy does not seem to fit any category, or you don’t have enough information to code it, mark 999.
 - If no strategy was given, mark 888.
- Example-“I checked my BS, gave an insulin shot, and thought I would need to study harder for my next test.”
 - These strategies would be coded as follows on the Score Sheet:

Subject ID#	SE1	11	12	13	14	21	22	23	24	31	32	33	34
		1	0	0	0	1	0	0	0	1	0	0	0

- On the score sheet, you will notice that there are double digit columns (11, 12, 13...34). The first digit refers to the coping strategy (1-3 as there are only up to three coping strategies reported for each stressful event) and the second digit refers to the coping style (i.e., 1=problem approach, 2=problem avoidance, 3=emotion approach, and 4=emotion avoidance). Each coping strategy coded can be assigned one of the four possible coping categories. You can only choose one coping category for each strategy coded.
- In the example provided above, the first strategy given is “I checked my BS.” It is coded within the first four columns (11-14) because it is the first strategy and we are trying to determine if it is 11-problem approach, 12-problem avoidance, 13-emotion approach, or 14-emotion avoidance.
 - This strategy is a problem approach coping strategy. It is reflected as such on the score sheet by marking ‘1’ in the ‘11’ column. This indicates that for the first strategy, it is a problem approach strategy. The other three columns have a ‘0’ in them to signify that the strategy given is NOT a(n): problem avoidance (12), emotion approach (13), or emotion avoidance (14) strategy.
- Because the second and third strategies given in this example are also problem approach, they are coded similarly in their respective column sets (21-24 and 31-34) with a ‘1’ in the problem approach columns, and a ‘0’ in the other three columns.
- Ignore the SE1 and SE2 columns in the score sheet because they exist only to visually distinguish strategies given for the first stressful event from the second stressful event for each participant. There is no need to mark anything in these columns.

General Coping Categories and Specific Coping Strategies: Below is a conceptual description of each with examples.

1. Problem Approach: Strategies aimed at solving the problem. This can occur through one's own direct actions or the actions of a support provider. It also includes strategies that reflect efforts to understand the problem (e.g., analyzing the problem, seeking advice from others) or figuring out a solution to the problem, and strategies that alter some aspect of the problem to make it more manageable or less problematic. With diabetes in particular, restrained action is also important in this domain (e.g., waiting to see whether BG goes down).

- Active/Instrumental Coping (e.g., took more insulin; ate a snack; packed supplies so I wouldn't forget).
- Problem Solve/Analyze the Problem (e.g., tried to figure out why my BG was high; I felt shaky so I thought I needed to check BG; using symptoms to understand what is going on- e.g. I felt shaky and thought I should test or eat something).
- Planning/Priority Setting (e.g., thought about how I could avoid it next time; thought I should start testing before I eat).
- Seeking Information and Advice-including from others (e.g., asked my parents what to do; checked BG).
- Seeking Instrumental Support (other people are instrument) (e.g., asked my mom to buy more strips; I had a headache and asked the school nurse for a Tylenol).
- Restrained Action (e.g., I stayed awake to see if my BG would go up; I waited a half an hour before taking my snack).

2. Problem Avoidance: These are strategies in which the individual **avoids** addressing or engaging in the problem. The goal is to avoid, ignore, or withdraw from the stressor. This includes efforts to distract oneself, focus on other things, etc. This is different from emotion avoidance because the individual is often actively avoiding dealing with the problem itself. Furthermore, there may also be no clear indication that they are addressing the problem with restrained actions. If there is clear indication that they are trying to address the problem with restrained action, then it should be coded as Problem Approach. An example of this would be: "I watched a movie" as a coping strategy vs. "I watched a movie to wait to see if my BS came back down."

- Behavioral Avoidance/ Distraction Coping/Competing Activities (e.g., found something else to do to get my mind off of it; played so I could forget about it).
- Disengagement (e.g., did nothing to deal with the problem).
- Avoiding People/Withdrawal from an Unsupportive Context (e.g., I stayed home because I did not want to test in front of my friends; I didn't talk to my mom about it because we were fighting about it).

3. Emotion Approach: These are strategies that reflect attempts to address or actively engage in one's emotions related to the problem, and are largely geared towards managing or regulating one's emotions. This can include identifying and understanding one's emotions (e.g., I felt frustrated which means I kind of needed to hurry), expressing

one's emotions (e.g., I yelled at my mom for forgetting to pick up my test strips on her way home from work), and strategies (e.g., cognitive interpretations) aimed at regulating one's emotions (e.g., figured it wasn't a big deal because had checked two hours before they left).

- Emotional Regulation Actions (e.g., stayed calm until it went back up; took a deep breath and prepared for an angry response).
- Acceptance (e.g., annoyed, but I needed to accept, be positive, and face the facts; I realized there was nothing I could do so I dealt with it).
- Positive Re-Interpretation and Growth (PRG) (e.g., I thought it was just ONE cookie- and that it would be okay to and healthy for me to not eat it; getting so sick made me realize it was best for me to check on a regular basis). Strategies that fit in this category have to be linked to personal growth or benefits out of the stressor.
- Venting Emotions/Emotional Expression/Whining (e.g., yelled in my bedroom because I was frustrated with my frequent highs and lows; I complained to my mom that she never buys me things other than my supplies).
- Seeking Emotional/Interpersonal Support (e.g., talked with mom for encouragement because I need to try harder; talked with a doctor who encouraged me to keep doing well).
- Cognitive Restructuring/Downplaying Importance (e.g., felt it didn't matter that one time, it would be okay just this once). This is different from PRG in that it focuses on thinking about the event differently in order to regulate emotions associated with the stressor, but does not imply personal growth and adaptation.
- Religion/Spirituality (e.g., prayed to God and asked him for help; thought I would start praying everyday).

4. Emotion Avoidance: These are strategies in which one is trying to disengage from, avoid, or ignore the negative emotions associated with the stressor. Strategies in this category reflect efforts to avoid thinking about, recognizing, and dealing with ones negative emotions surrounding the stressor. For this category, there is no clear indication of the participant trying to deal with the stressor in any way, either emotionally or using approach methods.

- Denial (e.g., I told myself it wasn't really happening; I saw my meter reading and new it was lying).
- Mental Withdrawal/Mental Disengagement (e.g., went back to bed so as to not worry about being low).
- Wishful Thinking/Fantasy/Escapism (e.g., I wished that I would have had more snacks to keep from being so low; I imagined that I didn't have diabetes; I just acted like I didn't have diabetes).
- Alcohol or drug use (e.g., I drank a 40 oz to keep from stressing about my diabetes; smoked a joint to forget about my diabetes).
- Hiding Diabetes from others (e.g., I stopped going to practice so that I wouldn't be embarrassed in front of other people).
- Blaming others/Disclaiming Responsibility (e.g., I thought it was my mom's fault that I went low).

- Using Humor as a Means of Distraction Coping (I made a joke about being diabetic; I make fun of my diabetes sometimes when I am with my friends).

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