

Health-Related Quality of Life in Children with Type 1 Diabetes: The Role of Family
Environment, Parental Perceived Social Support, and Children's Coping

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ABSTRACT

Children diagnosed with Type 1 diabetes face lifetime issues that will affect their health-related quality of life (HRQoL). These challenges require varied coping skills to manage the disease and a commitment to find ways to increase HRQoL. It was proposed that children's general coping styles would be mediators in both the relation of family environment and children's health-related quality of life and the relation of parental perceived social support and children's health-related quality of life in children aged 8-16 with Type 1 diabetes. Age was also proposed to be a moderator in the relation of children's coping to their health-related quality of life. Children aged 8 to 16 and their primary caregivers ($N = 56$) were recruited to participate in the study at a university hospital tertiary care clinic. Children completed the Pediatric Quality of Life Inventory 3.0 Diabetes Module for children and adolescents (PedsQL 3.0) and the Children's Coping Strategies Checklist-Revision 1. Primary caregivers completed the PedsQL 3.0 for parents, the Family Environment Scale and the Multidimensional Scale of Perceived Social Support. Regression analyses were used to identify a model that explained the contribution of each factor to predict HRQoL. It was hypothesized that children's active, distraction, and support-seeking general coping strategies would be mediators in the relation of family environment and parental perceived social support to children's health-related quality of life and that children's general avoidant coping strategies would not mediate either the relation of family environment or parental perceived social support to children's health-related quality of life . Although children's active, distraction, and support-seeking coping strategies were not found to mediate the relation of family environment to children's health-related quality of life or the

relation of parental perceive social support to health-related quality of life, children's avoidant coping strategies were found to be a mediator in the relation of family environment to children's health-related quality of life and in the relation of parental perceived social support to health-related quality of life. It was also hypothesized that children's age would moderate the relation of children's active, distraction, and support-seeking coping strategies to children's health-related quality of life. Age moderated the relation of avoidant coping to HRQoL. Avoidant coping was negatively associated with HRQoL for the older children but the association was not significant for younger children. To facilitate a better health-related quality of life for children with Type 1 diabetes, therapists and healthcare professionals should identify ways to help parents feel more supported as they care for and create a more cohesive and low conflict family environment, which contributes to their children's health-related quality of life. Additionally, therapists should work with children and their parents to increase children's use of active, distraction, and support-seeking coping strategies, which are related to more positive outcomes compared to children's use of avoidant coping strategies, which are related to less positive outcomes.

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GENERAL AUDIENCE ABSTRACT

This research study explored social and emotional climate in families, perception of parents' social support, and children's coping as factors that contribute to the health-related quality of life (HRQoL) in children aged 8 to 16 with Type 1 diabetes. One of the main goals of treatment for children diagnosed with Type 1 diabetes is preventing nerve, heart, and blood vessel damage from occurring in adulthood. When children are diagnosed with Type 1 diabetes, they face a lifetime issues that will affect their HRQoL. These challenges require children to develop skills to help them process both the expected and unexpected emotions and thoughts that occur while managing the disease and a commitment to find ways to increase HRQoL over the span of their lives. It was hypothesized that children with better social and emotional family climates or environments and more parental perceived social support would be able to more effectively cope and that better coping would be associated with more health-related quality of life. Effective forms of coping included three different strategies: active (e. g., use of positive restructuring of thoughts), distraction (e. g., use of physical release of emotion), and support-seeking (e. g., seeking support for managing feelings). Avoidant coping was also examined and included use of actions such as wishful thinking. Of note, the children's coping measure used identified use general coping strategies and was not diabetes specific. Children with connected, expressive, and low conflict family climates and with parents who perceived themselves being supported more were lower in avoidant coping, which was related to more HRQoL for the children. How coping

was associated with HRQoL was also predicted to be different when looking at older versus younger children. As children aged, their use of avoidant coping strategies increased and more avoidant coping was related to less HRQoL for older children but not for younger children. To facilitate a better health-related quality of life for children with Type 1 diabetes, therapists and healthcare professionals should identify ways to help parents feel more supported as they care for and create a more cohesive and low conflict family environment, which can contribute to their children's health-related quality of life. Additionally, therapists should work with children and their parents to decrease children's use of avoidant coping strategies, which are related to less positive outcomes.

DEDICATION

I would like to dedicate my dissertation to my parents, Willis and Delsie Williams. Without your unending love and support, I would have never made it this far. Through your belief in God, you raised me to trust in Him, to be guided by His direction, and to seek His face. Despite the trials you have endured in your lives in providing support for our family, you did so with tremendous grace that I know only comes from your belief and trust in God. You have taught me to thrive in the midst of trouble. I am forever grateful and honored that I was given to you.

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First, I acknowledge My Heavenly Father. The Lord is my strong defender; He is the one who has saved me. He is my God, and I will praise Him, my father's God, and I will sing about His greatness. For every mountain You brought me over, for every trial You've seen me through, for every blessing, Hallelujah for this I give you praise! Blessing, and glory, and wisdom, and thanksgiving, and honour, and power, and might, be unto our God for ever and ever. Amen.

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Introduction

Healthcare providers are diagnosing increasing numbers of children with diabetes (Centers for Disease Control and Prevention, 2014). Diabetes is a group of autoimmune disorders in which the body does not properly regulate blood glucose levels or what is more commonly known as blood sugar levels (Juvenile Diabetes Research Foundation International; JFDR, 2010). Diabetes is the second most common childhood disease with insulin-dependent diabetes mellitus or Type 1 diabetes occurring more frequently than Type 2 diabetes (JFDR, 2010). The most recent statistics from the Centers for Disease Control and Prevention (2014) showed that over 18,000 youth were diagnosed with Type 1 diabetes during each of the years of 2008 and 2009.

To date, there is no cure for the disease, and children with this diagnosis must live with the disease and its effects throughout their lifespan. Children with Type 1 diabetes are likely to rely on their parents significantly as they receive their diagnosis early in their development and depend on their parents to help them adjust to living with the disease and with disease management. Because of the ongoing nature of care necessary by parents and the complex regimen required to maintain health, the family environment in which children with Type 1 diabetes live and the level of perceived social support parents feel is likely to be associated with children's health-related quality of life. Although most children are diagnosed early in life, children experience continual changes from the effects of diabetes throughout their childhood into adulthood. Because of these changing and often stressful experiences, children's coping may play an important role in how children live with the disease and how well they maintain their health-related quality of life as they transition into adulthood. Their coping ability may play an important role in how children live with the disease and how well they maintain their health-

related quality of life as they move into adolescence and adulthood.

In the American Diabetes Association (ADA) Statement of Care Statement, Silverstein et al. (2005) outlined the suggested treatment protocol for children and adolescents with Type 1 diabetes, which provided age specific recommendations across multiple modalities. Regarding diabetes education and treatment specifically, Silverstein et al. noted the importance of a diabetes team to provide qualified care, education, and support and to consist of at a minimum, “a pediatric endocrinologist, a nurse educator, a dietitian, and a mental health professional” (p. 187). Because the recommended treatment protocol for children with Type 1 diabetes is specific and challenging, the diabetes care team is integral in providing treatment to provide the intensive management required to decrease the likelihood of children and adolescents developing secondary complications. The multidisciplinary diabetes care team helps children and adolescents with Type 1 diabetes and their families adjust to and cope with the challenges experienced with the disease and provides regular monitoring of blood glucose levels with the aim to keep the levels within the acceptable range. The intensive care protocol is likely to offset children and adolescents’ use of less positive coping because of the strategic and purposeful interventions of the care team. The decrease of less positive coping in children and adolescents would lead to better health-related quality of life.

The aim of this study was to examine how family environment, parents’ perceived social support, and children’s coping were related to the health-related quality of life of children ages 8 to 16 with Type 1 diabetes. Specifically, children’s coping was explored as a mediator in both the relation of family environment and children’s health-related quality of life and the relation of parental perceived social support and children’s health-related quality of life (see Figure 1). Age was explored as a moderator in the relation of children’s coping to children’s health-related

quality of life.

Throughout the literature regarding research with children with Type 1 diabetes, children between the ages of 8 and 16 were categorized generally as children instead of making a developmental distinction between children in middle childhood and adolescence. Although there are clear developmental differences between these groups, the term children has been used to refer to this age span of the population studied and, when appropriate, the distinction between the groups was made. Therefore, throughout this study, the population studied was referred to as children and the distinction between them was identified where appropriate.

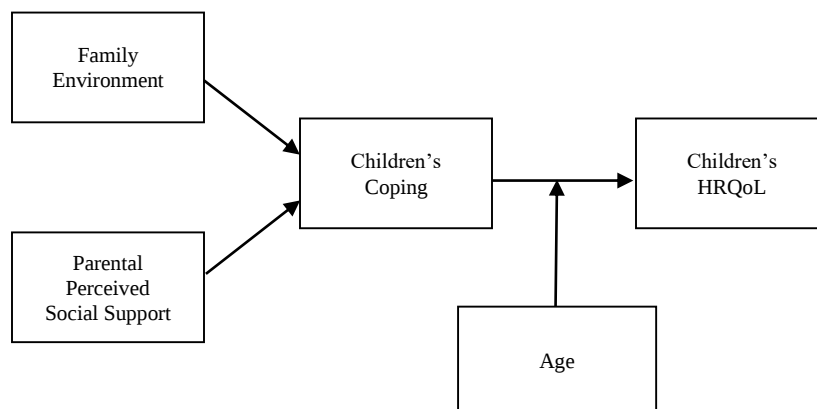


Figure 1. Moderated mediated model of the relation of family environment and parental perceived social support to children's health-related quality of life (HRQoL) by children's coping.

Transactional Stress and Coping Model

The transactional stress and coping model has been identified as a model that conceptualizes how children's chronic illness, in this case Type 1 diabetes, is a stressor to which children and their families seek to adapt (Thompson & Gustafson, 1996). This model uses an ecological-systems theory approach and considers the contextual factors of the biological, developmental, and psychosocial as contributors of the illness outcome (Thompson & Gustafson,

1996).

The ecological-systems theory identifies multiple aspects of environments that relate to children's growth and development (Bronfenbrenner, 1977). Because of the interconnection of these environments, any change in the one can trigger changes in the others. The smallest system is the microsystem, which represents children's immediate environment. The microsystem is composed of children's immediate relationships with parents/family, school, religion, and in this study, hospitals/medical and mental health professionals. The next level of systemic interaction is at the mesosystem level. This level describes how the multiple parts of the microsystem interact in relation to children. While the remaining three systems of interaction (exosystem, macrosystem, and chronosystem) are not a place of direct interaction, these larger systems indirectly impact children as they constitute cultural, societal, economic, and sociohistorical transitions across the life span.

The focus of the transactional stress model is on patient and family variables as these variables are thought to more likely relate to the illness outcome more than illness and demographic variables (Thompson & Gustafson, 1996). The patient or child variables consist of the adaptational processes, which include their methods of coping (Thompson & Gustafson, 1996). The family variables include methods of coping and family functioning (Thompson & Gustafson, 1996). The transactional stress and coping model has been shown to be useful in understanding adjustment in children with sickle cell disease (Thompson, Gil, Keith Gustafson, George, & Kinney, 1994) and in children who have Type 1 diabetes (Hocking & Lochman, 2005). The model considers how family functioning, parents' interaction with their children, and children's coping are related to how well children adjust to having an illness.

When conceptualizing this study, it was helpful to use the transactional stress and coping

model to think about how these proposed variables may be related. Within the transactional stress and coping model, children's coping is a component of children's adaptational processes. Coping can be adaptive or less adaptive. Adaptive coping is oriented toward changing relations between individuals and the environment through attempts to change the individuals' responses either to the stressor or to the actual environment (Hocking & Lochman, 2005). Coping that would be considered less adaptive would use a combination of wishful thinking and avoidance to adapt to the stressor, in this case Type 1 diabetes (Hocking & Lochman, 2005). As studies have identified coping strategies that would be considered adaptive as related to positive outcomes in children and adolescents with Type 1 diabetes (e. g., better metabolic control, higher quality of life), this study focused on adaptive coping and how this type of coping may serve as a mediator in the proposed model (See Figure 1).

When considering the parental component of the transactional stress model, parents' adaptational processes, primarily identified as maternal processes, are identified as cognitive processes, parental methods of coping, and family functioning (Thompson & Gustafson, 1996). Parental adaptation, child coping, and family functioning were the focus of this study.

Type 1 Diabetes and Its Challenges

Type 1 diabetes or juvenile diabetes causes the individual's own body to fight against and ultimately destroy the insulin producing cells in the pancreas (JDRF, 2010). Type 2 diabetes occurs when individuals' pancreatic cells do not recognize the insulin produced or do not produce enough insulin to absorb the sugar created from the breakdown of ingested carbohydrates (Centers for Disease Control and Prevention, 2014).

Because children with Type 1 diabetes cannot make their own insulin, they must receive insulin through daily injections or through infusion via insulin pumps for the rest of their lives

(JDFR, 2010). These children face numerous potential medical complications (i.e., kidney failure, heart disease, blindness) as the disease progresses as they age. As such, Type 1 diabetes qualifies as a chronic illness. Holm, Patterson, Rueter, and Wambolt (2008) have defined chronic illness in accordance with the World Health Organization as an illness meeting the following criteria: “(a) having a biological, physiological, or anatomical basis; (b) lasting, or expected to last for a minimum of 1 year; and (c) producing, or likely to produce, long-term sequelae” (p. 284). Given the potential life-long issues faced by children with diabetes, identifying and understanding factors associated with their ability to cope are important. The ability to cope is dynamic and refers to the adaptive processes by which individuals use behaviors and thoughts to deal with stressful events (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Receiving a diagnosis of Type 1 diabetes would qualify as a stressful event for these children, not only immediately but also on a long-term basis.

As children age, their risk for complications increases and with this increased risk comes additional emotional and physical stress. As with any other chronic illness, children who have Type 1 diabetes may experience long-term problems from the conditions created in childhood, secondary complications (e. g., neuropathy (nerve damage), cardiovascular disease (heart and blood vessel damage), and increased behavioral and psychological problems in adulthood (Schmidt, Petersen, & Bullinger, 2002). Increased levels of coping skills may help children to deal with these potential issues and may serve to increase well-being (Schmidt et al., 2002). The coping mechanisms learned in childhood may become useful when, as adolescents and adults, they need to adjust to different symptoms related to diabetes and diabetes management while experiencing the normative developmental transitions that occur across the life span (Schmidt et al., 2002). From a therapeutic intervention perspective, helping children identify, develop, and

modify their coping skills to deal with anxiety, fear, and depression along with learning to cope with the frustration of continual changes in medication management creates better emotional health. It is likely that the children's coping resources that allow them to manage these emotions would be related to improving their health-related quality of life.

Children diagnosed with diabetes early in their lives face a lifetime of issues caused by diabetes. Diabetes causes primary (e.g., blood sugar maintenance, dietary control, exercise regimen) and secondary (e.g., neuropathy, renal failure, hypertension) complications (Botello-Harbaum, Nansel, Haynie, Iannotti, & Simons-Morton 2008; Franzese, Valerio, & Spagnuolo 2004; Greening, Stoppelbein, Konishi, Jordan, & Moll, 2007; Jacobson et al., 1994). Because of the continual challenges to maintain this intensive treatment to prevent or delay these complications, children with Type 1 diabetes may be more susceptible to health-related quality of life issues because of the physical, emotional, and social demands that exist in managing a chronic illness (Grootenhuis, Koopman, Verrips, Vogels, & Last, 2007). Health-related quality of life has been defined as "the value ascribed to a person's life, by the individual or society, as a result of his or her own health, and influences such as personal behavior, medical care, health policy, or larger social forces" (Mozes, Maor, & Shmueli, 1999, p. 269). The goal of diabetes management is to prevent the potential long-term vascular complications that arise from having chronically elevated blood glucose levels (LeRoith & Smith, 2005). As children are constantly adjusting to their treatment regimen because of the progression of the disease, how well they cope with making these changes becomes important. These complications, of which these children are at risk, may create health issues over time such as kidney disease, retinopathy, and loss of extremities. As children shift into adolescence, they become more at risk for developing psychological issues like depressive symptoms and anxiety and behavioral issues, such as not

adhering to treatment regimens (Whittemore, Jaser, Guo, & Grey, 2010). If these complications can be prevented or delayed through improving children's coping ability, health-related quality of life can be improved.

Type 1 diabetes typically emerges between either the ages of 5 and 7 or at the onset of puberty (Franzese et al., 2004). In the current literature, few studies have focused on children in middle childhood (aged 8-12) with Type 1 diabetes or on the habits they form that lower their risk for complications and that may be related to their health-related quality of life (Davis et al., 2001). A review done by Hocking and Lochman (2005) explored factors that contribute to children's adjustment to Type 1 diabetes and identified that only five of the forty-six studies reviewed focused on children in middle childhood. Children in middle childhood are at a stage developmentally that lends to their ability to be active participants in augmenting their existing coping skills and learning more effective ways to cope.

Although less literature exists that explores health-related quality of life in younger children regarding to Type 1 diabetes, there is an abundance of research about adolescents with Type 1 diabetes and their health-related quality of life (Caferoğlu, Inanç, Hatipoğlu, & Kurtoğlu, 2016; Moreira, Frontini, Bullinger, & Canavarro, 2013; Wagner, Müller-Godeffroy, von Sengbusch, Häger & Thyen, 2005; Yi-Frazier et al., 2016). As children transition into adolescence, they are more likely to be affected by psychological stress, which in turn may relate to their ability to attend to their diabetes regimen well (Wysocki, Buckloh, & Greco, 2009). Because of the normative development of adolescents (seeking to establish autonomy and seeking to establish an increased sense of self), diabetes management can become more challenging because of the shift in the adolescents' perception of the level of parenting needed or desired. Additionally, as coping appears to shift depending on the developmental phase,

adolescents tend to rely on avoidant forms of coping more than younger children (Graue, Wentzel-Larsen, Bru, Hanestad, & Søvik, 2004). Research has shown that adolescents' lower HbA_{1c} and higher life satisfaction regarding living with diabetes were associated with their increased use of active coping (Graue et al., 2004).

To date, the recommended treatment regimen is the intensive treatment as determined by the Diabetes Control and Complications Trial Research Group (DCCT, 1993) because of its demonstrated ability to minimize the potential complications faced by individuals with Type 1 diabetes. When children with Type 1 diabetes manage the disease effectively through better coping, they may increase their health-related quality of life and may experience less health complications.

Child Development: Middle Childhood and Adolescence

From the perspective of children's overall development, there are three perspectives that inform how we think about children and the relationships in which they are involved. These perspectives inform how children may cope with living with diabetes as their disease progression challenges their social and cognitive abilities, their social relationships, and their developmental pathways.

According to the maturational perspective of child development, children in middle childhood are at the stage where they can use their social and cognitive abilities more adeptly (Davies, 2004). During this time, the areas of the brain responsible for cognition, language, and social skills are improving (Mah & Ford-Jones, 2012). From this perspective, children in middle childhood are more likely to be capable of learning coping skills needed to manage their disease. Although the maturational perspective focuses on the social and cognitive abilities of children, the transactional model perspective focuses on the interactions of children with their family

members and other social contexts to understand children's development (Davies, 2004). This perspective also includes how children organize their experiences with their family and as well as with their social contacts (Davies, 2004). Considering this perspective, children are more likely to make sense of their situation from how they relate to their parents and how their parents relate to them.

Lastly, the developmental pathways and intervention perspective acknowledges that the interactions children have with their environment both in the social and cognitive domains can create alternative adaptive or maladaptive developmental pathways to which interventions can be used to shift the trajectory towards normative development (Davies, 2004). This perspective also seeks to empower parents to respond better to the difficulties their children are experiencing by tapping into protective factors. From this perspective, when children with Type 1 diabetes have parents who work with them to create ways to function better, they are more likely to cope better, which would improve their health-related quality of life. At this intersection, therapeutic interventions like structural family therapy enactments and firming up boundaries between the parental and child/sibling subsystems (Minuchin, 1974) can be used involving parents and children designed to increase the implementation of authoritative parenting behaviors and provide feedback in the moment to create a low conflict, supportive family environment. Not only can the parents incorporate this training to strengthen parenting behaviors, children can also be taught therapeutic techniques to identify and solidify their existing coping resources and to explore and develop new ways of coping as well.

It is in this population that the beginnings of healthy self-care habits emerge and form the foundation of better diabetes management over the lifespan (Davis et al., 2001). Because the onset of diabetes typically occurs in middle childhood, these children work closely with their

parents in the management of the illness because of the required glucose testing, insulin administration, and attention to dietary changes needed to keep their blood glucose levels in check. These new changes in their lives will require children to acquire new skills to keep on track with their new way of living. As parents are still an integral part of modeling and decision making, middle childhood is an important time in these children's lives because parents create space to allow children to cope with the new emotional and physical demands of the disease using existing coping skills or by encouraging children to learn new ways to cope with the changing demands.

In addition, these children test their new skills of regulating the potential anxiety and stress from living with this disease. When children are learning these new skills in self-regulation related to managing diabetes, their parents' receptivity to their attempts may be related to their use of the new skills (Maccoby, 1984). If children have parents who create warm and supportive family environments that encourages communication, children may be more apt to try the new skills. Therefore, a parenting style that would allow parents to provide a warm and supportive yet structured environment would be expected to be associated with how well children can cope with the disease.

When children who have been diagnosed with Type 1 diabetes transition into adolescence, they show greater difficulty in managing their disease (Anderson & McKay, 2011). This shift usually occurs because of the developmental shift towards independence and because of the change in their physical bodies due to puberty (Anderson & McKay, 2011). With each normative and disease-related transition children face, the physical, emotional, and social challenges seem to become additive. Those challenges will more than likely be related to their overall health-related quality of life both at each life stage and overall. Children diagnosed with

Type 1 diabetes need to identify and modify coping mechanisms early on in their diagnosis that will ease the transitions they will experience.

There is a need to focus health interventions on children in middle childhood with Type 1 diabetes, as this period is crucial to developing habits that are likely to increase their ability to manage their care and the changes they may experience due to the disease. Children in middle childhood are in a period of development where they are establishing positive health behaviors (Lohaus, Vierhaus, & Ball 2009). Even though children's behaviors are controlled by their parents, children in middle childhood can make some decisions about their health and the value of maintaining good health (Lohaus et al., 2009). Even without the complications of Type 1 diabetes, children's creation of positive health behaviors may more than likely lead to better coping during middle childhood which may be related to increasing future positive health behaviors as they transition into adolescence and throughout adulthood. If this time of positive behavior development is critical in normative populations, it stands to reason that for children with Type 1 diabetes, this period would be even more important to focus on to develop positive health behaviors in this population.

Although middle childhood is a time when children are beginning the health habits that will carry them throughout their lives, adolescence is the time when children have begun to coalesce the "cognitive, playful, affective, social, and moral reactions into a whole" (Piaget & Inhelder, 1969, p. 128). This shift in understanding and self-reflection enables adolescents to think on a more global level than they were capable of earlier in their development (Piaget & Inhelder, 1969).

The hallmark identifiers for adolescent development are their use of logic to understand abstract concepts, metacognition, and problem-solving skills (Piaget, 1972). Since adolescents

are beginning to integrate these aspects of their life into a meaningful whole, they are more able to take the skills they began to learn in middle childhood and augment them in a way that expands the skills on both meaning and application. The gaining of perspective and the increasing of differentiation of self and of their own thoughts from others allow them to begin to think in terms other than the concrete application of ideas (Piaget & Inhelder, 1969). Having an ability to understand the abstract enables adolescents to better identify the coping skills they have found useful in different developmental domains separately and merge them into an integrative whole. As a result, adolescents' shift in thinking creates opportunity for them to grasp the potential unintended consequences of failing to adhere to the proper treatment regimen required for Type I diabetes.

There is an expectation by both medical professionals and parents that adolescent youth take on more responsibility for disease management. Typically, this transition does not go as smoothly as anticipated and causes conflict both as it pertains to their physical health and to their socio-emotional health. Adolescents struggle with requesting changes in rules and in level of desired autonomy alongside of their parents' struggle with imposing developmentally appropriate rules and granting appropriate levels of autonomy.

Middle childhood is a time when what children learn and do can impact their future ways of learning and doing (Mah & Ford-Jones, 2012). Because this period seems to be a critical time of social, emotional, and cognitive development for these children, healthcare professionals should take advantage of this fertile time to teach children with Type 1 diabetes more effective ways of coping, which would help younger children make the transition into adolescence better and would ultimately lead to a better health-related quality of life. Although middle childhood is a fertile learning time to develop and to begin to master these positive behaviors, adolescents can

benefit from this type of focus with the emphasis shifted to reflect the appropriate developmental stage and normative process being experienced. Adolescents would be better able to improve upon existing coping skills and master new ones simultaneously. This ability would assist healthcare and mental health providers in improving adolescents' management of Type 1 diabetes, which would also lead to a better health-related quality of life both in the short and long term.

Health-Related Quality of Life

Health-related quality of life is a construct that encompasses physical, emotional, and social functioning (Sawyer et al., 2004). Research has shown that measuring health-related quality of life can be useful in prioritizing mental and physical health services, planning treatment protocols, and incorporating children's perspectives in treatment plans (Coghill, Danckaerts, Sonuga-Barke, Sergeant, & the ADHD European Guidelines Group, 2009). Because health-related quality of life is a multifaceted construct, factors that may contribute to improving health-related quality of life in children with Type 1 diabetes should be explored. Additionally, it is worth noting current research on health-related quality of life in children under the age of 11 is scarce (Valenzuela et al., 2006). Although health-related quality of life has been studied more in adolescents, it stands to reason that younger children's experiences should be explored as children 18 years old and under receive treatment in pediatric endocrinology clinics. This study will contribute to the literature that explores the importance of health-related quality of life in children with Type 1 diabetes and would benefit medical and mental health professionals who are tasked with providing structure and support.

The factors that are related to children's ability to cope and their health-related quality of life have not been fully explored. Because coping and health-related quality of life are

multidimensional constructs, the factors that may be associated with each of them should be explored to improve these important contributors to children living well with diabetes both in the short and long term. Health-related quality of life values can facilitate therapist and medical professionals' understanding of the impact of the disease and of the treatment on children and their families (Coghill et al., 2009). This understanding grounds care in a systemic approach, which would be beneficial to patients and their medical team as how patient care is delivered is shifting to a more collaborative stance. Identifying these factors may not only improve children's physical health but also may improve their emotional health. When individuals physically feel better, they feel better emotionally, and this will impact their health-related quality of life both in the present and the future.

Creating an environment for children that encourages and strengthens their ability to cope and experience success in managing diabetes may be linked with an authoritative parenting style. In this context, authoritative parenting may be associated with children's ability to try new coping skills and incorporate them into their existing coping framework, which would increase their health-related quality of life. It stands to reason that developing coping skills in middle childhood would create more successful experiences in coping with diabetes as these children transition from middle childhood into adolescence, which may increase their health-related quality of life. When considering adolescents, an authoritative parenting style would be beneficial with strengthening and maintaining the coping skills learned in middle childhood. The authoritative parenting style, shifted to accommodate adolescents' desire for increased independence while supporting the desired clear and flexible boundary structure needed to maintain both the diabetes treatment regimen and healthy normative development, would provide the necessary structure and oversight to assist them in solidifying existing coping skills and in

learning newer coping skills.

In considering long-term care for children with Type 1 diabetes, improving health-related quality of life becomes important. The cornerstone of good care is prevention of health-related complications (Wagner et al., 2005). Wagner et al (2005) explored health-related quality of life in German children and adolescents, aged 8 to 16, diagnosed with Type I diabetes and compared their health-related quality of life values with those of healthy children and adolescents. The authors found that children and adolescents with higher health quality of life had good control of the disease. The children in the study participated regularly in in-patient training programs along with their parents. This multidisciplinary team support may have influenced the health-related quality of life and the children and adolescents' ability to cope better with diabetes. It was not determined how much each factor contributed to this support, which factor may have had a stronger association, or whether it was a combination effect. As found in this study, younger children had better health-related quality of life. Wagner et al. did not identify how individual factors such as coping were associated with good metabolic control or health-related quality of life.

Having a good health-related quality of life is the end goal of diabetes care. Children and adolescents with Type I diabetes are at risk for developing complications and they live with that uncertainty. This uncertainty may create feelings of depression, fear, dread, and anxiety at varying points in the progression of the disease. Children are capable of being taught developmentally specific coping skills and behaviors that will help them tolerate these changes in how they experience living with the disease. Therapists can engage both children with Type I diabetes and their parents therapeutically in ways to increase the desired behaviors and skills to think and behave differently to promote healthy change within the family system not only in

disease management but also in the family environment. Based on the importance of coping, children's coping may be a factor that mediates the processes in which it has a role, specifically the relation of family environment to children's health-related quality of life.

Family Environment

Type I diabetes treatment and management requires that children and adolescents as well as parents play active roles in the management of the disease. Because of this reliance on parents, parental and familial factors may relate to how children cope with the disease (Hocking & Lochman, 2005). Family environment may be one of the parental factors that is associated with the health-related quality of life of children with Type I diabetes. The research addressing how family environment is related to Type I diabetes management is sparse. As Type 1 diabetes affects the family system due to the shared responsibility of care, it would be beneficial clinically and medically to identify the family environment factors that foster optimal treatment adherence, which would improve children's health related quality of life.

The circumplex model of marital and family systems (Olson, 2000) measures families' levels of cohesion, flexibility, and communication. Cohesion represents how emotionally connected families are with one another and as a unit (Olson, 2000). Flexibility identifies families' ability to adapt to change whereas the communication domain measures families' ability to use positive skills to shift cohesion and flexibility within the system (Olson, 2000). Within the cohesion dimension of the model, families' level of connectedness or togetherness can be disengaged, separated, connected, or enmeshed with the separated and connected levels representing the more balanced areas (Olsen, 2000). Individuals who fall within these ranges typically balance their levels of independence/dependence or time together/apart with others in the family. When families are placed within the flexibility domain, their position can range from

rigid to structured to flexible to chaotic where families who function better fall into the range of structured or flexible (Olsen, 2000). Since flexibility focuses on families' leadership, roles, and rules within the system, these families can use a more democratic decision-making process around roles and rules and can change these areas when needed. The communication dimension allows families to facilitate change within the cohesion and flexibility dimensions (Olsen, 2000). As this dimension focuses on facilitation, there is no range of communication, and families who use effective listening skills while using empathy and attention have good communication whereas families who do not have these skills or use them poorly would have poor communication (Olsen, 2000). Considering this model of marital and family systems, balanced families function better because they can appropriately move between separateness and connectedness within the domains of flexibility and cohesion. When children have Type 1 diabetes, having a family environment that would be flexible with roles and rules while maintaining appropriate dependence and independence may be helpful as parents would be capable of clearly communicating the rules and roles that each member takes and is responsible for regarding management of the disease while maintaining appropriate connection.

A study was conducted by Missotten, Luyckx, and Seiffge-Krenke (2013) to identify family climates present in families with adolescents with Type I diabetes. Specifically, the researchers wanted to determine the following: whether previously identified family climates would emerge in this population, how the climate was related to internalizing and externalizing symptoms, whether the climates were associated with specific change in these behaviors, and whether the relation between family climate and internalizing and externalizing symptoms would be moderated by the adolescents' health (having Type I diabetes or not). Missotten et al. found that the previously identified family climates in the literature of conflictual, controlling,

cohesive, and balanced emerged for families with adolescents with Type I diabetes. In addition, they found that families with high cohesion and organization supported positive psychological functioning in the adolescents. When Missotten et al. compared the distribution of the healthy control adolescents to the adolescents with Type 1 diabetes into the family climates that emerged, they found that the adolescents with Type 1 were found to be more likely located in the balanced climate and less likely to be found in the cohesive and conflictual climates. It seemed the families with adolescents with Type 1 responded to the diagnosis by shifting their environment to one of warmth and organization. Another finding from this study was that when adolescents were raised in a balanced family climate, they were more likely to have better psychosocial health. Although this study examined adolescents, the outcomes of this research should be applicable to children in middle childhood with Type 1 diabetes as the beginnings of care and management of the disease most often begins at this age. Having a positive and balanced family climate may serve as a protective mechanism which would position children in middle childhood to make better transitions into adolescence as adolescents tend to become less compliant to adhering to the required treatment regimen.

Baumrind (1966) identified three parenting styles that described how parents respond to their children's behavior. The permissive parenting style allowed children to self-monitor without using power to control children's behavior (Baumrind, 1966). These parents did not make demands or attempts to control and responded to children's behavior with acceptance. The second style of parenting was authoritarian. These parents were very rigid about children following rules and used power to enforce their standard of behavior (Baumrind, 1966). The authoritarian parenting style used punishment to achieve control of children's behavior. The authoritative parenting style was the third style defined. These parents used encouragement,

reasoning, and respect for children's autonomy to control children's behavior and valued open communication, warmth, and acceptance towards their children (Baumrind, 1966).

To further understand parenting style, a contextual model of parenting style should be considered. Darling and Steinberg (1993) proposed a contextual model of parenting style in which they outlined how parenting style impacts child development. According to Darling and Steinberg (1993), parenting style has three different aspects: "the goals toward which socialization is directed; the parenting practices used by parents to help children reach those goals; and the parenting style, or emotional climate, within which socialization occurs" (p. 488). It is the parenting style portion of this model in which the authoritative parenting style falls.

An authoritative parenting style allows parents to show their children warmth and support and provide clear rules and boundaries for their behaviors (DeHart et al., 2006). Pettit et al. (1997) studied supportive parenting in children aged 5 to 11 to examine its effect on children's adjustment over time. The supportive parenting behaviors were measured using social involvement, calmness in conflict, proactive teaching, and warmth towards children. These supportive parenting behaviors were found to be associated with promoting school adjustment and buffering against developmental risks over time. These supportive behaviors are identified as characteristics of authoritative parents. Parents whose parenting style is supportive or authoritative may better help their children manage the stress they experience living with diabetes. This potential lowering of stress benefits children in improving their coping, which would be associated with their health-related quality of life. When children have supportive parenting while experiencing stress, their coping may serve to increase their health-related quality of life.

In middle childhood (8 to 12 years of age), development and coping ability are

interrelated in that the developmental processes of children in middle childhood are shaped by their coping ability and their coping ability is shaped by their developmental processes (Schmidt et al., 2002). Because of this connection between developmental processes and coping ability, the developmental aspects of children in middle childhood and factors that may be associated with their coping should be explored. Just as children in middle childhood are in this cycle of interdependence of coping and development, adolescents are negotiating this cycle as well. As adolescents are expanding their social context, they are expanding their thinking and attempting to understand their sense of connection which can leave them excited, happy, and satisfied or sad, isolated, and inadequate (Laser & Nicotera, 2011). According to Piaget (1952, 1970), adolescents are entering the beginning of formal operations, meaning they are starting the process of thinking abstractly and creatively. This achievement would allow them to use previously learned individual coping mechanisms in a more integrated fashion.

Throughout middle childhood and adolescence, children and parents are in an active negotiation and renegotiation of boundaries (Davies, 2004). As children with Type 1 diabetes establish their treatment regimen, they actively engage in negotiation with their parents about how and when they will use these new skills. Although younger children work closer with parents to manage their treatment regimen, adolescents are less inclined to do so as they are actively seeking autonomy and are encouraged to take on more responsibility for their regimens by both medical professionals on their treatment team and their parents. This apparent shift in responsibility and increased desire for more autonomy may be influenced by the family environment and the parents' ability to shift their perspectives of their roles of responsibility and presence.

The ability to communicate openly about how one thinks and feels is indicative of

healthy interactions among family members. Openness to communication is determined by the parental subsystem. The style of communication is indicative of the parental relationship and the level of distress between parents/partners and how children respond to this distress (Cummings et al., 2000). Mackey et al. (2011) explored the association of disease management, metabolic control, individual strengths, and family strengths in youth aged 11 to 14 with Type 1 diabetes. Family cohesion was identified as a family strength and positive, desirable youth qualities were identified as the specific individual youth strengths (Mackey et al., 2011). Youth in families with better cohesion attended to disease management better and had parents who were more involved, which was associated with better metabolic control – a marker of better management of the disease (Mackey et al., 2011). If parents of children with Type 1 diabetes create an environment where children receive the help they need and feel they are supported, children may be better able to seek parental support and direction in coping with the challenges of successful disease management. When children know they will receive help and support, they are able to voice their concerns and cope with the demands of the disease, thereby experiencing better emotional health and competence.

Research has shown that open communication between parents and children may increase constructive coping mechanisms. Gentzler, Contreras-Grau, Kerns, and Weimer (2005) studied parent-child emotional communication and the relation to children's coping in middle childhood. The focus was to determine if emotional communication was related to constructive coping when children were placed in upsetting situations. The self-report of both children and parents revealed 23-24% of the variance in children's coping came from emotional communication variables such as expressive encouragement and emotional openness, which are components of an authoritative parenting style.

Children's coping is influenced by how emotionally open parents are to their children and how encouraged children feel in sharing their emotions with their parents (Gentzler et al., 2005). When parents model better communication regarding emotions, this creates a more supportive family environment where children's coping with both upsetting and non-upsetting situations may be enhanced. This increased coping behavior would be associated with better emotional health.

Additionally, positive family environments with supportive parents may provide children with a model of positive coping. Children still depend on their parents for direction, protection, and care. Although what is required and expected is different based on developmentally appropriate need, the types of interactions children have with their parents should be considered as one of the factors that may be associated with children's ability to cope with living with Type 1 diabetes, especially when the parent-child interactions are healthy. Therefore, a positive family environment and positive parent-child relationships would be expected to be strongly associated with how well children cope with diabetes and its management (Kliewer, Fearnow, & Miller, 1996).

A theoretical model created by Kliewer et al. (1996) described how parental socialization was associated with children's coping behavior in a normative population. In this study, they found that family environment and the parents' own coping were directly related to children's coping and that both parents contributed to coping development (Kliewer et al., 1996). Parents may model coping skills in response to their children's distress and encourage them to use those skills to lessen the experienced stress. They also found that cohesive, expressive, low conflict family environments were positively associated with children's coping (Kliewer et al., 1996). Children living in cohesive, expressive, low conflict environments with positive parental

relationship quality are likely to have better coping.

Positive family environment where children have Type 1 diabetes is likely to be a factor that relates to children's coping. Factors, like family environment, associated with increasing coping in children with Type 1 diabetes would more than likely be associated with increased health-related quality of life in children with Type 1 diabetes. This insight adds to the need to target this population for early therapeutic interventions that will teach authoritative parenting behaviors and positive coping to children and encourage use of an authoritative parenting style, possibly decreasing other behaviors that may be detrimental or problematic as they age and thereby increasing their health-related quality of life. Although factors centered on the child and family environment should be explored, factors that may impact parents' ability to support their children, such as social support, should be explored as a possible contributor that may impact children's health-related quality of life as social support of parents may affect parents' ability to maintain a healthy family environment.

Parental Perceived Social Support

A significant body of research regarding social support has shown that physical disease and psychological stress is mitigated by social support (Cohen & Syme, 1985). The power and importance of social support as well as how the support is perceived during children's developmental processes can be seen in the attachment of children to their primary caregivers and others that provide care. All the relationships of which children are a part, have both direct and indirect effects on their social, emotional, and intellectual development (Boyce, 1985). The nature of the parental relationship with the child tends to be the most impactful. As such, parents' ability to support and care for their children with Type 1 diabetes depends on their ability to use both internal and external resources, to manage the stress of living with the disease and the

management of their children's disease.

Parenting children with a chronic illness can be stressful. The transactional stress and coping model (Hocking & Lockman, 2005) identifies chronic illness as “a potential stressor to which the child and the family attempt to adapt” (p. 222). According to this model, both the child and the parent, identified as the mother in this model, have adaptational processes that foster adjustment to living with a child who has a chronic illness (Hocking & Lockman, 2005). Cognitive processes, methods of coping, and family functioning are aspects that constitute the maternal adaptational processes (Hocking & Lockman, 2005). Palliative and adaptive coping are components of maternal adaptational processes (Hocking & Lockman, 2005). It is within the methods of coping from which parents' social support would come. Parents' use of adaptive coping would attempt to change themselves or the environment in response to the stressor (Hocking & Lockman, 2005). The type of parental stress present, the type of parental support received to mitigate the stress, and the family environment are factors that could affect parents' ability to adjust to parenting children with a chronic illness, specifically Type 1 diabetes.

It has been well documented that perceived and received social support has been linked to physical health outcomes (Berkman, Glass, Brissette, Seeman, 2000; Cohen, 1988). When considering the psychosocial and physical impact Type 1 diabetes has on children and their families, perceived and received social support become constructs worth exploring. Studies have shown how parents receiving or perceiving social support is related to parents' ability to manage their responses to different illness and normative stressors. What has not been identified is how parents' perceived social support and children's coping with Type 1 diabetes are related.

When exploring the association between social support and parenting, research has shown that parents who receive social support and who perceive themselves as being supported

by significant people in their lives tend to parent better than those parents who do not receive social support or who do not have a perception of being supported. The ability to respond or the actual responses used by parents who have chronically ill children and adolescents is determined by their ability to respond to stressors of all types. Reviews of the research regarding social support system of parents consistently showed parents who have friends, family and community support parent better (Gay, 2005). Raina et al. (2005) explored the health and well-being of caregivers of children with cerebral palsy. They found that family function and the support provided by extended family, close friends, and neighbors were the two most impactful influences on the health of the caregiver.

Eurelings-Bontekoe, Diekstra, and Verschuur (1995) explored social support in terms of having both quantitative and qualitative elements and focused on perceived support and the use of social support seeking as a coping mechanism. For this study, social support was identified “as the number of contacts, as perceived understanding and satisfaction, and as frequency and intensity of interpersonal conflicts” (Eurelings-Bontekoe et al., 1995). Eurelings-Bontekoe et al. (1995) recruited patients from primary care psychologists who were then interviewed over the span of several months during which time the patients were receiving treatment for various psychosocial issues. The researchers found that the level of distress was dependent on which form of social support was used; individuals experiencing higher levels of distress sought out more contacts indicating the quantitative aspects of social support were more important during high levels of distress (Eurelings-Bontekoe et al., 1995). In addition, patients were found to have more contacts, less conflict, and a perceived satisfying environment at the end of study which could have been a result of the therapeutic interventions from the psychologist (Eurelings-Bontekoe et al., 1995). Parents who have children with Type 1 diabetes may be more likely to

seek out support from their partners, close family members, and friends to cope with the stress as the numbers of significant people who are perceived as being helpful may facilitate lower levels of distress and interpersonal conflict.

A meta-analytic review of parenting stress among caregivers of children with chronic illnesses found that parents' or caregivers as identified in this review experienced more stress due to both illness-related incidents and normative events, than caregivers of healthy children (Cousino & Hazen, 2013). The increase experience of stress was related to the increased demands of healthcare for the disease that are not experienced in normative populations. The systematic review also found that children experience more psychological issues when their caregivers' experienced greater stress (Cousino & Hazen, 2013). When parents/caregivers are overwhelmed by the increased stressors in their life, they may be less able to use appropriate coping because they are emotionally weary, which would impact their ability to be fully present and attentive to their children's medical and psychosocial needs. If parents have access to the social support they need and their children feel supported and/or perceive their parents as being supportive, children may experience better health-related quality of life.

When exploring the role of social support in families where children or adolescents have Type 1 diabetes, the literature has shown that social support, whether actual or perceived, impacts health-related quality of life (Almeida, Pereira, & Leandro, 2013; Holtslander, Kornder, Letourneau, Turner, & Paterson, 2012; Monaghan, Hilliard, Cogen, & Streisand, 2011; Tol et al., 2011). Researchers in India conducted an exploratory study about the caregiving experience parents of children and adolescents with Type 1 diabetes (Grover et al, 2016). Grover et al. (2016) found that parents frequently used social support seeking and problems solving, which the study defined as adaptive coping skills used in response to disease-specific stress. Grover et al.

acknowledged that the parents in their study may have used these forms of adaptive coping because of cultural influence, specifically cultural expectations of family structure and values. Although culture may have influenced this group of parents' choice of coping with the stress of caring for their children and adolescents with Type 1 diabetes, the choice of seeking social support does not seem limited to culture and may be linked to the lived illness experience.

While parents are impacted by both support given and how they perceive the support offered, their children may be impacted by parents' perception of the show of social support. Mlynarczyk (2013) conducted a study to determine the impact of adolescents' perception of their parents' social support on adherence, metabolic control, and quality of life in adolescents with Type 1 diabetes. Mlynarczyk (2013) found that supportive parenting behaviors improved treatment adherence and were positively correlated to adolescents' health-related quality of life. Parents who felt supported and used supportive parenting behaviors like responsiveness, warmth, and care with their adolescents who had Type 1 diabetes had adolescents who felt more supported, exhibited fewer symptoms related to poor metabolic control or depressive symptoms, and demonstrated better coping (Mlynarczyk, 2013). When parents perceive that they are supported, they are able to provide support to their children to manage their diabetes and treatment regimen better.

Perceived support and the receiving of support have also been shown to be related to stress and adjustment (Sepa, Frodi, & Ludvigsson, 2004). Sepa et al. explored the parenting stress construct in mothers who had recently given birth and in their partners. Specifically, they explored the construct of parenting stress and social support and confidence/security and how they related to parenting stress. Sepa et al. found that parental dissatisfaction and poor child sleep were the best predictors of parenting stress but did not find any demographic variables that were

related to parenting stress; however, lack of social support and confidence/security were found to be related. While this study focused on parents of healthy newborn children, the impact of stress on these parents and their ability to feel confident or secure in their parenting capability may be applicable to understanding the impact on perceived support felt by parents. When considering parents who have children with Type 1 diabetes, parenting stress may contribute to how they view the social support they receive, which may be related to their ability to be supportive and caring with their children. This lack of care and support from parents may affect their children's health-related quality of life.

A tremendous amount of research has explored the role social support plays on health-related quality of life. There is also significant research that has explored the role of social support in parents who have children with chronic illnesses. Research has shown that parents use various coping strategies, which most commonly included seeking out social support and information about the disease, as the primary strategies used (Azar & Solomon, 2001; Lazarus & Folkman, 1984). Despite the significant research done in these areas, the role parents' perception of social support may play in their children's health-related quality of life has not been explored. This study explored the possible association of perceived parental social support with children's coping and children's health-related quality of life. It is anticipated that perceived parental support would be associated with children's coping and children's health-related quality of life.

Children's Coping

Coping as defined by Compas et al. (2001) is the "conscious volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances" (p. 89). Responding to stress is part of adapting to new situations and it "includes the ways in which individuals manage their emotions, think constructively, regulate and direct

their behavior, control their autonomic arousal, and act on the social and nonsocial environments to alter or decrease sources of stress” (Compas et al., 2001, p. 87). The effects of stress are determined by how well individuals respond to stressors and their coping ability is the totality of those responses (Compas et al., 2001; Overmier & Murison, 2005). Whether the event is perceived as single occurrence or as an extended exposure to a trauma or stressful event, individuals’ responses are based on their coping mechanisms (Overmier & Murison, 2005). Children’s ability to learn or develop a new cognition occurs in response to a situation and is related to their coping ability (Compas, 1987; Overmier & Murison, 2005).

Children and adolescents with Type 1 diabetes experience stress both from everyday life experiences and from the management of the disease. It has been shown that stress can increase blood sugar levels in individuals with Type 1 diabetes whether the stress comes from normative events or from diabetes management issues (Stabler, Surwit, Lane, Morris, Litton, & Feinglos, 1987). Studies have shown that children and adolescents with medical health issues utilize coping to deal with the stressors that affect their lives (Landolt, Vollrath, & Ribi, 2002; Seiffge-Krenke & Stemmler, 2003) and children and adolescents who live with diabetes would fall into this category. Once children are diagnosed with Type I diabetes, their lives become filled with additional stressors related to diabetes management and their coping shifts and changes in response to the stressors and to the onset of developmental maturation. As children with Type 1 diabetes transition into adolescence, their coping repertoire expands to make more use of cognitive, active, and support-seeking strategies, which is indicative of their developmental growth and maturity as well as their ongoing experiences with disease-related stress (Landolt et al. 2002).

Silverstein et al. (2005) published the statement of care recommendations from the

American Diabetes Association (ADA) for children and adolescents with Type 1 diabetes, which addressed both medical and psychosocial recommendations. Silverstein et al. (2005) recommended aspects of children's/adolescents' and family functioning should be identified and addressed, which would include both children's coping and family environmental/contextual factors. This action is prudent from a perspective of family functioning both with normative family transitions and with diabetes-specific transitions. The literature has shown that children with Type 1 diabetes and their families establish patterns of engagement and coping within the first few years of diagnosis and these patterns become families' ways being (Weissberg-Benchell et al., 1995). This adjustment behavior necessitates the need to understand both children's and their families' behavioral patterns before potentially flawed interactional patterns and maladaptive coping become entrenched.

Compas (1987) reviewed the literature about stress and coping in children and adolescents. When evaluating coping, it was determined that both the successful and unsuccessful attempts to manage stress should be evaluated, not just the attempts that proved successful (Compas, 1987; Skinner, Edge, Altman, & Sherwood, 2003). Research on coping has identified engagement (approach) or disengagement (avoidance) coping as one of the most commonly used dimensions to measure coping (Compas et al., 2001). When individuals use engagement coping, they target their responses towards changing the stress or towards the emotions experienced (e.g., cognitive restricting or emotional regulation; Compas et al., 2001). Individuals using disengagement coping would use attempts to engage the individuals' responses away from the stress (e. g., wishful thinking or blaming others; Compas et al., 2001).

Another group of researchers examined the associations between coping and metabolic control and diabetes-related quality of life in adolescents 13-18 years of age (Graue, Wentzel-

Larsen, Bru, Hanestad, & Søvik, 2004). Graue, Wentzel-Larsen, Bru, Hanestad, and Søvik, (2004) concluded the adolescents' emotion-focused coping was significantly related to poor metabolic control and lower diabetes-related quality of life whereas problem-focused coping, specifically greater use of active coping, was related to improved metabolic control and higher diabetes-related quality of life. These findings supported previous research (Folkman & Lazarus, 1980; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986) that identified individuals' use of more problem focused coping in situations where change was attainable and more use of emotion-focused coping in situations where it was unlikely that the issue would be resolved. It is anticipated that as children transition into adolescence and even into adulthood that the use of emotion-focused coping would increase. Although the previous research studies (Folkman & Lazarus, 1980; Folkman et al., 1986) were done with adults, the results support existing research exploring children and adolescents' use of coping with stressful situations.

In an additional study that explored adolescents' coping in relation to resilience, which was measured by adolescents' social competence, the researchers found adolescents were more likely to employ coping strategies in the following order: primary control coping strategies, secondary control strategies, and disengagement coping strategies (Jaser & White, 2010). Adolescents preferred to use coping strategies such as problem solving, emotional expression, acceptance, and distraction over strategies such as avoidance and denial. Adolescents' use of these particular coping strategies was related to a report of higher social competence and better quality of life. Additionally, adolescents' use of disengagement coping strategies were associated with poorer metabolic control as well as other negative health outcomes and this conclusion is supported by the literature (Delamater et al., 1987; Grey et al., 1997; Graue et al., 2004)

As has been noted, the literature is sparse regarding children's coping (aged 8-12) related

to living with Type 1 diabetes or any of the psychosocial factors that accompany management of the disease. The literature is more robust regarding adolescents (Delamater et al., 1987; Grey et al., 1997; Graue et al., 2004; Jaser & White, 2010; Landolt, Vollrath, & Ribi, 2002; Luyckx et al., 2017). The literature has also showed inconsistencies in what forms of coping are used by children versus adolescents. Although some research (Rossman, 1992; Ryan, 1989; Wertlieb, Weigel & Feldstein, 1987) has shown that children were more likely to use direct action and support-seeking strategies than their adolescent counterparts when encountering a stressful event, other research (Compas, Malcarne, & Fondacaro, 1988; Donaldson, Prinstein, Danosky, & Spirito, 2000; Seiffge-Krenke, 1993) has shown children use more emotion-focused coping instead of direct action.

While significant numbers of studies explore children's and adolescent's coping using problem/emotion-focused coping or engagement/disengagement coping to categorize their experiences, researchers have suggested using a multidimensional framework that captures use of active or primary control coping, accommodative or secondary control coping, and passive, avoidant or disengagement coping in response to stress (Compas, Jaser, Dunn, & Rodriguez, 2012). To utilize this multidimensional framework effectively, the coping strategies focused on in this study were active coping strategies, distraction coping strategies, avoidance coping strategies, and support-seeking coping strategies to achieve a more informed understanding of what coping was related to increased health-related quality of life.

In review of the literature, there has been conflicting conclusions about the coping used by children versus adolescents. Compas, Jaser, Dunn, and Rodriguez (2012) conducted a review of the literature to highlight the role coping plays in children and adolescents who experience chronic illness. Although the review included research with children and adolescents with

cancer, diabetes, and chronic pain, there are similar aspects to living with a chronic illness that is applicable across disease groups. Compas et al. found evidence that suggested that children and adolescents who use secondary control coping, or accommodative coping, experienced better adjustment to living with the illness. Compas et al. also found that the use of disengagement or passive coping was related to children and adolescents experiencing poorer adjustment.

Despite the conflicting literature regarding the type of coping used in children versus adolescents, this study anticipates that younger children would use more active coping, as evidenced by use of problem-solving and support-seeking coping strategies. It is anticipated that adolescents would engage in more secondary coping, as evidenced by more use of not only active and support-seeking coping strategies but also use of accommodation and cognitive restructuring compared to children.

Factors that may be related to children's coping should be considered when evaluating children's efforts to cope with living with diabetes. Because adaptation to living with diabetes occurs over time, it is layered over normative developmental change. Children's ability to adapt and cope is based on how they interact with their environment whether through individual coping or through relationships. A chronic illness changes the normative experiences thereby challenging children's ability to cope with events that may not have been as stressful as experienced by healthy children.

The benefit to understanding children's coping mechanisms is two-fold. Determining the factors that may be associated with coping is helpful in explaining why children respond the way they do in stressful situations and in understanding how children's coping may mediate other relations. As children age and mature, they experience significant changes in how they interact in social settings. According to Piaget's stages of development, children in middle childhood are in

the concrete operational stage (Lewis, 1982). During this stage, they have achieved the ability to apply basic logic to their experiences and have begun to make sense of their relationships. The parental relationship is children's primary social relationship, and that relationship provides the structure by which they learn to relate to others and how to handle new situations (Minuchin, 1974). Similarly, adolescents are shifting how they make sense of their world. Adolescent development is marked by their transition into more abstract ways of thinking and their desire to increase independence and a greater sense of self (Piaget & Infelder, 1969).

Physical, emotional, and social demands exist for children with Type 1 diabetes. These increased demands may increase children's susceptibility to health-related quality of life issues (Grootenhuis et al., 2007). The measurement of health-related quality of life in children includes aspects of their physical, social, emotional, and cognitive selves (Mozes et al., 1999). To help children cope with diabetes successfully, research is needed to identify how children's coping mechanisms relate to their health-related quality of life. Because Type 1 diabetes is a chronic disease and has the potential to affect children's health-related quality life, research should explore emotional and social factors that may improve children's health-related quality life. Children's coping, family environment, and parental perceived social support could be factors that are associated with the social and emotional well-being of children with Type 1 diabetes respectively.

The first goal of this study was to examine a model that explains the role children's coping has in mediating the relation between family environment and children's health-related quality of life in children ages 8-16 with Type 1 diabetes. Throughout childhood, children remain somewhat dependent on their parents and learn the skills to improve self-control during this time (Davis et al., 2001). Parenting style determines how parents support, teach, and encourage

children transitioning from dependence towards appropriate developmental independence. The parenting literature has shown that family structure and communication patterns (Walsh, 2002), family environment (DeHart et al., 2006; Jacobson et al., 1994), parent-child relationships (Miller-Johnson et al., 1994; Wysocki et al., 2006), and parenting styles (Botello-Harbaum et al., 2008; Darling & Steinberg, 1993; Davis et al., 2001) are associated with coping in children. It was hypothesized that children's coping would mediate the relation between family environment and children's health-related quality of life. Specifically, family environment would predict children's coping, which would then predict children's health-related quality of life.

The second goal of this study was to examine a model that explained the role children's coping has in mediating the relation between perceived social support of parents and children's health-related quality of life in children ages 8-16 with Type 1 diabetes. Parents often need support to adjust to and live with parenting children with Type I diabetes. The amount of support parents' perceive themselves receiving from significant others (spouses/partners), friends, and family members shape parents' ability to cope. The literature has shown that parental coping (Hocking & Lockman, 2005) and parental perceived support (Belsky, 1984; Davis et al., 2001; Eurelings-Bontekoe et al., 1995; Mlynarczyk, 2013; Sepa et al., 2004) are associated with coping in children. It was hypothesized that children's coping would mediate the relation between parental perceived social support and children's health-related quality of life. Specifically, parental perceived social support would predict children's coping, which would then predict children's health-related quality of life.

Because of the wide span of ages and because of the two distinct developmental periods represented in this study, age was explored as a moderator in the relation of children's coping to their health-related quality of life within the proposed mediation model (see Figure 1). When

considering the possible pathways where age could moderate the interaction, the literature that explores disease management in children and adolescents with Type 1 diabetes shows that adolescents are more likely to have poorer adherence and health-related quality of life than children. Because of these outcomes, there is a greater likelihood that age would moderate the path between children's coping and health-related quality of life instead of either the path between family environment to children's coping or perceived parental social support to children's coping. As the maintenance of the family environment is based on factors that are considered more stable (family dynamics, parenting and attachment style), it is unlikely that an increase in the age of children in the home would influence children's coping. Additionally, the perception of social support by parents is contingent on the parents' social network and would be unlikely to change as their children age.

Control Variables

There are several variables that have been shown to correlate with children's health-related quality of life. Children's metabolic control, age at onset of Type 1 diabetes, socioeconomic status, and ethnicity were variables that were shown to correlate to children's health-related quality of life. In the proposed model, these variables were controlled to determine the effects of the variables in question.

Metabolic or glycemic control. The standard test to measure the blood glucose levels in the body is the hemoglobin A1c value or HbA_{1c}. This test shows the average of what the blood glucose levels have been in the body in past three months and shows how well individuals have controlled their diabetes during that span of time (Jeppsson et al., 2002). Although a normal HbA_{1c} value ranges from 4.0% to 6.0% or less of the mean plasma glucose level, the American Diabetes Association (ADA; 2009) suggests that individuals with Type 1 diabetes keep their

HbA_{1c} value at 7% or less without triggering unacceptable hypoglycemia. It should be noted that the guidelines are not as stringent for children with Type 1 diabetes. The ADA (2009) currently recommends that school aged children (6-12) have an HbA_{1c} value of less than 8%. This recommendation is in response to the relatively low risk that children will develop micro- and macro-vascular complications prior to the onset of puberty (ADA, 2009).

The definitive goal of Type 1 diabetes treatment is maintaining tight control of blood glucose levels so that individuals do not develop problems within their micro- and macro-vascular systems (LeRoith & Smith, 2005). This overarching focus promotes overall improved health and quality of life because of secondary complication prevention (Wagner et al., 2005). When blood glucose levels are elevated and remain elevated over time, secondary complications develop. These complications are what medical professionals are seeking to prevent or postpone in children with Type 1 diabetes. As a means of prevention, the recommended treatment regimen focuses on maintaining very tight control of the blood glucose levels (DCCT, 1993).

Diabetes Control and Complications Trial Research Group (1993) conducted a multi-site research study that compared the effects of conventional treatment with intensive treatment on the development and progression of vascular and neurologic problems (DCCT, 1993). The goal of intensive treatment was to achieve near normal glycosylated hemoglobin (HbA_{1c}) levels by treatment with three or more daily injections by needle or pump (DCCT, 1993). Conventional treatment consisted of one or two injections a day. The DCCT (1993) clinical trial showed that intensive treatment was more effective than the conventional treatment. A key component of intensive treatment was tight metabolic control. Individuals with tight metabolic control sought to keep their HbA_{1c} levels at 7 mg/ml or below (DCCT, 1993). When the follow up was done with the participants, the participants who received the intensive therapy had significantly

lowered risks of retinopathy, neuropathy, cholesterol development, and kidney disease. Because of this landmark study, individuals with Type 1 diabetes were strongly encouraged to follow the intensive treatment regimen with the measurement of HbA_{1c} as an indicator of maintaining tight control of the blood glucose levels. When children manage diabetes well, their propensity to develop health complications should decrease, improving health-related quality of life.

Jacobson et al. (1994) studied how family environment was related to glycemic control over time in children ages 9-16 diagnosed with Type 1 diabetes. They focused on psychosocial variables (family factors) that could be identified and could be used to predict medical outcomes. Family cohesion, conflict, expressiveness, and organization were the factors identified as psychosocial variables. Jacobson et al. (1994) found that family's perceptions of their environment may be related to how well children were able to control their blood glucose levels. Because an open family environment may be related to children's metabolic control, the HbA_{1c} values will be controlled for so that only the family environment effect can be identified. As metabolic control may be strongly associated with health-related quality of life, the metabolic control value was held as a control variable so that the relations of family environment, parental perceived social support, and children's coping to children's health-related quality of life were identified.

Length of disease duration. In studies of children with chronic illness, children's current age, their age at onset of the disease, and the duration of disease were highly correlated (Johnson & Meltzer, 2002). As children with Type 1 diabetes age, they are more likely to have poorer glycemic control and have poorer adjustment (Hocking & Lochman, 2005). Children's current age was explored as moderator of the relation between children's coping and children's health-related quality of life.

The length of duration of the disease is a major factor. When children are diagnosed with Type 1 diabetes, they may continue to experience partial remission or what is commonly known as the honeymoon phase (Abdul-Rasoul, Habib, & Al-Khouly, 2006). Because children may have some pancreatic cells still capable of producing insulin, insulin therapy may trigger insulin production from those cells (Abdul-Rasoul et al., 2006). When the natural insulin level increases, the need for higher doses of injected insulin may decrease, which means children will require less administered insulin to maintain their metabolic control. This partial remission phase may last a few weeks or may even last months (Couper & Donaghue, 2007). Keeping the disease duration as a control variable allowed the researcher to control for the time children spent in partial remission.

Socioeconomic status. Socioeconomic status (SES) was a control variable in this study. Socioeconomic status has been identified as a strong predictor of diabetes care and metabolic control (Gallegos-Macias, Macias, Kaufman, Skipper, & Kalishman, 2003; Thompson, Auslander, & White, 2001). Research has shown that children who come from lower income homes may have poorer metabolic control than those who come from higher income homes (Gallegos-Macias, Macias, Kaufman, Skipper, & Kalishman, 2003; Thompson, Auslander, & White, 2001). The participants in this study came from the greater Chicago area, Illinois, and neighboring states because of the comprehensive nature of the program of care at the University of Chicago. Although the participant pool did not represent varied socioeconomic status levels, SES was still controlled for in the model.

Ethnicity. Healthcare disparities exist for minorities and minorities experience greater health challenges (e.g. access to care, lack of insurance) as opposed to Caucasians (Agency for Healthcare Research and Quality, 2011). This holds true for individuals with Type 1 diabetes.

Ethnicity plays a role in treatment adherence and metabolic control in Type 1 diabetes outcomes (Auslander, Thompson, Dreitzer, White, & Santiago, 1997). African-American and Hispanic youths are more likely to have poor metabolic control (Delamater et al., 1999). While the participants in this study did not show varied ethnic backgrounds, ethnicity was controlled for in the proposed model.

Present Study

Mental health is a crucial component of how health is defined. According to the World Health Organization (2014), “health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (p. 1). When individuals have good mental health, they have a solid sense of well-being and have healthy functioning. The World Health Organization (2014) also defined mental health as “...a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (p. 1). Good mental health forms the basis of healthy functioning both on a personal level as well as on a systemic level (e.g., family, community). Mental health is impacted by multiple factors and a systemic approach to exploring mental health is advantageous. Mental health is a significant contributor to individuals’ health-related quality of life. Medical and mental health providers seek to improve mental health as mental health contributes to individuals’ maintaining a better health-related quality of life. When individuals have good mental health, they can be productive members of society, and that impacts individuals at all relational levels – within their families, communities, and society.

Children in middle childhood are in the transitional stage leading into adolescence and the onset of puberty. At this developmental period, children with Type 1 diabetes are not only

beginning physical and emotional transitions but also medical transitions. For young children, parents or primary caregivers are responsible for most of their diabetic treatment. As children transition into adolescence, they are encouraged to become more responsible for aspects of their care. The ultimate goal of healthcare providers is for children, as they age, to develop the skills necessary to assume primary responsibility for all aspects of their care related to diabetes.

Developmentally, over the span of childhood, children become more capable of shaping their experiences and assigning meaning to them because children become less bound by their perceptions and use basic logic to understand their experiences (Lewis, 1982). Children in middle childhood are becoming more able to understand how their actions may influence how they feel. As children transition into adolescence, they increase their ability to understand how their choices and decisions create health consequences. To assist with this transition, most children and parents receive comprehensive and age-appropriate diabetes education and have consistent access to an endocrinology medical team equipped to deal with the complications experienced throughout childhood (Silverstein et al., 2005; Wagner et al., 2005). Even with these types of resources in place, barriers or challenges can exist to creating an environment that supports optimal health. The complex care regimen, the intersection of disease progression with the normative life cycle transitions, and family functioning may be associated with how well diabetes care is managed (Anderson, Svoren, & Laffel, 2007).

There is a need to identify and expand the factors that may affect the health-related quality of life of children with Type 1 diabetes to address the transitions they make as they mature. Factors that may affect the health-related quality of life in children with Type 1 diabetes can include family environment, perceived parental support, and children's coping. Parents serve a major role in children's development of coping and in sustaining health-related quality of life.

Identifying a parenting style as more beneficial may give clinicians an added resource to teach parents more authoritative parenting behaviors to increase their ability to provide support to their children. Children's coping is influenced by children's interactions with their parents because of the systemic nature of the family. Although family environment, parental perceived social support, and children's coping may contribute positively to the health-related quality of life in children with Type 1 diabetes, researchers have not fully explored each factor as such. By identifying factors that improve health-related quality of life in children with Type 1 diabetes, therapists can attend to implementing therapeutic interventions to improve children's health-related quality of life.

The first aim of this study was to determine if children's coping mediated the effect of family environment on children's health related quality of life. Specifically, children's coping was proposed as a mediator in the relation of family environment and children's health-related quality of life. Higher health-related quality of life would predict active, distraction, and support-seeking coping strategies, which would then predict higher family environment scores and lower health-related quality of life would predict avoidant coping strategies, which would then predict lower family environment scores. The second aim of the study was to determine if children's coping would mediate the relation of parental perceived social support to children's health-related quality of life. Higher health-related quality of life would predict active, distraction, and support-seeking coping strategies, which would then predict higher levels of parental perceived social support and lower health-related quality of life would predict avoidant coping strategies, which would in turn predict lower levels of parental perceived social support. Additionally, children's age was proposed as a moderator in the relation of children's active, distraction, and support-seeking coping strategies to children's health-related quality of life and children's age

was proposed to have no moderating effect on the relation of children's avoidant coping strategies to children's health-related quality of life.

Hypotheses

Hypothesis I: It was hypothesized that children's health-related quality of life would be higher where family environment is cohesive, supportive, and low in conflict and this effect would be due to children's use of active, distraction, and support-seeking coping strategies and that children's use of avoidant coping strategies would not significantly contribute to the relation of family environment to children's health-related quality of life (See Figure 1). It was proposed children's coping would mediate the association of family environment to health-related quality of life. The path from family environment to children's coping and children's coping to children's health-related quality of life were hypothesized to be statistically significant.

Hypothesis II: It was hypothesized that children's health-related quality of life would be higher where parents perceived their social support to be higher, and this effect would be due to better children's coping, specifically their use of active, distraction, and support-seeking coping strategies and that children's use of avoidant coping strategies would not significantly contribute to the relation of parents perceived social support to children's health-related quality of life (See Figure 1). It was proposed children's coping would mediate the association of parental perceived social support to health-related quality of life. The paths from parental perceived social support to children's coping and children's coping to children's health-related quality of life were hypothesized to be statistically significant.

Hypothesis III: It was hypothesized that children's age would moderate the relation of children's coping to children's health-related quality of life (see Figure 1). The relation between children's coping to children's health-related was predicted to be stronger for older children than

the relation would be for younger children. Children's use of active, distraction, and support-seeking coping strategies were predicted to increase with age and children's use of avoidant coping strategies would not increase as children entered adolescence. Additionally, it was proposed only active, distraction, and support-seeking coping strategies would be associated with higher health-related quality of life while avoidant coping strategies would not be associated with health-related quality of life in both children and adolescents.

Method

Sample and Recruitment

The study participants included a convenience sample of 56 children and adolescents with Type 1 diabetes and their primary caregivers receiving care at a comprehensive diabetes center located within a university hospital. The comprehensive diabetes center provided comprehensive care to patients with Type 1 and Type 2 diabetes and their families. Pediatric patients and their families were seen in a tertiary care clinic within the hospital and received care from a care team that comprised of pediatric endocrinologists, diabetes health educators, nurses, therapists, and social workers. Therapists worked with patients and their families to provide psychosocial support during visits and family therapy sessions in between scheduled clinic visits. The center provided these services to patients and their families free of charge. Patients who were eligible for care lived in the city where the hospital was located and in the surrounding neighboring states. Table 1 provides the complete details of the participant characteristics. All participants had received a diagnosis of Type 1 diabetes as defined by the American Diabetes Association (ADA, 2009; Silverstein et al., 2005). All the children were within the developmentally appropriate range of cognitive ability. Because the child measures included self-report, children with a cognitive disorder that would limit their ability to complete the

questionnaires were excluded. In addition, children who were currently hospitalized and children who had received a diagnosis of Type 1 diabetes within the past year were excluded as they may have still been in partial remission, and their treatment regimens may not have been fully established (Abdul-Rasoul et al., 2006). The child participants ranged from 8-16 years of age with a mean age of 12.4 ± 2.5 years and were predominately white, 70.4%. The mean family income for the participants was over \$100,000 a year composing 68.2% of the sample, with most children and adolescents, 74.5%, residing in two parent homes. Children and adolescents had a mean HbA_{1c} of $8.2 \pm 1.5\%$. The HbA_{1c} means and standard deviations for the total sample, the child sample and adolescent sample can be found in Table 2.

Procedure

When primary caregivers and children arrived for the clinic visit at the university tertiary care clinic, a research assistant approached the caregivers and children and asked if they would be willing to participate in the current study. If they declined and did not wish to participate, it was noted as not to approach the family in future clinic visits. The children and primary caregivers who consented to participate were given the informed consent. The researcher reviewed the informed consent and asked the primary caregivers and children if there were any questions about the procedure that were not addressed prior to their clinic visit. Once questions and concerns were addressed, the primary caregivers were asked if they would like to participate. The children were also asked if they were willing to participate. When primary caregivers gave consent and the children gave assent, the consent forms were signed and collected by the researcher or the research assistant. Once instructions were given to both the primary caregivers and children, the primary caregivers and children completed their questionnaires independently (see Table 3 for list of completed measures and abbreviations used). Additionally, children's

HbA_{1c} values were obtained for the children participating in the study. The children's HbA_{1c} values were obtained from the children's medical records as a part of the routine clinic care.

Demographic data were collected at the time the questionnaires were administered and the data were described in the above Sample and Recruitment section.

Measures

Pediatric Quality of Life Inventory (PedsQL) 3.0 Diabetes Module. The Pediatric Quality of Life Inventory 3.0 Diabetes Module for child and teen report and parent proxy (PedsQL 3.0; Varni et al., 2003; see Appendices E, F, G, and H) was used to measure children's health-related quality of life who have been diagnosed with Type 1 diabetes across the dimensions of diabetes, treatment barriers, treatment adherence, worry, and communication (Varni et al., 2001). The Pediatric Quality of Life Inventory (Varni, Seid, & Kurtin, 2001) was created to measure children's health-related quality of life and consists of 23 items that represents four different scales that measure health-related quality of life (HRQoL) in children and adolescents (Varni et al., 2001). To provide a more accurate measure of the health-related quality of life for children living with diabetes, the PedsQL 3.0 diabetes module, a 28-item questionnaire, was created to integrate aspects of both a general and a disease-specific measure as there was not a multidimensional measure that included both parent and child report (Varni et al., 2003). The PedsQL 3.0 measures health-related quality of life across the dimensions of diabetes care, treatment barriers, treatment adherence, worry, and communication (Varni et al., 2003). The children completed the child report version of the PedsQL 3.0 for ages 8 to 12 and the children aged 13-16 completed the teen report version of the PedsQL 3.0. For a measure to be a valid measure of HRQoL, it must address cognitive domains as the PedsQL 3.0 does (Varni et al., 2001). It has been shown that administration of the PedsQL to children as young as 5 years

of age generated reliable and valid self-report when the proper age-appropriate instrument was used (Varni, Limbers, & Burwinkle, 2007). The PedsQL 3.0 measured the current quality of life that the participants were experiencing over the past month. Both the child and parent reports are based on child and parent perceptions respectively (Varni et al., 2001).

In the child self-reports for children aged 8-12 and children aged 13-16, the 5-point scale ranges from 0 (never a problem) to 4 (almost always a problem) (Varni et al., 2003). Reversed scored items (0=100, 1=75, 2=50, 3=25, 4=0) are adapted to a linear model allowing the scores to fall on a 100-point scale. The questionnaire responses for the child report are summed with higher scores indicating better HRQoL. The Cronbach alpha for the child self-report on the PedsQL 3.0 subscales ranged from .63 to .81 while the range for the parent report were .68 to .84 (Varni et al., 2001). The construct validity was determined by comparison between healthy and patient-identified population responses (Varni et al., 2003). The Cronbach alpha for the PedsQL 3.0 child self-report in this sample was .94 and the parent report for the PedsQL 3.0 was .92.

To test whether the self-report of children 8-12 (child report) was consistent with the self-report of children 13-16 (teen report), an independent samples t-test was conducted to compare means of child and teen self-reports and of the parent proxy for both child and teen. There was not a significant difference in the parent proxy report for child and $t(54) = -.32, p = .75, CI [-10.61, 7.70]$, indicating the child and teen versions produced similar means. This provides support for combining the single measures of the parent proxy for both child and teen measures into one to be used in the subsequent analyses.

There was a significant difference in the scores for the child and teen self-reports ($M = 77.09, SD = 14.67$); $t(50) = 2.06, p = .045, CI [.21, 18.08]$. A significant p value of less than .05 ($SD = 14.67$) indicated that child report mean was significantly higher than the teen self-report

mean 67.94 ($SD = 17.18$). This indicates that there could be a significant measurement difference between the child and teen self-reports. Alternatively, the measurement could be valid and the children and teens could be reporting their health-related quality of life differently. Either of these interpretations could pose a threat to the validity of the statistical results; however, not combining these two measures would result in examining them separately, leaving each sample without adequate power.

To address this issue, the combined child-teen report variable was used to run two separate mediation models – parent variables of family environment and health-related quality of life in one model and child variables of family environment and health-related quality of life. To further investigate whether age confounded the hypotheses, the moderation analyses were conducted to address age as a possible confounding factor in the relation to the other variables and health-related quality of life.

Family Environment Scale. The Family Environment Scale (FES; Moos & Moos, 1974/2002; See Appendix I) was created through observing families and interviewing families about their environments. The FES measures the social and environmental characteristics present in families and was intended to provide a quick evaluation of what separates families (Moos & Moos, 1974/2002). The scale consists of ten subscales (90 total true-false items) divided among three dimensions, family relationship, personal growth and system maintenance and change (Oliver, May, & Handal, 1988). The family relationship dimension measures families' ability to support members and encourage open communication about feelings and includes the subscales of cohesion, expressiveness, and conflict (Kronenberger & Thompson, 1990). The personal growth dimension measures families' ability to be self-sufficient and self-directive and includes independence, achievement orientation, intellectual-cultural orientation, active-recreational

orientation, and moral-religious emphasis subscales (Kronenberger & Thompson, 1990). Lastly, the system maintenance measures families' ability to utilize clear organization and rules and uses the organization and control subscales to measure the ability (Kronenberger & Thompson, 1990). The scale has three forms that can be used with families. The Real Form (Form R) assesses how individuals understand their family environment for what it is, the Ideal Form (Form I) assesses how individuals perceive the ideal family environment to be, and the Expectations Form (Form E) assesses how individuals expect the family to operate under certain conditions. Form R was used in this study. Additionally, only the relationship and system maintenance domains with the designated subscales were used.

The Cronbach alphas reported by Moos (1990) for the subscales within the relationship and system maintenance domains were as follows: cohesion .78; expressiveness .69; conflict .75; organization .76; and control .67. Although there have been challenges to the reliability and validity (Roosa & Beals, 1990), the FES continues to be widely used and accepted to determine family climate (Oliver et al., 1988). The Cronbach alphas for the FES subscales for the collected data was not possible to compute as the research collaborators collected and scored the data prior to the researcher gaining access to the existing data set. The summed scores for the subscales were reported. Given the reliability of the FES to determine family climate, the data should be considered reliable and valid.

Multidimensional Scale of Perceived Social Support. The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet & Farley, 1988; See Appendix J) is designed to measure perceived social support utilizing a subjective report of how supported by family, friends, and significant others individuals feel. The MSPSS consists of 12 items which are grouped into three subscales: family, friends, and significant other (Zimet et al., 1988). Each

subscale has 4 items that can be responded to using a 7-point rating scale with 1 being very strongly disagree and 7 being very strongly agree (Zimet et al., 1988). The MSPSS asks individuals to rate their agreement with the support items. For example, “My family really tries to help me.” (Zimet et al., 1988, p. 35) or “I can count on my friends when things go wrong.” (Zimet et al., 1988, p. 35) is answered on the 7-point rating scale. The subscale totals were summed for a total perceives social support score.

The Cronbach’s alpha was determined to be .88 for the entire scale and determined to be separately for each subscale of family, friends, and significant other as .87, .85, .91 respectively (Zimet et al., 1988). Subsequent research showed the following Cronbach alpha range for the subscales: the family subscale produced a range from .90 to .94; the friends subscale range was from .83 to .92; and the significant other subscale range was .83 to .98 (Zimet, Powell, Farley, Werkman, & Berkoff, 1990) Additionally, the test-retest reliability coefficients for the family, friends, and significant other subscales were .85, .75 and .72 respectively and the entire scale was .85 (Zimet et al., 1988).

Further study using differing populations was conducted to determine reliability and validity (Zimet et al., 1990). The study showed that the MSPSS had good internal reliability for the entire scale across the multiple population with a range of .81 to .90 for the family subscale, .90 to .94 for the friends subscale and .83 to .98 for the significant other subscale (Zimet et al., 1990). The range for the scale was .84 to .92. (Zimet et al., 1990). For this study, the Cronbach alphas for the MSPSS was calculated as .96.

Children’s Coping Strategies Checklist-Revision 1. The Children’s Coping Strategies Checklist (CCSC; Ayers, Sandler, West, & Roosa, 1996; see Appendix K) was created from a content analysis of semi-structured interviews designed to assess children’s coping to a stressful

event. Because of the analysis, a preliminary factor model was proposed for the eleven categories that emerged, and those factors were identified as the following five dimensions: problem-focused strategies, direct emotion-focused strategies, distraction strategies, avoidance strategies, and support-seeking strategies (Ayers et al, 1996). In addition, the study offered a revised four factor model, which removed the direct emotion-focused strategies factor and loaded its subscales to the active coping strategies factor leaving active coping strategies (ACS) distraction strategies (DS), avoidance strategies (AS) and support-seeking strategies (SSS) remaining (Ayers et al., 1996). The current Children's Coping Strategies Checklist – Revised 1 (CCSC-R1; Program for Prevention Research, 1999) was revised and removed all items that were connected to persons children would seek out for assistance with their efforts to problem solve (Program for Prevention Research, 1999).

Each of the four factors contain sub-classifications and subscales. Only the active coping strategies factor has two sub-classifications, problem-focused coping and positive restructuring, which have three and four subscales respectively (Program for Prevention Research, 1999). The distraction strategies factor has two subscales, distracting actions and physical release of emotions, while avoidance strategies has three subscales, avoidant actions, repression, and wishful thinking (Program for Prevention Research, 1999). Lastly, the support-seeking strategies subscales are support of actions and support for feeling (Program for Prevention Research, 1999).

The subscales of the checklist were scored by calculating the mean of each item or the total score of the items within the subscale (Program for Prevention Research, 1999). The researcher used the score of the items to allow for missing data as calculating the mean of each item requires at least a 75% completion rate of all items within the subscale (Program for

Prevention Research, 1999). The entire checklist was scored through adding the respective means of all the subscales.

The Cronbach alphas for the checklist subscales, as reported by Ayers et al. (1996), were as follows: within the problem-focused strategies, cognitive decision making subscale .72 and direct problem solving .68; within the emotion-focused strategies, seeking understanding .72, positive cognitive restructuring .68 and expressing feelings .34; within the distraction strategies, physical release of emotions .64 and distracting actions .60; within avoidant strategies, avoidant actions .64, and cognitive avoidance .72; and within support-seeking strategies, problem-focused support .46 and emotion-focused support .50. Initially, the expressing feelings subscale had a Cronbach alpha of .34 and was removed from the loading because of poor internal consistency; however, the remaining coefficients were comparable to other children's coping measures (Program for Prevention Research, 1999). When comparing goodness of fit with established coping measures on the study data, the "four factor model provided a significantly better fit to the data than either the emotion-versus problem-focused models (Ayers et al., 1996, pp. 937 & 939). In this study, the computed Cronbach alphas ranged from .57 to .86 for the CCSC subscales, which was reflective of existing reported reliability measures of the CCSC.

Glycosylated Hemoglobin (HbA_{1c}). The HbA_{1c} is a measure that represents a mean of blood glucose levels over a two to three-month period. HbA_{1c} values for children diagnosed with diabetes can range from less than 2.5% to greater than 14.0% (Greening et al., 2007); however, the target HbA_{1c} for children is to maintain a level as close to 7.0% or below since the acceptable value of HbA_{1c} for non-diabetic populations ranges from 4.0% - 6.0% (ADA, 2009). The HbA_{1c} is included to measure children's metabolic control.

Results

Data Analysis Plan

Data analyses were conducted using the Statistical Package for Social Sciences (SPSS, version 23; IBM SPSS, 2013) for Windows. Descriptive statistics were computed for all sociodemographic, clinical, and study variables. Table 2 shows means and standard deviations for all study variables of the total child participant sample, the child sample (8 to 12 years of age,) and adolescent sample (13 to 17 years of age).

To determine if children's coping was a mediator in the relation of family environment to children's health-related quality of life and parental perceived social support to children's health-related quality of life, correlations were first run to determine effect size and strength of association. Using the procedures identified for estimating indirect effects in simple mediation models by Preacher and Hayes (2004) allowed testing indirect effects in absence of full mediation.

Mediation models were estimated for parent and child report HRQoL where FES and MSPSS were the independent variables and parent proxy and child report HRQoL were the dependent variables. Using the procedures identified for estimating indirect effects in simple mediation models by Preacher and Hayes (2004), the mediation effects were determined. The PROCESS macros for SPSS (Hayes, 2014) measured the direct, indirect, and total effects for children's coping on the relation of both family environment and of parental perceived social support to health-related quality of life using nonparametric bootstrapping to calculate a sampling distribution to determine effects.

Post hoc power calculations (G*Power; Faul, Erdfelder, Lang, & Buchner, 2007) were performed for analyses of variance at a significance level of 0.05, and it was found that there was a 28.4% chance of committing a type II error. Because of the limited number of participants, the

literature was evaluated to determine reported effect sizes of the measures used in this study.

Throughout the literature where the measures in this study were used, the effect sizes were not identified. A literature search revealed three studies in which the effect sizes were identified. Two additional studies were found; however, while they measured similar variables, they used different measures. All of the studies used the following guidelines for effect sizes: small effect size at or around 0.10; medium effect size at or around 0.30; and large effect size at 0.50 or higher.

The first article explored family cohesion and health-related quality of life in children with Type I diabetes (Moreira, Frontini, Bullinger, & Canavarro, 2014). The sample consisted of 209 parent-child dyads of which 88 were identified as a pair with a child that had Type 1 diabetes (Moreira et al., 2014). While the study explored how these two variables may affect parental adjustment, the only measure that was consistent with the current study was the cohesion subscale of the Family Environment Scale. It was reported that a post hoc power calculation was performed using the significance level of 0.05 and found effect sizes between 0.17-0.26 (Moreira et al., 2014).

The second study explored the relation of disease management to metabolic control in youth with Type 1 diabetes. The sample ($N = 257$ dyads) consisted of youth aged 11 to 14 with Type 1 diabetes and one of their parents (Mackey, Hilliard, Berger, Streisand, Chen, & Holmes, 2011). The authors' model determined the association of positive youth qualities, family cohesion, disease management and metabolic control HbA_{1c} (Mackey et al., 2011). Family cohesion and disease management were identified as latent variables. This study also used the cohesion subscale of the Family Environment Scale. The authors reported effect sizes of 0.22 when family cohesion was associated with positive youth qualities and effect sizes of .27 when

more family cohesion was associated with better disease management and an effect size of 0.21 when better disease management was associated with lower HbA_{1c}.

The third study explored the reliability and validity of the PedsQL™ in Type 1 and Type 2 diabetes. (Varni et al., 2003). The sample consisted of children (5 to 18) and their parent ($N = 300$, $N = 308$ respectively). This measure is used to determine the pediatric health-related quality of life in my study. Varni et al. (2003) reported 0.28 - 0.47 effect sizes with the parent-child intercorrelations of the PedsQL Generic Core Scales and the Diabetes Module. They also reported effect sizes of 0.17 – 0.29 for HbA_{1c} and the child self-report of both the generic and the diabetes-specific module (Varni et al., 2003)

An additional study explored diabetes-specific family conflict and psychological distress in pediatric Type 1 diabetes (Williams, Laffel, & Hood, 2009). Children and adolescents ($N = 187$) and their parent participated in the study (Williams et al., 2009) completed measures to determine diabetes-specific conflict; however, the measure used was not the Family Environment Scale. The authors reported a moderate to large effect size range (0.38 – 0.62) specifically in the diabetes-specific conflict.

In examining the results of the current study, significant relations were identified. For example, the parent report of children's health-related quality of life was associated with the child report of the family environment with an effect size of 0.29. Although there was not a significant correlation between either the parent or child report of family environment and any coping strategy group, a small moderate effect size of 0.25 was found between parental support and child family environment. Parental perceived social support was associated with the parent report of the children's health-related quality of life with an effect size range 0.35 – 0.36. These analyses are reported in greater detail in the following sections. While power was not achieved to

measure small effect sizes, it appears that these results were in line with what has been found in the literature.

Normality

The initial parent data from MSPSS and the child FES data showed a strong negative skew and did not meet the assumption of normality. The negative skew could have prevented a variable effect from being identified as it would have confounded the analysis of means. A linear transformation was used for both the parent MSPSS and child FES data where the total values were squared. The result for the parent MSPSS data reduced the skew to within the acceptable limits, which allowed the parent MSPSS data to meet the normality assumption. Although the linear transformation did not bring the child FES data within the limit, it brought the skew within normal range and lowered the kurtosis from 5.71 to 1.46.

Bivariate Correlations

Family Environment (FES). Correlations were calculated to assess the relations among parent FES, child FES, and child report of coping (see Table 4). When exploring the relation between the parent report of family environment and child report of family environment, neither parent nor child report was related to any of the child report of children's coping strategies. Although there was not a significant correlation between these variables, a small moderate effect size was found between parental perceived social support and child FES.

Child-report of family environment was found to be significantly correlated to the parent report of HRQoL ($r(54) = .28, p \leq 0.05$); however, the child report of family environment was not significantly correlated to the total child report of HRQoL (see Table 5). The higher the children's report of better family environment, the higher parents rated the children's health

related quality of life ($r(54) = .28, p \leq 0.05$). The parent-report of FES was not significantly related to child-report of FES however, but there was a moderate effect size present.

Parental Perceived Social Support (MSPSS). Correlations assessed the relation between parent MSPSS and child report of children's coping. MSPSS was significantly related to the parent report of child total HRQoL ($r(54) = .36, p \leq 0.01$, see Table 6). When parents are feeling supported by family, friends, and a significant other, they report a higher HRQoL for their children. MSPSS was not significantly correlated to the child reported total HRQoL.

Children's Coping (CCSC). Correlational analyses were conducted on the relation of family environment and children's health-related quality of life, the relation of parental perceived social support and children's health-related quality of life, and the relation of children's coping to children's health-related quality of life (see Table 7). Only the avoidance strategies subscale of children's coping was significantly correlated to the child total HRQoL self-report ($r(54) = -.55, p \leq 0.01$). Lower scores of coping for children were associated with higher HRQoL self-report scores. Children reported a lower HRQoL while using of higher levels of avoidant coping. MSPSS was not significantly correlated to any of the children's coping strategies (see Table 8).

Mediation Results

Two mediation pathways were proposed. The first mediation pathway tested Hypothesis I, which proposed children's coping as a mediator of the relation of family environment and children's health-related quality of life (Figure 1). As family environment data were collected from both parents and children, eight models of the proposed pathway were run, using children's coping strategies as the mediator, and focusing first on the parent reports for both family environment and the health-related quality of life and then the child reports of family

environment and health-related quality of life. In examining the mediation model generated by PROCESS macro for SPSS (Hayes, 2013), the following paths were evaluated: 1) the path between family environment to each coping strategy (path *a*); the path between children's coping strategies and children's health-related quality of life (path *b*); and the path between family environment report and children's health-related quality of life (path *c*).

Contrary to Hypothesis I, there was no significant correlation found between parent family environment report and children's coping strategies (see Table 4). When evaluating the model using the parent report for family environment and the parent proxy children's health-related quality of life, no significance was found in path *a* and the confidence intervals (CIs) in these paths included zero, indicating that the null hypothesis could not be rejected (see Table 9). Significance was found in path *c* ($b = 2.36$, $SE = .93$, $p < .01$, $CI [.49, 4.24]$) and there were no significant indirect effects found in this model.

When evaluating the model using the children's report for family environment and child report children's health-related quality of life, there was no significant correlation found between children's family environment report and any of the child's report of children's coping strategies (see Table 4). The pathway between the child report of children's coping to child report of children's health-related quality of life (path *b*) was found to be significant for the avoidant coping strategies only ($b = -17.77$, $SE = 3.29$, $p < .001$, $CI [-24.40, -11.15]$; see Table 10). The model that included child report for all the coping strategies indicated that only avoidant coping was significant, and the model indicated that avoidant coping strategies explained 43.2 % of the model. Indirect pathways were not present through the child report of children's active, distraction, or support-seeking coping strategies using PROCESS macros for SPSS (Hayes, 2013).

The second mediation pathway tested Hypothesis II, which proposed children's coping reported by children as the mediator in the relation of parental perceived social support and children's health-related quality of life (Figure 1). In evaluating the second mediation pathway generated by the PROCESS macro for SPSS (Hayes, 2013; Figure 1), the following paths were evaluated: 1) the path between parent perceived social support to each coping strategy (path *a*); the path between children's coping and children's health-related quality of life (path *b*); and the path between parent perceived social support and children's health-related quality of life (path *c*).

When evaluating the model using the parent report for parental perceived social support and parent proxy for children's health-related quality of life, a significant correlation was found, $r = .36, p \leq .01$ (see Table 6). Contrary to Hypothesis II, which hypothesized that children's report of children's coping would mediate the relation of parent report of parental perceived social support and parent proxy of children's health-related quality of life, no significance was found in path *a* of the parent report of parental perceived social support and children's report of children's coping, and the confidence intervals included zero, indicating that the null hypothesis could not be rejected; however, significance was found in path *c* ($b = .54, SE = .18, p < .01, CI [.18, .90]$; see Table 11). No significant indirect effects were observed in this model.

Although paths *a* and *c* were not significant in the model using the child report of health-related quality of life, the pathway between child report of children's coping to child report of children's health-related quality of life (path *b*) was found to be significant for the avoidant coping strategies only ($b = -17.85, SE = 3.27, p < .001, CI [-24.44, -11.27]$; see Table 12). As only the avoidant coping strategies path showed significance, the model indicated that 44.0 % of the model was explained by coping. PROCESS macros for SPSS (Hayes, 2013) showed an indirect effect within the children's coping strategies, namely avoidant coping strategies ($b = -$

17.85, $SE = 3.27$, $p < .001$, $CI [-24.44, -11.27]$; see Table 12). Higher avoidant coping strategies scores predicted a lower health-related quality of life.

The moderation model, identified in Hypothesis III, tested proposed age as a moderator in the relation of children's coping and children's health-related quality of life (Figure 1). The first set of moderation analyses explored the relation of the child report of children's coping to child self-report of health-related quality of life. The path from the child report of children's coping strategies to the child report of children's health-related quality of life was represented by b_1 , the path from children's age to the child report of children's health-related quality of life was represented by b_2 , and the interaction term was represented by b_3 . The first moderation analysis within this group examined age as a moderator of the relation the child report of the active coping strategies subscale of the Children's Coping Strategies Checklist and the child report of children's health-related quality of life. The model was not significant ($p > .05$) and the R^2 was less than 1.00%. The path of the child report of children's active coping strategies to children's health-related quality of life (path b_1) was not significant, $b = -1.50$, $SE = .386$, $p > .05$, $CI [-.27, 6.27]$; see Table 13. The interaction of the active coping strategies subscale and children's age with the child report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

The second moderation analysis examined age as a moderator of the relation the child report of the distraction coping strategies subscale of the Children's Coping Strategies Checklist and child report of children's health-related quality of life. The model was not significant ($p > .05$) and the R^2 was less than 1.00%. The path from distraction coping strategies to children's health-related quality of life (b_1) was not significant, $b = -.95$, $SE = .357$, $p > .05$, $CI [-8.12, 6.22]$; see Table 14. The interaction of the distraction coping strategies subscale and children's

age with the child report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

The third moderation analysis examined age as a moderator of the relation the avoidant coping strategies subscale of the Children's Coping Strategies Checklist and children's health-related quality of life. The model was significant ($p < .001$) and age contributed to 4.51% of the model variance. While the overall model was significant, the path from the child report of the avoidant coping strategies to the child report of children's health-related quality of life (path b_1) was not significant, $b = 3.62$, $SE = 3.04$, $p > .05$, $CI [-2.50, 9.73]$; see Table 15. The interaction of the child report of avoidance coping strategies subscale and children's age with the child report of health-related quality of life (path b_3) produced a $p = .05$ significance, indicating an indirect moderation effect from age. The interaction was probed by testing the conditional effects of age at three levels, one standard deviation below the mean, at the mean, and one standard deviation above the mean. As shown in Table 16, avoidant coping strategies were significantly related to health-related quality of life when age was at the mean and at one standard deviation above the mean ($p < .001$) but not when age was one standard deviation below the mean ($p = .14$). The Johnson-Neyman technique showed the child report of health-related quality of life and the child report of avoidant coping strategies were significantly related, $t(48) = 2.01$, $p = .05$, $b = 7.62$. As age increased, the relation between the child report of health-related quality of life and the child report of avoidant coping strategies becomes more negative with 16 years of age at the maximum, $b = -20.90$, $t(48) = -20.90$, $p < .001$.

The fourth moderation analysis examined age as a moderator of the relation the support-seeking coping strategies subscale of the Children's Coping Strategies Checklist and the child report of children's health-related quality of life. The model was not significant ($p > .05$) and the

R^2 was less than 1.00%. The path from support-seeking coping strategies to the child report of children's health-related quality of life (path b_1) was not significant, $b = -1.50$, $SE = .3.86$, $p > .05$, $CI [-.27, 6.27]$; see Table 16. The interaction of the support-seeking coping strategies subscale and children's age with the child report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

The second set of moderation analyses examined age as a moderator of the relation of the child report of children's coping and parent proxy report of health-related quality of life. The first moderation analysis in the relation of the child report of children's coping to parent-proxy report of health-related quality of life examined age as a moderator of the relation the active coping subscale of the Children's Coping Strategies Checklist and children's health-related quality of life. The model was not significant ($p > .05$) and the R^2 was less than 1.00%. The path of children's active coping strategies to parent-proxy children's health-related quality of life (path b_1) was not significant, $b = .12$, $SE = 4.30$, $p > .05$, $CI [-8.52, 8.76]$; see Table 17. The interaction of the active coping strategies subscale and children's age with the parent proxy report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

The second moderation analysis in the relation of the child report of children's coping to parent proxy report of health-related quality of life examined age as a moderator of the relation the distraction coping strategies subscale of the Children's Coping Strategies Checklist and parent-proxy report of children's health-related quality of life. The model was not significant ($p > .05$) and the R^2 was less than 1.00%. The path from distraction coping strategies to parent-proxy children's health-related quality of life (path b_1) was not significant, $b = -3.46$, $SE = 3.97$, $p > .05$, $CI [-11.44, 4.52]$; see Table 18. The interaction of the distraction coping strategies

subscale and children's age with the parent proxy report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

The third moderation analysis in the relation of the child report of children's coping to parent-proxy report of health-related quality of life examined age as a moderator of the relation the avoidant coping strategies subscale of the Children's Coping Strategies Checklist and children's health-related quality of life. The model was not significant ($p > .05$) and the R^2 was less than 1.00%. The path from avoidant coping strategies to parent-proxy children's health-related quality of life (path b_1) was not significant, $b = 2.12$, $SE = 4.31$, $p > .05$, $CI [-10.78, 6.54]$; see Table 19. The interaction of the avoidant coping strategies subscale and children's age with the parent proxy report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

The fourth moderation analysis in the relation of the child report of children's coping to parent-proxy report of health-related quality of life examined age as a moderator of the relation the support-seeking coping strategies subscale of the Children's Coping Strategies Checklist and parent proxy report of children's health-related quality of life. The model was not significant ($p > .05$) and the R^2 was less than 1.00%. The path from support-seeking coping strategies to parent-proxy children's health-related quality of life (path b_1) was not significant, $b = 1.77$, $SE = 3.13$, $p > .05$, $CI [-4.53, 8.06]$; see Table 20. The interaction of the support-seeking coping strategies subscale and children's age with the parent proxy report of health-related quality of life (path b_3) showed no significance, indicating no moderation effect from age.

Discussion

The goal of this study was to explore the relations among family environment, perceived parental social support, children's coping, and children's health-related quality of life in

children's with Type 1 diabetes. Specifically, children's coping was explored as a mediator of the relation of family environment to children's health-related quality of life and of parental perceived social support to children's health-related quality of life. It was anticipated that active, distraction, and support-seeking coping strategies would mediate both the relation of family environment and children's health-related quality of life and of parental perceived social support and children's health-related quality of life and that avoidant coping would not mediate neither the relation the relation of family environment and children's health-related quality of life nor of parental perceived social support and children's health-related quality of life. Although support for the mediation pathways was not found, avoidant coping strategies did significantly relate to the child report of health-related quality of life.

Additionally, children's age was explored as a moderator of the relation of children's coping and children's health-related quality of life. It was anticipated that the use of avoidance coping strategies to cope with living with the disease and the required treatment regimen would not be found in this sample although much of literature indicates adolescents with Type 1 diabetes increase their use of avoidance coping strategies (Delamater et al., 1987; Graue et al., 2004, Seiffge-Krenke & Stemmler, 2003). Given the participants' access to comprehensive and integrative medical care (doctors, nurses, diabetes health educators, nutritionists, therapists) and financial resources, it was anticipated adolescents use of avoidance coping strategies would be minimal. Of note, most patients seen at the comprehensive diabetes center who participated in this study were white, not Hispanic or Latinx, with a household income over \$100,000. In the researcher's experience as medical family therapist providing therapy for these children and families, the population receiving services at this comprehensive medical facility were mostly compliant with their treatment regimen. Only a small percentage of pediatric patients were

classified as non-compliant with treatment recommendations, which was typically evidenced by HbA_{1c} values outside the expected range for children and adolescents with Type 1 diabetes. As the HbA_{1c} values represent patients' consistent adherence to the regimen over a three-month span of time, the cross-sectional nature of the data may not have been indicative of children and adolescents' adherence to their regimen over a significant amount of time.

Research has shown that white children and adolescents are at less risk for poor metabolic control (Delamater, et al. 1999). Wagner et al (2005) found that children and adolescents with Type 1 diabetes perceived their health-related quality of life on par with their peers and attributed the similarity in health-related quality of life report to the access to quality, comprehensive medical treatment, educational, and social resources provided by the multidisciplinary diabetes care team. Although this research was conducted using German parents, children, and adolescents, the outcomes would be relevant to the current study's population as the study's children, adolescents, and parents have similar access to medical treatment, education, and social resources provided by a multidisciplinary diabetes care team.

In this study, a clear correlation of children's active, distraction, and support-seeking coping strategies either to family environment or to parental perceived social support was not found although previous research identified such relations for family environment (Gentzler et al., 2005; Kliewer et al., 1996; Missotten et al., 2013) and parental perceived social support (Mlynarczyk, 2013; Respler-Herman et al., 2012). As has been discussed previously in this document, a smaller participant size effected the power for this study and may have prevented measurement of clear correlations of children's active, distraction, and support-seeking coping strategies either to family environment or to parental perceived social support.

Another factor that may have prevented clear correlations of these variables could be related to the measures used in this study in comparison to existing literature. This current study used the Family Environment Scale subscales that measured cohesion, expressiveness, conflict, organization, and control while previous studies with similar populations only used only data from the cohesion subscale (Mackey et al., 2011; Moreira et al., 2014). The current study focused on the larger dimensions of family relationship (cohesion, expressiveness, and conflict subscales) and system maintenance (organization and control subscales) to represent a more general representation of family environment, and the inclusion of multiple subscales may have prevented a clear association to active, distraction, and support-seeking coping strategies from emerging. Future studies should explore the specific components of family environment to determine how each are related to children's use of active, distraction, and support-seeking coping strategies in coping with living with medical, physical, and psychosocial aspects of disease management.

When considering the lack of correlation between parental perceived social support and children's coping, time since diagnosis may have been a factor. Children and adolescents in this study were not newly diagnosed, which meant they were medically stable, their medication regimens were consistent, and family relationships with medical staff were well established at the time of completing the study. Primary caregivers' perception of support may have allowed them to accommodate better to the significant changes experienced and may have made them feel more able to respond to their children's needs and to the stresses experienced with the disease, which may have negated the influence of their children's coping strategies on parents' feeling supported.

Interestingly, avoidant coping strategies were significantly correlated to child report of health-related quality of life but not parent report of health-related quality of life. Children's higher use of avoidance coping strategies reflected a lower report of their health-related quality of life while parents' proxy report did not show any significance. When considering how this difference in child versus parent proxy report may affect treatment, children and adolescents are perceiving their health-related quality of life differently than their parents, which may relate to children and adolescents' choice to use avoidance behaviors. The perceived difference could create tension with both their parents and medical professionals. Children and adolescents may feel overwhelmed by the attention being given to not following the prescribed regimen and may resort to use of avoidance behaviors to cope with the increased stress of not meeting the expectations of their parents and medical professionals. Family therapists could intervene in this dynamic and normalize the children and adolescents' experience with frustration and help parents and medical professionals understand the tension children and adolescents experience in the knowing and doing regarding managing their regimen and the expectations others have of them. Future studies should explore how children and adolescents use their coping and its effect on their health-related quality of life and what coping works best for each group as well as how those skills may shift as children transition into adolescence and even as adolescents' transition into adulthood.

Although age did not moderate the active, distraction, or support-seeking coping strategies to children's health-related quality of life, age did moderate the relation of avoidant coping strategies to children's health-related quality of life, as reported by children. It was expected that children's use of active, distraction, and support-seeking coping strategies would continue to increase in older children and adolescents. The current study sample may not have

been larger enough to detect children's increased use of active, distraction, and support-seeking coping strategies. As children age, their use of coping strategies increases with their cognitive ability and their coping strategies choices may shift depending on context. There may have been other contextual factors that suppressed the correlations. Although research has shown that adolescents have the capacity to maintain stable metabolic control (Seiffge-Krenke & Stemmler, 2003), there seems to be a segment of children who, as they transition into adolescence, increase their use of avoidant coping strategies even when they are considered medically stable. In this sample, despite adolescents having access to and utilization of the services provided by a comprehensive diabetes center, there seems to be some factor that has not been identified that influences the use of avoidant coping strategies by children as they age or transition into adolescence, even though indicators of medical adherence are met (e. g., HbA_{1c} values within acceptable range).

Clear correlations of children's age to family environment, perceived parental social support, or health-related quality of life were not found, despite the results of previous studies showing relations among children's age, family environment, perceived parental social support, and health-related quality of life (Daviss et al., 1995; Mackey et al., 2011; Wagner et al., 2005). Given the clear and distinct differences in physical, emotional, and social development of children and adolescents, age would seem to be correlated to family environment, perceived parental social support, and children's health-related quality of life; however, the data did not support that assumption.

Family Environment

The results of this study confirmed that family environment may contribute to increasing children's health-related quality of life. Parents who indicated that the family environment was

better were more likely to rate their children's health-related life better. The mediation analyses showed that the children's report of the family environment was significantly related to the parent report of health-related quality of life in children. The Family Environment Scale (Moos & Moos, 1974, 2002) relationship dimension measures cohesion, expressiveness, and conflict within a family, and these are considered identifying aspects of the family environment. Since children's behavior is a function of their family system and the relationships within the system, the family environment adequately identifies relational dynamics that may impact how a family functions and how relational dynamics may affect health-related quality of life. For children and adolescents with Type 1 diabetes, a family environment high in cohesion and expressiveness and low in conflict would encourage a family system where children and adolescents feel supported in the day to day completion of diabetes related tasks, talk about the challenges they experience with disease management, and trust parents to proactively respond instead of reactively engaging them when issues of compliance surface. Oftentimes, children and adolescents may feel burdened by being different and a supportive family environment may help mitigate the additional non-normative stress children and adolescents with Type 1 diabetes experience.

This study focused more broadly on the relationship and system maintenance domains within the FES (Moos & Moos, 1974/2002) while Mackey et al. focused only on the Cohesion subscale, which is one of the three subscales that comprise the family relationship domain. The results of this study and Mackey et al indicate that more narrow approach (e.g., choosing particulate subscales) is needed to identify specific aspects of family environment that contribute to children and adolescents' health-related quality of life.

Although it has been established that the measurement of health-related quality of life encompasses the physical, emotional, social, and behavioral domains, the literature is lacking in

understanding the specific contribution family environment has on children's health-related quality of life (Moreira et al., 2014). This study has shown that family environment is related to children's health-related quality of life, which provides evidence that family environment is a factor that relates to the health-related quality of life of children and adolescents with Type 1 diabetes. As research has shown, a higher level of family support, as indicated by higher family environment scores, was predictive of a higher quality of life (Pereira, Berg-Cross, Almeida, & Machado, 2008) and of better disease management as indicated by lower HbA_{1c} values (Mackey et al., 2011). The goal of treatment is to improve disease management so that as individuals with Type 1 diabetes age, their likelihood of secondary complications are minimized. As there are multiple dimensions that contribute to health-related quality of life, further research is needed to determine the components of family environment that prove most beneficial to increasing health-related quality of life in children and adolescents with Type 1 diabetes.

Additionally, parenting that is warm, responsive, and involved is considered as supportive and protective against negative psychosocial events (McCarty, Zimmerman, Diguseppe, & Christakis, 2005; Williams, Sharpe, & Mullan, 2014) and contributes to a positive family environment as evidenced by greater family cohesion (Mackey et al., 2011). Children and adolescents with Type 1 diabetes may benefit from these aspects of family environment differently. Diagnosis typically occurs early in children's lives and is a very disruptive life event for both children and their families. Supportive parenting, which contributes to a more positive family environment would provide stability and care for children at initial diagnosis, possibly increasing their ability to learn the skills they need to manage the disease.

Parenting behavior that uses autonomy-supportive parenting, which would also be reflective of an authoritative parenting style, likely promotes receptivity from adolescents who

are transitioning to increased responsibility of their treatment regimen (Landers, Friedrich, Jawad, & Miller, 2016). Adolescents struggle with the push/pull of establishing autonomy and pubertal changes. Their sense of self is challenged by normative development and the necessary changes that occur with disease management brought on by hormonal changes. Adolescents have lived with management issues longer and may be experiencing frustration because of their dietary and medication requirements and their perception of how those aspects of care impinge upon them being viewed as “normal” within their peer group. When adolescents have supportive parents who can normalize their adolescents’ experience and provide healthy boundaries to help them negotiate their increasing autonomy, adolescents may feel better able to manage these changing demands and the power over dynamic between adolescents and their parents can shift to one of power to (Smith-Acuña, 2011). This action by adolescents’ parents may facilitate greater family cohesion, which is more likely to create a positive family environment, and that positive family environment would impact children’s health-related quality of life.

When considering the components of positive family environment (high cohesiveness and expressiveness and low conflict) and a supportive parenting style, these aspects of the family system are not likely to change as children age. Additionally, the amount of stress experienced by the family and by the individual members may connect to lack of resources available whether they be financial, social, or emotional. This study sample predominately had higher incomes and was mostly White, non-Hispanic or Latinx. Higher incomes could contribute to the perception of a positive family environment. Families that have access to resources, whether they be financial, social, emotional, or medical, would respond to stressors differently. Given the demographics of this population and the access they had to a high level of comprehensive medical treatment, it is likely that their income would have been at this higher bracket when their children were first

diagnosed. These factors may have contributed to the correlation between family environment and children's health-related quality of life. The nature of this populations' demographics indicates further study is needed with more diverse populations, as additional stress experienced on the family could contribute to a less positive family environment, which would negatively affect the health-related quality of life of children and adolescents with Type 1 diabetes in marginalized populations.

Although family environment did not show a significant correlation to children's coping, a relation cannot be ruled out. In this study, the small *N* may have contributed to the inability to detect significance. A small moderate effect size (0.25) was noted for the correlation of parental perceived social support and child family environment. A small moderate effect has been noted in research using the Family Environment Scale with children with Type1 diabetes and their families to determine levels of family cohesion where effect sizes between 0.17 and 0.26 were found (Moreira et al., 2014; Mackey et al., 2011).

Parental Perceived Social Support

The analyses showed a significant relation between parents' perception of social support and the parent proxy of children's health-related quality of life. The association was consistent with previous studies. Mlynarczyk (2013) reported parents' perception of social support was positively correlated to their children's quality of life. Parents' perceptions of being supported by the significant people in their lives seem to allow them to better support their children and adolescents living with Type 1 diabetes. Given the tremendous care and attention needed to successfully manage diabetes well, parents who receive social support may be better able to tolerate the ups and downs of disease management. Additionally, research has shown when parents operate from a position of perceived support, they are more able to provide basic care

and respond appropriately to their children (Respler-Herman et al., 2012). If parents are more able to provide appropriate care to their children, their ability to provide the needed significant and differing support to manage the disease better may increase and this action would contribute to a better health-related quality of life for their children and adolescents living with Type 1 diabetes.

The amount of stress experienced by parents of children with Type 1 diabetes and their perception of being supported by others would be comparable as parents who have children with disabilities may experience similar significant adjustment challenges as parents of children with Type 1 diabetes (Åsberg et al., 2008). As parents are the primary caregivers and managers of all health-related matters for their children with Type 1 diabetes, parents' perception of being supported by significant people/relationships may enable them to be more present, to provide appropriate care, and to support their children as they grow, develop, and manage their treatment regimen.

Although perceived parental social support was correlated with children's health-related quality of life, perceived parental social support did not correlate to children's coping. When parents feel supported, they are better able to attend to their children's needs, which would be increase children and adolescents' health-related quality of life. It has been reported that children who perceive their parents as having an authoritative parenting style would have better quality of life than parents who displayed authoritarian or permissive parenting styles (Mlynarczyk, 2013). Given the small population size and lack of diverse population in this study, further research should be done to determine how parents' ethnicity and SES and their perception of their social support may be related to how their children cope.

Children's Coping

Children's coping, specifically avoidant coping strategies, was significantly related to adolescents' health-related quality of life but not children's health-related quality of life. As avoidant coping strategy use increased, the health-related quality of life decreased in children and adolescents. Of note, the Children's Coping Strategies Checklist-Revision 1 (Ayers et al. 1996) measure is a general coping measure and is not specific to diabetes-related copings strategies, especially avoidance coping strategies. In this study, the coping measure may have captured more general coping strategies and may not have accurately captured with specificity how children with Type 1 diabetes cope with living with the disease and whether the coping used was positive or negative. Additionally, the increased use of avoidance coping strategies by older children nearing adolescence and adolescents could be impacted by other contextual issues (e.g. normal developmental maturation, increased social and emotional demands). To gain a more accurate understanding of how children and adolescents cope with living with Type 1 diabetes, identifying and using a measure that separates developmental and disease specific coping should be considered.

The avoidant coping strategies subgroup in the Children's Coping Strategies Checklist-Revision 1 (Ayers et al. 1996) measure included factors that indicated children's use of avoidant actions, repression, and wishful thinking. When considering that actions like avoiding and repressing thoughts about diabetes or imagining that diabetes does not exist only serve to create more of a challenge in coping with the disease, it seems prudent to develop interventions to challenge these coping behaviors. These behaviors would indicate that children may not be attending properly to their treatment regimen or coping well with the changes required of them. The use of avoidant coping may only exacerbate health concerns that medical professionals so arduously try to prevent, and this supports the findings of other research (Delmater, 1992; Grey,

Lipman, Cameron, & Thurber, 1997). Because of the nature of coping behaviors, children's choice of coping style may negatively impact the health-related quality of life of children and adolescents with Type 1 diabetes.

Although literature exists that identifies a relation between avoidant coping strategies and adolescents with Type 1 diabetes, such literature about children in middle childhood using avoidant coping strategies has not been readily identified. Given the study population demographics, it is surprising that avoidant coping strategies was more prominent than active, distraction, and support-seeking. Although there was an equal distribution of child and adolescent participants, the child group did have a higher age mean, which may indicate that this group of children was already beginning to use avoidant coping strategies. When considering how intensive and potentially burdensome the treatment regimen is for managing Type 1 diabetes, children and adolescents may experience a significant amount of stress, which is a part of managing any chronic disease. Given the additional normative strains and stresses experienced by adolescents, adolescents may be more susceptible to the stress of a changing treatment regimen as they are adjusting to normative developmental changes as well as hormonal changes that their younger counterparts are not experiencing. Therapeutic interventions directed towards improving relational dynamics may be helpful for both children/adolescents and their parents as they work to lessen the experienced and perceived stress of living with Type 1 diabetes. Although this study did not explore the role normative and disease-specific stress may play in disease management, future studies are needed to identify the role stress may have and identify interventions that may counteract both experienced and perceived stress by children and adolescents with Type 1 diabetes. In addition, as the use of avoidant coping by children with

Type 1 diabetes may be stress related, the contribution of stress and avoidant behaviors on their health-related quality of life should be explored in future studies.

Although there was not a significant correlation between parental perceived social support and children's coping, parental perceived social support was significantly related to the parent proxy of children's health-related quality of life. Parents who perceive that they are being supported may experience less stress, which would allow them to engage with their children in a more supportive and caring way when responding to the challenges experienced with changes in medication and in diet. If parents feel supported, they may be more capable to provide a more cohesive and low conflict environment for their children and adolescents utilizing better communication to negotiate responsibility for the day to day tasks, to adjust to disease management overall, and to strengthen relational dynamics with parents and medical professionals, which would promote a better health-related quality of life. Previous research has shown that a cohesive, communicative, low-conflict family environment lends itself to children having better adherence to their diabetes treatment regimen (Botello-Harbaum et al., 2008; Delmater, de Wit, McDarby, Malik, & Acerini, 2014; Graça Pereira et al., 2008; Mackey et al, 2011) and better adherence is related to better health-related quality of life in children and adolescents with Type 1 diabetes.

Limitations

The data analyzed in this study was cross-sectional and any causal inferences regarding the results should not be made as cross-sectional data can only indicate that a relation exists between the identified variables.

This study used a narrow population of children with Type 1 diabetes (ages 8 to16) and did not include representation of all children who would be seen in a pediatric endocrinology

clinic. This study purposefully excluded children with recent diagnoses. The use of this diabetes-specific measure was designed to capture children's experience of a diagnosis of Type 1 diabetes after at least one year. These children may have had time to make meaningful adjustments to living with the disease, making these results inaccurate for newly diagnosed children and their families.

The models examined in this study explored the relations of family environment to children's health-related quality of life from the child data and the parent data separately even though the family environment parent and child data were significantly correlated. The determination to separately analyze parent and child data in separate models was aimed towards preserving a larger N to conduct the data analyses and an unintended consequence of this decision was losing the ability to determine how the family experience of the family environment may have impacted the respective reporting of health-related quality of life. As diabetes care is considered a family activity, understanding how the family perceives and identifies the levels of cohesion, expressiveness, and conflict would contribute to the overall experience, which may impact both children's and parents' reports of children's health-related quality of life.

Another limitation of this study was sample size. Although the sample size was large enough to determine moderate to large effect sizes, it may have adequately lacked the power to detect small effect sizes. Although this study was unable to detect small effect sizes with the current N , research using the Family Environment Scale (Moos & Moos, 1974/2002) and the PedsQLTM Diabetes module (Varni et al., 2003) has reported moderate to large effect sizes in their use to measure both family environment and health-related quality of life in children with Type 1 diabetes (Mackey et al., 2011; Moreira et al., 2014; Varni et al., 2003).

Another potential limitation of this study could have been self-selection bias, which may have contributed to lack of significant findings. The participants of this study were a convenience sample receiving care at a specialty comprehensive treatment center housed within a major university. Children and their families who were doing better may have been more likely to participate as an expressed desire to be helpful to the medical team and to be helpful to others who are living with Type 1 diabetes. Future studies should consider a recruitment strategy to capture a more representative sample of children and adolescents who are at varied levels of managing their treatment.

Additionally, as this was a convenience sample from patients receiving care at a specialty comprehensive treatment center, the sociodemographic characteristics in the population, such as higher incomes and parent education, are not representative of the population of parents of children with Type 1 diabetes. It has been shown that when single mothers are in a lower socioeconomic status, they are more likely to experience more negative events and less social support (Simons, Beaman, Conger, & Chao, 1993). While this sample did not have a significant number of single parents, statistically, there will be children who have Type 1 diabetes who live in a single-parent-headed home and future research should take this into consideration to have a more representative sample population that would better represent the children who are seen in pediatric endocrinology clinics. In future research, the population should be expanded to include lower and higher ages as well as a more diverse distribution of sociodemographic characteristics.

This examination of children's coping would only be applicable to this population. Because ethnic diversity was limited within this study, these results may not be representative of children from different ethnic backgrounds. As has been shown in the literature, children with Type 1 diabetes who are from a lower socioeconomic status tend to have diabetes that is less

controlled. When there is limited income and lower educational attainment, situations that would stress the family system because of the lack of access to physical and financial resources may be compounded, and the family environment may not be able to tolerate additional stress from noncompliance to treatment regimen.

Clinical Implications

As these children and their families are seen in the context of a clearly defined medical disease, therapeutic interventions should be at the level of medical family therapy. The goal of family therapy is to help clients change the interactional patterns that no longer serve the family system well using systems theory to understand the relationships between and among family members as well as the family's relationship with other larger systems. Within the medical context, the biopsychosocial-spiritual model and systems theory connect in the form of medical family therapy. Medical family therapy is defined as

an approach to healthcare sourced from a BPSS [biopsychosocial-spiritual] perspective and marriage and family therapy, but also informed by systems theory. The practice of MedFT spans a variety of clinical settings with a strong focus on the relationships of the patient and the collaboration between and among healthcare providers and the patient. MedFTs are endorsers of patient and family agency and facilitators of healthy workplace dynamics. (Tyndall, Hodgson, White, Lamson, & Knight, 2010, pp. 68 – 69)

Therapists who work with children who have Type I diabetes and their families must consider the ways in which children and family members, specifically their primary caregiver, interact within the family system. Because MedFT is informed by systems theory and incorporates the BPSS with marriage and family therapy, it is a useful framework to consider the aspects that inform treatment. The BPSS perspective “acknowledges the hierarchical,

interdependent relationships of the biological, psychological, personal, family, and community and larger systems” (McDaniel, Doherty, & Hepworth, 2014, p. 9). This perspective views the biological, psychological, and sociocultural aspects as critical components to be acknowledged throughout the developmental process. Medical family therapy seeks to bring together multiple systems collaboratively to facilitate healing and well-being using agency and communion (McDaniel et al., 2014). It is in these two areas of agency and communion where the intersection of therapeutic intervention and advocacy lie. Medical family therapists can facilitate families’ ability to be actively involved in and committed to the families’ healthcare and strengthen the stressed bonds of the primary social relationships (McDaniel et al., 2014).

Family Environment

This study found the child report of family environment was significantly correlated to the parent report of children’s health-related quality of life. The higher the children’s report of better family environment, the higher parents rated the children’s health related quality of life. Botello-Harbaum et al. (2008) found that responsive parents, as characterized by Darling and Steinberg’s (1993) parent style typology, would promote a higher diabetes health-related quality of life in children with Type 1 diabetes. From an intervention standpoint, interventions directed at training parents how to increase health-related quality of life in their children would be ideal. Regarding family environment, parents need support and direction in developing authoritative parenting style behaviors such as warmth, support, and appropriate boundaries while taking into consideration the developmental needs of their children. Younger children need parents to take an active stance in attending to disease management and appropriate psychosocial responses to changes and the resulting stress from the changes. Alternately, adolescents need a balance between autonomy and directed care as transitioning into adolescence is an area of risk

especially between the ages of 14 and 16 (Whittemore et al., 2010). Adolescents are in the process of testing authority and conflict about disease management becomes prominent. This is where parenting behaviors would come into play. Younger children benefit from caring guidance as they learn the behaviors needed to manage the disease effectively, whereas adolescents benefit from the same guidance, but the way in which it is implemented determines how adolescents receive the direction. Both parents and their children would benefit from therapeutic techniques designed to increase authoritative parenting style behaviors.

Perceived Parental Social Support

In this study, parental perceived social support was significantly related to children's health-related quality of life. Although parents felt supported, the perception of support may not be accurately identified as the report is based on perception, and the lack of support could be related to the inability to accept said support (Al-Gamal & Long, 2012). Clinical interventions for parents would be targeted towards determining what support is needed, how the support is needed, and who can provide the desired and needed support. Since the perception of support may be more meaningful, engaging parents in ways to strengthen the parenting dyad may be beneficial. If it is a single parent, identifying a person who can provide the meaningful support he/she would need would be helpful. From the MedFT perspective, the goals of establishing agency and community would be helpful. In the context of parental support, increasing and supporting both agency and community are appropriate. From this standpoint, if children are struggling to maintain appropriate HbA_{1c} levels and the parent or parents is/are feeling helpless, the MedFT can promote agency of parents and the children by engaging them in conversations regarding their ability to make choices both about the children's care and their health system (McDaniel et al., 2014). This action both promotes clearer boundaries and may promote feelings

of support within the parents, which in turn may change how they relate to and engage with their children, the medical professionals, the therapist, and the larger community in which they live.

From the context of promoting feeling of support from the community, the goal of communion becomes relevant. As defined by McDaniel et al. (2014) communion is “the emotional bonds that are often frayed by illness, disability, and contact with the health care system. It means the sense of being cared for, loved, and supported by family members, friends, and professionals.” This definition and explanation of communion fits nicely with the perception of social support in parents. The demands of the disease are significant for both the children and parents, and strengthening the much needed relational connection is valuable. When families are in the chronic phase of living with diabetes, often extended family relationships and friendships may have become strained because of unexpected emotional needs, and the therapeutic relationship can mitigate the impact of the strain by helping families enhance their sense of communion within their immediate and extended families as well as with their communities or larger support network (McDaniel et al., 2014).

Children’s Coping

Children’s coping, specifically the avoidant coping strategies subgroup, was found to be significantly correlated to children’s health-related quality of life. As children aged, they began using avoidant coping strategies, which was related to a decrease in their health-related quality of life. Although the children and adolescents in this study had access to comprehensive care, they engaged in using more avoidant coping strategies as they aged. Additionally, active, distraction, and support-seeking coping strategies were not significantly related to either the child report or parent proxy of children’s health-related quality of life. When considering these findings, a therapeutic focus emerges. Although a focus on more positive coping strategies would seem to

be ideal in the treatment of children with Type 1 diabetes, the findings suggest a more focused approach on addressing overuse of avoidant coping strategies.

Clear differences in children's and adolescents' coping with living with Type 1 diabetes have been shown (Compas, Jaser, Dunn, & Rodriguez, 2012; Graue et al., 2004; Kelo et al., 2011; Whittmore et al., 2010). Developmentally, adolescents are more likely to use avoidant coping, creating greater risk to developing psychosocial and medical issues. Because adolescents are more vulnerable to developing psychosocial and medical issues, interventions should be aimed strategically at identifying and implementing more problem focused coping skills which focus on taking a rational stance to managing the problem (in this case, diabetes treatment challenges) and on working to change the situation (Graue et al., 2004). Additionally, interventions targeted towards learning different coping skills would be needed. Because the use of avoidant coping may put children at risk for additional psychosocial and diabetes-related issues, incorporating a screening to assess for coping style may be useful and serve to direct the intervention needed to shift their coping style (Grey et al., 1991).

As avoidant coping strategies were significantly related to children's health-related quality of life, interventions are needed to help children in middle childhood and adolescents learn better and healthier coping strategies. The therapeutic interventions should be implemented according to the level of development. Based on the study by Hema et al. (2008), children and adolescents respond to stress differently. In response to their developmental needs, interventions suitable for children should be directed towards helping them to develop better relationship skills to engage with family members, medical professionals, and friends, whereas interventions for adolescents should be directed towards increasing their understanding of how context can shape and can alter perspective as well as building better relationships.

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Table 1

Participant Characteristics

Characteristic	Child (<i>n</i> = 28)	Adolescent (<i>n</i> = 28)	Primary Caregiver (<i>n</i> = 56)
Mean age (years) ($\pm SD$)	10.3 $\pm$ 1.4	14.6 $\pm$ 1.2	
Sex (% female)	11%	12%	
Ethnicity (%)			
White, not of Hispanic Origin	61.5%	78.6%	
Black/African American	26.9%	10.7%	
Hispanic	11.5%	10.7%	
Education (%)			
Elementary	59.1%		
Middle School	40.9%	33.3%	
High School		66.7%	
Some Undergraduate			9.6%
Undergraduate			34.6%
Graduate			36.5%
Annual Family Income			
Less than \$40,000			11.3%
\$40,000 - \$80,000			11.3%
Greater than \$80,000			77.4%

Table 2

Means and Standard Deviations of Children Reported Variables

Variable	Total Sample (<i>n</i> = 56)		Child Sample (<i>n</i> = 28)		Adolescent Sample (<i>n</i> = 28)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
HbA _{1c}	8.16	1.53	8.71	2.08	8.30	1.96
FES	15.28	2.60				
CCSC-A	2.59	0.60	2.54	0.63	2.64	0.59
CCSC-D	2.37	0.61	2.41	0.69	2.34	0.55
CCSC-AV	2.35	0.66	2.32	0.62	2.38	0.71
CCSC-SS	2.17	0.79	2.24	0.86	2.10	0.73
PedsQL	72.34	16.52	72.46	16.39	72.27	16.47

Notes. FES – Family Environment Scale; Child Report of Children Coping (CCSC): CCSC-A – Active Coping Strategies; CCSC-D – Distraction Strategies; CCSC-AV – Avoidance Strategies; CCSC-SS – Support-Seeking Strategies; PedsQL – Child and Teen Pediatric Quality of Life Diabetes Module.

Table 3

List of Children's and Primary Caregivers' Completed Measures and Abbreviations

Primary Caregiver Measures		Child Measures	
1. Pediatric Quality of Life Inventory 3.0 Diabetes Module - Parent Proxy	PedsQL-PP	1. Pediatric Quality of Life Inventory 3.0 Diabetes Module - Child Report	PedsQL-CR
2. Family Environment Scale		2. Children's Coping Strategies Checklist – Revision 1	CCSC
3. Multidimensional Scale of Perceived Social Support	MSPSS	Subscales	
		a. Active Coping Strategies	CCSC-A
		b. Distraction Coping Strategies	CCSC-D
		c. Avoidant Coping Strategies	CCSC-AV
		d. Support Seeking Coping Strategies	CCSC-SS

Table 4

Bivariate Correlations among the Family Environment and Coping Variables

Variable	1	2	3	4	5	6
1. PFES	-					
2. CFES	.27	-				
3. CCSC-A	-.14	-.02	-			
4. CCSC-D	-.21	-.02	.37**	-		
5. CCSC-AV	-.16	-.04	.45**	.25	-	
6. CCSC-SS	.15	.04	.58**	.31*	.07	-

Notes. Parent Report Family Environment (PFES); Child Report Family Environment (CFES); Child Report of Children's Coping (CCSC); CCSC-A – Active Coping Strategies; CCSC-D – Distraction Strategies; CCSC-AV – Avoidance Strategies; CCSC-SS – Support-Seeking Strategies. * $p < .05$; ** $p < .01$

Table 5

Bivariate Correlations among the Family Environment and Health-Related Quality of Life Variables

Variable	1	2	3	4
1. CFES	-			
2. PFES	.27	-		
3. PedsQL-PP	.28*	.35**	-	
4. PedsQL-CR	-.00	.17	.19	.18

Notes. Child Family Environment (CFES); Parent Family Environment (PFES); PedsQL-PP – Health-Related Quality of Life Parent Report, Total PedsQL-CR – Health-Related Quality of Life Child Report, Total. * $p < .05$; ** $p < .01$

Table 6

Bivariate Correlations among the Social Support and Health-Related Quality of Life Variables

Variable	1	2	3
1. MSPSS	-		
2. PedsQL-PP	.36**	-	
3. PedsQL-CR	.11	.189	-

Notes. Parent Perceived Social Support (MSPSS); PedsQL-PP – Health-Related Quality of Life Parent Report, Total; PedsQL-CR – Health-Related Quality of Life Child Report, Total. * $p < .05$; ** $p < .01$

Table 7

Bivariate Correlations among the Coping and Health-Related Quality of Life Variables

Variable	1	2	3	4	5	6
1. CCSC-A	-					
2. CCSC-D	.37**	-				
3. CCSC-AV	.45**	.25	-			
4. CCSC-SS	.58**	.31*	.07	-		
5. PedsQL-PP	-.09	-.03	.01	.06	-	
6. PedsQL-CR	-.02	-.00	-.55**	.17	.18	-

Notes. Children's Coping (CCSC); CCSC-A – Active Coping Strategies; CCSC-D – Distraction Strategies; CCSC-AV – Avoidance Strategies; CCSC-SS – Support-Seeking Strategies); PedsQL-PPC – Health-Related Quality of Life Parent Report, Child; PedsQL-CR – Health-Related Quality of Life Child Report, Total. * $p < .05$; ** $p < .01$

Table 8

Bivariate Correlations among the Social Support and Coping Variables

Variable	1	2	3	4
1. MSPSS	-			
2. CCSC-A	.027	-		
3. CCSC-D	.006	.370**	-	
4. CCSC-AV	-.007	.450**	.254	-
5. CCSC-SS	.149	.576**	.306*	.070

Notes. Parent Perceived Social Support (MSPSS); Child Report of Children's Coping (CCSC); CCSC-A – Active Coping Strategies Subscale; CCSC-D – Distraction Strategies Subscale; CCSC-AV – Avoidance Strategies Subscale; CCSC-SS – Support-Seeking Strategies Subscale.

* $p < .05$; ** $p < .01$

Table 9

Results of Mediation Analysis of Children's Coping Child Report on the Relation of Family Environment Parent Report to Children's Health-Related Quality of Life Parent-Proxy

Variable	β	SE	p	95% CI	
Constant	18.87	24.43	.44	-30.33	68.06
CCSC-A	-3.61	5.76	.53	-15.21	8.00
CCSC-D	.14	4.57	.98	-9.08	9.35
CCSC-AV	2.17	4.23	.61	-6.34	10.69
CCSC-SS	1.60	4.06	.70	-6.57	9.76
PFES	2.28	1.07	.04*	.14	4.42
R ²	.13				
F	1.29				

Notes. N = 51. CI = Confidence interval; PedsQL-PP – Health-Related Quality of Life Parent

Proxy; Parent Family Environment (PFES); Children's Coping Child Report (CCSC): CCSC-A – Active Coping Strategies Subscale; CCSC-D – Distraction Strategies Subscale; CCSC-AV – Avoidance Strategies Subscale; CCSC-SS – Support-Seeking Strategies Subscale. * $p < .05$.

Table 11

Results of Mediation Analysis of Children's Coping Child Report on the Relation of Family Environment Child Report to Children's Health-Related Quality of Life Child Report

Variable	β	SE	p	95% CI	
Constant	98.35	12.00	.00	74.19	122.52
CCSC-A	7.14	4.41	.11	-1.75	16.03
CCSC-D	-.84	3.42	.81	-7.72	6.05
CCSC-AV	-17.97	3.29	.00*	-24.56	-11.32
CCSC-SS	1.75	3.00	.56	-4.29	7.79
CFES	-.01	.03	.59	-.07	.04
R ²	.13				
F	1.29				

Notes. N = 51. CI = Confidence interval; Parent family environment (PFES); Children's Coping Child Report (CCSC): CCSC-A – Active Coping Strategies Subscale; CCSC-D – Distraction Strategies Subscale; CCSC-AV – Avoidance Strategies Subscale; CCSC-SS – Support-Seeking Strategies Subscale. * $p < .05$.

Table 12

Results of Mediation Analysis of Children's Coping Child Report on the Relation of Parental Perceived Social Support to Children's Health-Related Quality of Life Child Report

Variable	β	SE	p	95% CI	
Constant	45.41	14.02	.00	17.17	73.65
CCSC-A	-4.90	5.49	.38	-15.97	6.15
CCSC-D	-2.25	4.25	.60	-10.80	6.31
CCSC-AV	1.67	4.08	.68	-6.55	9.89
CCSC-SS	2.85	3.76	.45	-4.73	10.42
MSPSS	.53	.18	.01*	.15	.90
R ²	.18				
F	2.02				

Notes. $N = 51$. CI = Confidence interval; Parental perceived social support (MSPSS); Children's Coping Child Report (CCSC): CCSC-A – Active Coping Strategies Subscale; CCSC-D – Distraction Strategies Subscale; CCSC-AV – Avoidance Strategies Subscale; CCSC-SS – Support-Seeking Strategies Subscale. * $p < .05$.

Table 13

*Results of Moderation Analysis of Children's Age on the Relation of Active Coping Strategies
Child Report to Children's Health-Related Quality of Life Child Report*

Predictor	β	p	95% CI	
Age	-1.50	.70	-9.27,	6.27
CCSC-A	4.39	.81	-31.56,	40.33
Age x CCSC-A	-.36	.80	-3.19,	2.47

Notes. CI = Confidence Interval; CCSC-A – Active Coping Strategies Subscale; Fit for model R^2
= .14, $F(3, 47) = 2.57$, $p > .05$

Table 14

Results of Moderation Analysis of Children's Age on the Relation of Distraction Coping Strategies Child Report to Children's Health-Related Quality of Life Child Report

Predictor	β	p	95% CI	
Age	-.95	.79	-8.12,	6.22
CCSC-D	7.12	.72	-31.99,	46.23
Age x CCSC-D	-.67	.66	-3.72,	2.38

Notes. CI = Confidence Interval; CCSC-D – Distraction Strategies Subscale; Fit for model $R^2 = .14$, $F(3, 48) = .256$, $p > .05$

Table 15

Results of Moderation Analysis of Children's Age on the Relation of Avoidance Coping Strategies Child Report to Children's Health-Related Quality of Life Child Report

Predictor	β	p	95% CI	
Age	3.62	.24	-2.50,	9.73
CCSC-AV	19.08	.25	-13.89,	52.06
Age x CCSC-AV	-2.50	.05	-5.00,	.01

Notes. CI = Confidence Interval; CCSC-AV – Avoidance Coping Strategies Subscale; Fit for model $R^2 = .46$, $F(3, 48) = 13.76$, $p < .001$

Table 16

Conditional Effects of Children's Age on the Relation of Avoidant Coping Strategies Child Report to Children's Health-Related Quality of Life Child Report

Age	β	p	95% CI	
One <i>SD</i> below mean	-6.28	.14	-14.79,	2.23
At the mean	-12.44	.001	-18.34,	1.29
One <i>SD</i> above mean	-18.60	.001	-27.00,	.04

Notes. CI = Confidence Interval

Table 17

Results of Moderation Analysis of Children's Age on the Relation of Support-Seeking Coping Strategies Child Report to Children's Health-Related Quality of Life Child Report

Predictor	β	p	95% CI	
Age	-6.57	.01	-.01,	.15
CCSC-SS	-19.12	.18	-2.11,	1.29
Age x CCSC-SS	1.80	.11	-.03,	.04

Notes. CI = Confidence Interval; CCSC-SS – Support-Seeking Strategies Subscale; Fit for model

$R^2 = .21$, $F(3, 47) = 4.04$, $p < .05$

Table 18

Results of Moderation Analysis of Children's Age on the Relation of Children's Coping Active Strategies Subscale Child Report to Children's Health-Related Quality of Life Parent Proxy

Predictor	β	p	95% CI	
Age	..12	.27	-8.52,	8.76
CCSC-A	-1.97	.92	-41.95,	38.02
Age x CCSC-A	-.05	.98	-3.20,	3.10

Notes. CI = Confidence Interval; CCSC-A – Active Coping Strategies Subscale; Fit for model $R^2 = .01$, $F(3, 47) = .13$, $p > .05$

Table 19

Results of Moderation Analysis of Children's Age on the Relation of Children's Coping Distraction Strategies Child Report to Children's Health-Related Quality of Life Parent Proxy

Predictor	β	p	95% CI	
Age	-3.46	.39	-11.44,	4.52
CCSC-D	-19.67	.36	-63.19,	123.86
Age x CCSC-D	1.51	.37	-1.88,	4.90

Notes. CI = Confidence Interval; CCSC-D – Distraction Strategies Subscale; Fit for model $R^2 = .02$, $F(3, 48) = .28$, $p > .05$

Table 20

Results of Moderation Analysis of Children's Age on the Relation of Avoidance Coping Strategies Subscale Child Report to Children's Health-Related Quality of Life Parent Proxy

Predictor	β	p	95% CI	
Age	-2.12	.62	-10.78,	6.54
CCSC-AV	-11.41	.63	-58.16,	35.34
Age x CCSC-AV	.90	.61	-2.65,	4.45

Notes. CI = Confidence Interval; CCSC-AV – Avoidance Strategies Subscale; Fit for model $R^2 =$

.01, $F(3, 48) = .09$, $p > .05$

Table 21

Results of Moderation Analysis of Children's Age on the Relation of Support-Seeking Coping Strategies Subscale Child Report to Children's Health-Related Quality of Life Parent Proxy

Predictor	β	p	95% CI	
Age	.07	.07	-.01,	.15
CCSC-SS	-.41	.63	-2.11,	1.29
Age x CCSC-SS	.01	.61	-.03,	.04

Notes. CI = Confidence Interval; CCSC-SS – Support-Seeking Strategies Subscale; Fit for model

$R^2 = .01$, $F(3, 47) = .17$, $p > .05$