BENEFIT FINDING, NEGATIVE AFFECT, AND DAILY DIABETES MANAGEMENT AMONG ADOLESCENTS WITH TYPE 1 DIABETES

APPROVED BY SUPERVISORY COMMITTEE

Deborah J. Wiebe, Ph.D., M.P.H.

Austin A. Baldwin, Ph.D.

Julie N. Germann, Ph.D.

Heidi A. Hamann, Ph.D.

Sunita M. Stewart, Ph.D.

DEDICATION

I would like to dedicate this work to all of those that supported me and sacrificed for me so that I may pursue my personal and professional goals, and especially to my family, who only wish for my well-being.

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VINCENT HUY TRAN

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VINCENT HUY TRAN, B.A.

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Deborah J. Wiebe, Ph.D., M.P.H.

Abstract: This study examined whether benefit finding was associated with daily experiences of diabetes stress, negative affect, and diabetes management (e.g. daily average blood glucose and daily perceptions of coping effectiveness) among adolescents with type 1 diabetes. Early adolescents aged 10-15 with type 1 diabetes (n=209) completed a benefit finding measure prior to

participating in a 14-day daily diary study that provided information on daily diabetes stress, daily reports of how well they managed daily diabetes stressors, and daily emotional experiences. Blood glucose readings were also collected during the two-week study, and daily averages were calculated. Hierarchical linear modeling (HLM) was utilized to investigate day-to-day fluctuations of diabetes stress, emotion, and diabetes management as well as investigate whether these daily fluctuations differed as a function of benefit finding. Benefit finding was associated with overall reported higher average daily levels of both positive and negative affect across a two-week period. Benefit finding was associated with a stronger negative correlation between anxiety and lower perceived coping effectiveness. It was also marginally associated with a greater decline in next-day anxiety among older adolescents. Although benefit finding did not buffer adverse associations between negative affect and poorer diabetes management, there was evidence that it may serve to regulate anxiety over time. These findings are consistent with prior research suggesting that benefit finding occurs in a context of distress and anxiety and may serve as an emotion coping resource. However, questions arise about whether benefit finding facilitates better daily diabetes management in the context of ongoing stress and negative emotion during adolescence.

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LIST OF ABBREVIATIONS

ADA	American Diabetes Association
AIDS	Acquired Immune Deficiency Syndrome
DCCT	Diabetes Control and Complications Trial
H1	Hypothesis 1
H2	Hypothesis 2
H3	Hypothesis 3
H4	Hypothesis 4
H5	Hypothesis 5
H6	Hypothesis 6
H7	Hypothesis 7
HbA_{1c}	Hemoglobin A_{1c}
HIV	Human Immunodeficiency Virus
HLM	Hierarchical Linear Modeling
NA	Negative Affect
NIMH	National Institute of Mental Health
PA	Positive Affect
PANAS	Positive and Negative Affect Schedule
PCE	Perceived Coping Effectiveness
SPSS	Statistical Package for Social Sciences

CHAPTER ONE

STATEMENT OF THE PROBLEM

Adolescence is a difficult time for managing type 1 diabetes as evidenced by deteriorating metabolic control, poorer adherence, and heightened emotional distress (Helgeson, Snyder, Escobar, Siminerio, & Becker, 2007; Korbel, Wiebe, Berg, & Palmer, 2007). Such difficulties may occur, in part, because the increases in negative affect and emotional lability that occur normatively during adolescence (Larson, Moneta, Richards, & Wilson, 2002) may be exacerbated by the stress of diabetes, and may undermine diabetes self-management (de Groot, Anderson, Freedland, Clouse, & Lustman, 2001; Holmes et al., 2006; Kiviniemi, Voss-Humke, & Seifert, 2007; Skinner, Hampson, & Fife-Schaw, 2002). Understanding factors that predict adolescents' diabetes management patterns is important because self-management behaviors established during adolescence may carry into adulthood (Dovey-Pearce, Doherty, & May, 2007; Ickovics et al., 2006). In the present study, we examined adolescents' day-to-day experiences related to managing emotions and diabetes. Understanding these patterns on a daily basis is particularly important because management of diabetes and emotional fluctuations occur at an ongoing, daily level (Fortenberry et al., 2009).

In addition to examining associations between daily emotion and diabetes management, the present study explored how one potential protective factor – benefit finding – may be related to daily patterns diabetes stress, negative affect,

and diabetes management among early adolescents with type 1 diabetes. Defined as the experience of identifying positive outcomes in the face of adversity, benefit finding has often been examined as a factor in positive adjustment to illness, but data are inconsistent and the processes by which it may be adaptive remain unclear (Helgeson, Reynolds, & Tomich, 2006; Linley & Joseph, 2004). There is evidence that benefit finding has stress-buffering properties (Pakenham, 1999; Siegel & Schrimshaw, 2007; Tennen, Affleck, Urrows, Higgins, & Mendola, 1992; Tran, Wiebe, Fortenberry, Butler, & Berg, 2010), and Tran et al. (2010) recently reported that benefit finding may facilitate diabetes management even in the face of negative affective reactions to diabetes stress. Specifically, Tran et al. (2010) found that benefit finding was associated with *greater* negative affective reactions to diabetes stress, but it also buffered the adverse associations between negative affect and diabetes adjustment. The present study utilized daily diary reports to examine whether these associations occurred in the every day context of adolescents' lives, attempting to replicate and extend Tran et al.'s (2010) findings. We also attempted to understand why benefit finding may be related to heightened negative affect in the face of diabetes stress by testing several plausible hypotheses previously suggested by Tran et al. (2010). Understanding these processes will hopefully provide useful information for promoting better adjustment and diabetes management in this vulnerable population.

CHAPTER TWO

REVIEW OF THE LITERATURE

Diabetes management during adolescence

Type 1 diabetes can be an emotionally burdensome chronic illness for adolescents because diabetes requires an ongoing and demanding treatment regimen. Those with type 1 diabetes must coordinate an extremely complex treatment regimen including checking blood glucose levels, maintaining a strict and healthy diet, exercise, and giving multiple insulin injections in order to maintain healthy levels of blood glucose (Drotar, 2000; Helgeson et al., 2007). Although long-term complications of diabetes are largely viewed as controllable with good treatment adherence, the emotional burden of having to carry out the complex, daily treatment regimen for the rest of one's life can be frustrating and overwhelming. Maintaining ongoing treatment standards may be particularly difficult for adolescents because their awareness and insight into the complexity and importance of caring for diabetes are developing during this stage of development (Miller & Drotar, 2007), and their understanding of the future implications of their illness are beginning to be recognized.

Difficulty with diabetes management during adolescence is evidenced by marked deterioration in adherence and metabolic control as well as heightened emotional lability and distress. This developmental period is a time when metabolic control is relatively poor compared to earlier childhood and later

adulthood (Anderson, Ho, Brackett, & Laffel, 1999; Helgeson et al., 2007). Understanding why more disruptions in diabetes management occur during adolescence is important because poor management during adolescence is carried into adulthood (Dovey-Pearce et al., 2007). Stricter adherence to the treatment regimen in adolescents with type 1 diabetes slows the progression of serious, long-term complications of diabetes, such as cardiovascular disease, chronic renal failure, retinal damage and blindness, and microvascular damage (DCCT, 1994). If adherence is poor or haphazard, immediate health consequences could be devastating as well, in the form of hypoglycemia and seizures or loss of consciousness or hyperglycemia and ketoacidosis, both of which could require immediate hospitalization. Thus, it is imperative for adolescents to develop effective coping skills to managing their diabetes during this at-risk period and further research is needed to identify factors that may promote better management.

Adolescent difficulties in diabetes management may occur, in part, because the normative increases in negative affect and emotional lability that occur during adolescence (Larson et al., 2002) are exacerbated by the challenges of having diabetes (Beveridge, Berg, Wiebe, & Palmer, 2006). Adolescents face increased stress in their daily lives not only from normative developmental transitions (Larson et al., 2002), but also from the assumption of independence in managing their diabetes while the role of parents in diabetes management

decreases (Anderson, Auslander, Jung, Miller, & Santiago, 1990; Wiebe et al., 2005; Wysocki et al., 1996). In addition, pubertal changes can disrupt glucose metabolism and alter the effectiveness of the diabetes regimen (Amiel, Sherwin, Simonson, Lauritano, & Tamborlane,1986). Such dysregulation can create additional stress at a time when changing role responsibilities and peer relationships may result in children assuming increased responsibility for their diabetes management before they have the requisite skills to do so (Palmer et al., 2009; Palmer et al., 2004; Wiebe et al., 2005). All of these challenges and stressors in managing the illness occur at a time when adolescents developmentally have fewer coping resources to draw from (Ickovics et al., 2006).

Negative emotions and adolescent diabetes management

Theories of lifespan development have focused on early adolescence as a particular period in which there is great change in emotional experience (Larson et al., 2002). Early adolescence is marked by increases in emotional lability, including greater negative affect and less positive affect (Larson et al., 2002). Such emotional changes are likely to reflect a number of factors. External factors and "developmental transitions" such as changes in peer expectations, changes in responsibilities and roles within the family, increases in life stress, and transitioning to middle or high school are likely to be important for understanding this emotionally tumultuous period (Peterson, Kennedy, and Sullivan, 1991).

Physical changes such as those associated with puberty can also be experienced as unpredictable, out of one's control, and ultimately stressful (Graber & Brooks-Gunn, 1996; Hamburg, 1974). Cognitive and social-emotional changes such as increases in emotional awareness and understanding of the implications of negative events during this developmental period may lead adolescents to become more sensitive and vulnerable to being overwhelmed by stressful events as well (Larson et al., 2002).

Daily diabetes management can take an emotional toll, leading to greater distress and more risk for depression (Anderson et al., 1999, Kovacs, Obrosky, Goldston, & Drash, 1997) which itself is associated with poorer illness management and functioning (de Groot et al., 2001; Kovacs, Goldston, Obrosky, & Iyenger, 1992). Those with diabetes are at two to four times higher risk for experiencing depressive symptoms than the general population (Anderson, Freedland, Clouse, & Lustman, 2001; Barnard, Skinner, & Peveler, 2006; Kovacs et al., 1997). Adolescents with diabetes also spontaneously describe that managing negative emotions related to diabetes is one of their most stressful diabetes events (Beveridge et al., 2006). Taken together, such findings suggest the experience of living with diabetes can exacerbate the experience of negative affect among adolescents with diabetes.

The importance of emotions in the context of health outcomes has been demonstrated in many medical populations, including diabetes. An extensive

literature demonstrates the interrelationships between negative affect and poorer health outcomes in cardiovascular disease, HIV, and cancer populations and mortality rates, among other medical conditions (Gallo & Matthews, 2003; Suls & Bunde, 2005; Temoshok, 1993; Wiebe & Fortenberry, 2006). Similarly, psychosocial stress and poor emotional functioning have potentially strong relationships with blood glucose levels in both adults (de Groot et al., 2001; Lustman et al., 2000) and children (Grey, Whittemore, & Tamborlane, 2002; Northam, Matthews, Anderson, Cameron, & Werther, 2005, Kovacs et al., 1992). Such relationships may reflect fairly direct metabolic pathways via neuroendocrine and autonomic nervous system responses to diabetes stress (Dutour, Boiteau, Dadoun, & Feissel, 1996; Joynt, Whellan, & O'Connor, 2003). They may also reflect indirect behavioral pathways where negative affect disrupts behavioral aspects of diabetes management (de Groot et al., 2001; Grey, Lipman, Cameron, & Thurber, 1997; Holmes et al., 2006; Skinner et al., 2002).

A broad literature demonstrates associations between negative affect and poorer adherence to diabetes management and noncompliance with treatment in other populations as well. Emotions can have an impact on behavioral illness management, affecting motivation to engage in adaptive health behaviors (Kiviniemi et al., 2007; Rothman, 2000; Rothman, Baldwin, & Hertel, 2004) and adherence to medical treatment (DiMatteo, Giordani, Lepper, & Croghan, 2002). Negative affect may reduce cognitive processing skills and may lead to ignoring

relevant information (Baumeister, Zell, Tice, & Gross, 2007; Wiebe & Korbel, 2003), as resources to manage distressing emotions may leave fewer resources for long-term regulatory needs. Thus, emotional distress has been argued to inhibit coping processes as it pertains to illness management (Cameron & Leventhal, 1995, 2003). Difficulties with managing depressive symptoms leave adolescents at risk for poorer diabetes adherence (Korbel et al., 2007). Poor emotional care can also affect children's level of behavioral self-efficacy and adherence, thus having an additional indirect effect on blood glucose (Holmes et al., 2006; Korbel et al., 2007). Evidence for a pathway from emotional distress to glycemic control via adherence and self-efficacy has been found in a study of teens with diabetes in both cross-sectional and longitudinal studies (Stewart et al., 2000; Stewart et al., 2003)

Much of the existing literature has examined associations between diabetes management and broad measures of distress and depressive symptoms, despite the fact that adolescents experience heightened daily fluctuations in emotional experiences (Larson et al., 2002), which may disrupt the day-to-day demands of diabetes. Significant relationships between emotion, behavior, and glucose management have also been established on a daily basis (Aikens, Wallander, Bell, & Cole, 1992; Fortenberry et al., 2009; Gonder-Frederick, Cox, Bobbitt, Pennebaker, 1989). Reports of daily stress are associated with higher same-day blood glucose, though daily stress is not associated with next-day blood

glucose (Aikens et al., 1992). In one of the few studies examining daily emotion and adolescent diabetes management, Fortenberry et al. (2009) found a positive relationship between adolescent reports of negative affect and higher daily blood glucose over the course of a two-week daily diary study, and this relationship was mediated by daily reports of diabetes task competence. The present study drew upon this literature to examine the day-to-day relationships among adolescent experiences of emotion, stress, and diabetes management. We expected to replicate the finding that daily emotions among adolescents are important for diabetes management, and attempted to extend the literature by exploring whether individual differences in benefit finding moderated these associations.

Benefit finding and emotion management in the context of chronic illness

One factor that has been studied to potentially facilitate positive adjustment to chronic illness is benefit finding (Helgeson et al., 2006; Linley & Joseph, 2004). Benefit finding is posited to arise from a meaning-making process in which individuals accommodate adverse circumstances into their understanding of themselves and the world, leading to an increased appreciation of life, changes in life priorities, and improvements in relationships (Affleck & Tennen, 1996; Janoff-Bulman & Frieze, 1983; Milam, Ritt-Olson, & Unger, 2004; O' Leary and Ickovics, 1995; Taylor, 1983). Benefit finding is often associated with better illness adjustment and health outcomes in chronic illness populations such as cancer, HIV/AIDS, multiple sclerosis, and rheumatoid arthritis (Algoe & Stanton,

2009). These findings may reflect benefit finding's associations with patterns of coping, including heightened problem-focused coping, acceptance and positive reinterpretation, optimism, religion, cognitive processing, and positive affect (Linley & Joseph, 2004).

In some instances, however, benefit finding is unrelated or even negatively related to emotional well-being (Helgeson et al., 2006; Mohr et al., 1999; Tomich & Helgeson, 2004), and efforts to explain such inconsistencies have enhanced our understanding of how benefit finding may work. Findings from Helgeson et al.'s (2006) meta-analytic review of the benefit finding literature revealed that the construct is related to less depression and more positive well-being, but also to more intrusive and avoidant thoughts about the stressor. It has been suggested that intrusive and avoidant thoughts may reflect increased cognitive processing, perhaps to understand one's negative experiences (Tedeschi & Calhoun, 2004). If so, benefit finding may be associated with heightened distress in the short-term but with better psychosocial well-being in the long-term as patients develop a more mature and accepting understanding of their illness (Helgeson, et al., 2009) . It is also important to note that positive and negative emotion are not opposite ends of a single continuum, but rather two separate constructs that can occur simultaneously (Helgeson et al., 2006; Linley & Joseph, 2004). In light of such theorizing, further information needs to be gathered about the relationship

between benefit finding and negative affect to better understand the mechanisms by which benefit finding operates.

There is evidence to suggest that benefit finding has stress-buffering properties, acting as a protective resource when physical or emotional distress is heightened, but not when individuals experience less distress (Pakenham, 2005; Siegel & Schrimshaw, 2007; Tennen et al., 1992; Tran et al., 2010). In an earlier study, we investigated the complex benefit finding process in a sample of adolescents with type 1 diabetes by examining how benefit finding is related to negative affective reactions to diabetes stress (Tran et al., 2010). We found that benefit finding was associated with increased positive affective reactions to diabetes stress, adherence, and perceived coping effectiveness, as well as with lower depressive symptoms. In addition, benefit finding was associated with increased negative affective reactions to diabetes stress, but buffered the adverse associations between negative affective reactions and poorer diabetes management, namely worse metabolic control and more depressive symptoms. This finding is important because it provides a potential mechanism for how benefit finding may facilitate better illness management in the context of distress. The first broad aim of this proposed study was to examine whether benefit finding similarly buffered associations between negative affect and diabetes management on a daily basis.

It is important to consider why benefit finding was associated with heightened negative affective reactions to diabetes stress and how benefit finding may be associated with illness management on a daily basis. One explanation is that benefit finding is an emotional coping strategy that is elicited in the face of distress (Helgeson et al., 2006). This reverse causation explanation could suggest that adolescents who experience greater negative emotion in the face of diabetes problems simply engage in more benefit finding. Some have also argued that benefit finding may be more helpful for those who are more anxious or demonstrate more emotional instability (Danoff-Burg, Agee, Romanoff, Kremer, & Strosberg, 2006), although this explanation seems inconsistent with Tran et al.'s (2010) finding that found benefit finding was also associated with lower symptoms of depression. If benefit finding reflects an emotion-coping strategy to deal with distressing emotions, one would expect those with higher benefit finding to report heightened levels of negative affect.

It is also possible that benefit finding reflects a process of growth and adaptation where adolescents who are establishing their identities and beginning to set life goals do so in the context of living with a serious illness. Adolescents with diabetes routinely incorporate aspects of diabetes management into their life goals (Butler et al., 2010). Such openness to new experiences, and potentially to the future implications of diabetes, may facilitate the identification of experiencing benefits while also exposing youth to different diabetes stressors that

are inherently more distressing (Helgeson et al., 2006). If this is the case, benefit finding would be associated with increased reports of stress.

A third possibility is that an association between benefit finding and negative affect occurs because benefit finding may be associated with better emotion regulation, such that adolescents who find more benefits are more attuned to, and thus, report higher experiences of both negative and positive affect. Wild and Paivio (2003) suggested that to overcome the trauma of negative life experiences, those reporting increased benefits from the negative event likely display better emotion regulation capabilities, managing the distressing emotions associated with the event, but also experiencing and expressing their feelings appropriately. Others have also suggested a possible relationship between benefit finding and emotion regulation (Siegel, Schrimshaw, & Pretter, 2005). Rabe and colleagues (2006) found left frontal lobe activation was higher among car accident victims reporting higher benefit finding. The researchers suggested such activation is consistent with patterns of emotion regulation and depth of cognitive processing (Rabe, Zöllner, Maercker, & Karl, 2006). Emotion regulation includes being able to manage, experience, and express intense negative feelings without becoming too overwhelmed (Wild & Paivio, 2003). On a day-to-day basis, this ability may be evidenced by appropriate experiences of negative affect on days of heightened stress, as well as lower negative affect on days of less stress. The present study examined whether benefit finding was related to a tighter link

between stress and same-day emotion, suggesting appropriate access, to and expression of, emotions. We also examined whether benefit finding was associated with faster recovery of negative affect as indicated by larger decreases in negative affect the next day.

Benefit finding during adolescence

Benefit finding has been primarily studied in the context of adults (Algoe & Stanton, 2009), with limited study of benefit finding among children and adolescents with chronic illness (Barakat, Alderfer, & Kazak, 2006; Helgeson, Lopez, & Mennella, 2009; Phipps, Long, & Ogden, 2007). It is reasonable to question whether benefit finding will occur at similar levels or have similar associations among younger children or adolescents, particularly in light of the cognitive processing demands that have been theorized to contribute to benefit finding. Younger children and adolescents have lower levels of abstract and future oriented thought, and may be less likely to focus their coping efforts on managing the personal meaning or psychological significance of diabetes-related stress than are older youth. Band and Weisz (1990), for example, compared the coping patterns of youth with diabetes who displayed more versus less cognitive maturity (i.e., formal vs. preformal operational thought). Adolescents with formal operational thought displayed more secondary control coping strategies, which were conceptualized as indirect strategies related to accepting and adjusting to one's life circumstances, relative to primary control strategies intended to change

or alter these circumstances directly. The obvious parallels between benefit finding and secondary control coping raises the distinct possibility that benefit finding will have different patterns of association across the adolescent years.

Although benefit finding may function differently across the adolescent years, we believe it is a potentially important resource for children and early adolescents for several reasons. First, constructs that are likely to be associated with benefit finding such as illness perceptions, self-identity perceptions, and emotion-focused or secondary coping strategies have been found to be related to better illness management (Marrero, Golden, Kershner, & Myers, 1982; Skinner et al., 2002) and psychosocial adjustment (Band & Weisz, 1990) in adolescent diabetes populations. Second, in a review of the existing benefit finding literature among children and adolescents, Helgeson et al. (2009) reported benefit finding did not differ across age. Third, Helgeson and colleagues (2009) also found that the number of perceived benefits on an open-ended query was associated with heightened levels of anger and depressive symptoms among 10 to 14 year olds with diabetes, paralleling the finding of associations with heightened negative affective reactions to stress reported by Tran et al. (2010) in a similar sample. In the present study, we planned to explore the possibility of age-related differences in benefit finding, but anticipated the construct would be associated with better diabetes management, potentially by buffering the adverse effects of negative affect during adolescence.

CHAPTER THREE

RATIONALE, AIMS, AND HYPOTHESES

Rationale and aims

This current study was a continuation of Tran et al. (2010) and examined how benefit finding was associated with experiences of diabetes stress, negative affect, and diabetes management on a daily level among adolescents with type 1 diabetes. In Tran et al.'s (2010) study, negative affective reactions in an adolescent diabetes population were associated with poorer metabolic control and higher depressive symptoms among those reporting lower benefit finding, but not among those reporting higher benefit finding. In using daily diary data, this present study attempted to provide further information on benefit finding and its relationship to differences in diabetes management and emotional experience on a day-to-day basis. Additionally, utilizing such data would allow this study to gain insightful information about the complex relationship between benefit finding and negative affect, a limitation of the cross-sectional data gathered for Tran et al. (2010).

The current research study had two broad aims. Aim I was to examine whether benefit finding moderates the adverse association between negative affect and diabetes management on a daily basis, replicating the stress-buffering properties of benefit finding demonstrated in Tran et al. (2010) and providing further information on how benefit finding may lead to better illness adjustment in

a diabetes population. Aim II was to further understand the relationship between benefit finding and negative affect by examining several potential explanations for why benefit finding may be associated with heightened negative affective reactions to diabetes stress. Investigating such aims may provide valuable research on the relationship between benefit finding and better diabetes management and its underlying mechanisms.

Specific Hypotheses

These two broad aims were examined through a series of seven hypotheses (H1 to H7). The daily relationship between emotion and diabetes management occurs within a broader context of how adolescents perceive and experience their illness. The possibility that finding benefits in one's diabetes experiences can moderate the associations between daily negative affect and indices of diabetes management (i.e., perceived coping effectiveness and average daily blood glucose) were examined. There is overwhelming evidence that negative affect undermines diabetes self-management and poorer glycemic control. Thus, we expected the experience of heightened negative affect on a given day to be associated with lower same-day coping effectiveness (H1) and higher same-day blood glucose levels (H2). However, we expected these associations would be weaker for those with higher benefit finding (H3), replicating the stress-buffering properties of benefit finding demonstrated in Tran et al. (2010).

This study also aimed to examine why benefit finding is associated with heightened negative affective reactions to diabetes stress. If benefit finding is elicited by those more likely to experience negative emotion, one would expect benefit finding to be associated with heightened levels of negative affect across a two-week daily diary (H4). Second, if benefit finding reflects a process of genuine growth and adaptation resulting in heightened stress from working to integrate diabetes into their developing sense of self, one would expect benefit finding to be associated with higher levels of daily diabetes stress (H5). Third, if benefit finding is a marker of emotion-regulation, one would expect those with higher benefit finding to show stronger associations between concurrent fluctuations in daily stress and negative affect (i.e., negative affect occurs primarily during heightened stress; H6), but also to show stronger negative associations between daily stress and next-day negative affect (i.e., suggesting a quicker reduction in negation affect; H7).

CHAPTER FOUR

METHODOLOGY

Participants

Participants included 209 adolescents diagnosed with type 1 diabetes who are participating in an ongoing longitudinal study examining parent-adolescent relationships and diabetes management. Participants in the present study included those who completed the second wave of data collection, which occurred six months after enrollment. Participants were originally recruited from the Pediatric Diabetes Program at the Utah Diabetes Center and a diabetes clinic conducted by an additional pediatric endocrinologist. Initial eligibility criteria included that children be between 10 and 14 years of age, diagnosed with Type 1 diabetes for at least 1 year, living with his or her mother, and able to read and write either English or Spanish.

Of the 252 adolescents who participated in the first wave of the study, 214 participated in the second, current wave. Participants who did not participate in the second wave generally cited time or distance as reasons for not continuing in the study. They reported poorer blood glucose control (HbA_{1c}), t (249) = -3.49, p < .001, and borderline poorer adherence to the diabetes regimen, t(250) = 1.85, p = .06, at the first wave than did adolescents who participated in the second wave, but did not differ based on age, gender, or self-efficacy for diabetes management. Diaries and packets were returned by 209 of these adolescents. Participants who

did versus did not return the diaries reported borderline poorer blood glucose control (HbA_{1c}), t (207) = -1.84, $p < .067$, did not differ based on age, gender, or self-reported adherence. Therefore, a total of 209 adolescents (112 females and 97 males) 10 to 15 years of age (M= 13.0, SD= 1.54) with a diagnosis of type 1 diabetes of at least one year duration (M = 4.6 years, SD = 2.9, range 1-12 years) participated in the study. 58% of the adolescents were on an insulin pump, and adolescents tested blood glucose an average of 4.42 (SD = 2.33) times per day. Adolescents were primarily Caucasian (92.5%), and came from families with the majority of the households (64%) earning over $50,000 a year.

The study was approved by the appropriate Institutional Review Boards. Participating parents gave written informed consent and adolescents gave written assent. Parent authorization provided access to children's medical records to obtain all HbA_{1c} as well as other pertinent illness information.

Procedures

In this second wave of data collection, participants and their mothers attended a two-hour laboratory session where they completed surveys, an interview, and were trained by a research assistant on the diary protocol. Adolescents were asked to complete a brief daily diary at the end of each day for 14 consecutive days. This two-week time period was intended to maximize measurement of daily diabetes management episodes, without unduly burdening participants. In each diary, adolescents described a variety of aspects of that

day's diabetes management, including daily diabetes stressors, perceived effectiveness of coping with those stressors, and daily emotion. They also were provided with a glucometer on which to complete their standard blood glucose testing. Adolescents completed their diaries on-line via a secure website at the end of each day, and received reminder or problem-solving phone calls by trained research assistants as needed. Participants were paid $4 for each completed diary. Diary entries were checked for completion at 10:00 pm every night, and if a participant did not complete the day's diary entry, they received a reminder phone call. Both the daily diary entries and the glucometer readings were date- and time-stamped to assure that data was only included when days matched.

One-hundred and one adolescents (48.8%) completed all 14 diary entries on consecutive days. Two adolescents provided fewer than four days of consecutive data, and were excluded from further analyses. The remaining adolescents had data for five or more days (92 adolescents had data on 10-13 days, and 14 adolescents had data on 5-9 days) and were included in the analyses (Bryk & Raudenbush, 1992). Data are based on average of 12.8 diary days completed.

Measures

Copies of all measures utilized in the current study are located in Appendix A. The complete daily diary is included in Appendix A, with specific measures used in the present study indicated with asterisks (*****).

Benefit Finding. Prior to participating in the daily diary, adolescents reported on the benefits of diabetes using Antoni et al.'s (2001) 16-item benefit finding scale; one item was eliminated because it was not applicable to children or early adolescents ("Having diabetes has made me realize the importance of planning my family's future"). Participants rated agreement with each benefit using a 1 (not at all) to 5 (extremely) scale. It should be noted that the recently developed Benefit Finding Scale for Children (Phipps et al., 2007), which includes numerous items from the presently used scale, was unavailable at the time of data collection. A principal components analysis of items on the benefit finding scale completed revealed one large factor (Eigen value = 7.22, 45% variance explained) with good internal consistency (α = .92). Because limited research exists on benefit finding among children and adolescents, participants were allowed to list additional benefits to ensure the inclusion of personally relevant benefits. Data collected at the baseline assessment revealed that additional benefits were reported by 24% of adolescents. Content coding revealed additional items were sometimes elaborations on existing items, but an additional theme revealed that adolescents perceived increases in maturity and independence as a benefit of diabetes (e.g. "Makes me feel more independent") (Fortenberry, 2008). Scores across all items – including freely reported items - were averaged such that higher scores indicate higher levels of benefit finding. Adolescents reported an average rating of 2.97 (SD = 0.79) on the benefit finding scale.

Daily diabetes stress. In the daily diary, adolescents reported daily diabetes stress in two ways:

Number of diabetes stressors. First, adolescents endorsed the presence or absence of 10 problematic aspects of daily diabetes management (e.g., problems with glucose testing, administering correct insulin dose, managing emotions related to diabetes). Items on this checklist were developed from common diabetes stressors that were freely generated by adolescents with diabetes and their mothers (Beveridge et al., 2006) and map onto diabetes treatment recommendations (ADA, 2002). The most frequently reported problems included *problems with high blood sugar* (reported on 35% of days), *forgetting or skipping a blood sugar test* (reported on 26.5% of days), *problems with low blood sugar* (reported on 19.7% of days), and *problems in taking the wrong amount of insulin* (reported on 12.1% of days). Most adolescents reported experiencing problems with diabetes on at least one day; only 4 adolescents did not report experiencing any problems. The number of diabetes stressors variable was computed by counting the number of stressors endorsed each day.

Stressor severity. The second approach to measuring diabetes stress involved asking participants to describe their most stressful diabetes event of the day, and to rate its severity on a 1 (not at all bad) to 5 (as bad as it can get) scale.

Daily perceived coping effectiveness. For each diabetes stressor endorsed, adolescents indicated how well they handled the diabetes problem

using a 1 (did not do well) to 5 (did very well) scale. Average scores across endorsed stressors were computed for each day.

Daily negative affect. At the end of each daily diary, adolescents reported their daily mood using a modified version of the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), which was reduced to 14 items to decrease participant burden. Emotions were rated on a 1 (slightly) to 5 (extremely) scale. Two items were used to represent depression (sad, depressed), anger (angry, irritated, annoyed), and anxiety (anxious, nervous). All negative affect (NA) variables, as well as a composite NA score computed by averaging across all aforementioned affects, were used in statistical analyses. The composite NA variable demonstrated good internal consistency (α = .89). Additionally, adequate reliability and validity n the PANAS have been established (Watson et al., 1988). A positive affect (PA) variable was also conducted for exploratory analyses (represented by items happy, excited).

Daily blood glucose. Throughout the two-week diary protocol, adolescents monitored all blood glucose readings using a glucometer provided by the researchers; this glucometer had memory to provide date- and time-stamped records of all blood glucose measures obtained during the two-week period. The glucometers were returned at the end of the diary period, and blood glucose data were carefully screened for outliers and errors in measurements. Adolescents recorded an average of 4.50 blood glucose readings each day (SD = 2.35, range 1-

22). Days when glucometers provided only one blood glucose reading were excluded (4.9% of days) because single readings would not represent the adolescent's average blood glucose level that day. Average blood glucose levels for each day were computed for analyses.

Demographic and Illness Information. Mothers completed a demographics questionnaire that included personal and family information (child's age and sex, ethnicity, household income, parental marital status, parental education, and religious affiliation) as well as illness information (duration of illness, age at diagnosis).

CHAPTER FIVE

STATISTICAL ANALYSES

Overview of data collection and statistical analyses

Data were entered and managed by the Statistical Package for Social Sciences (SPSS) version 18.0 (SPSS, Inc., Chicago, IL) and descriptive statistics were analyzed in SPSS. For hierarchical linear modeling analyses that were performed, data were imported from SPSS into Hierarchical Linear Modeling (HLM) version 6.04 (Scientific Software International, Inc., Chicago, IL) and analyzed with HLM software. The data were preliminarily evaluated for violations of statistical assumptions and for outliers that may impact analyses. Distribution characteristics of all of the variables were also examined and appropriate transformations were conducted as needed.

All aims were analyzed via Hierarchical Linear Modeling (HLM) techniques (Bryk & Raudenbush, 1992). One advantage of HLM over other statistical methods is that it utilizes all the data points even if subjects do not have information at all the time points. Thus, subjects can be included in these analyses, even if they do not have data across all 14 days. HLM also allows the researcher to examine effects at multiple levels. At level 1 (within-person or random coefficients models), covariation between day-to-day fluctuations between two variables (e.g. NA and daily diabetes management) were initially examined. Level 1 analyses also indicate whether there is a fixed effect on the

association of interest or whether there is a variance component that could be examined at level 2. At level 2 (between-person or conditional models), the level 1 regression parameters were modeled to determine if variance at the level 1 model differed as a function of the between-person variable of benefit finding. Data were also examined to determine whether benefit finding interacted with age or sex in all analyses, though we only reported significant effects. It should be noted that in all level 1 analyses, the day the measure was completed (day 0, day 1, day 2 where 0 was the first day) was used as a covariate to remove linear trends in the dependent variables across the 14 days of the daily diary. Finally, daily predictor variables were centered on each individual's group mean, and level 2 variables were grand centered.

Aim I (H1-H3): To examine whether daily levels of negative affect are associated with daily fluctuations in diabetes management and whether benefit finding buffers this association.

In all pertinent analyses related to negative emotion, we conducted analyses utilizing the composite NA variable as well as each of the separate affects. At level 1 (within-person), estimates of the association between daily NA and both daily blood glucose or daily perceived coping effectiveness were examined. This generated estimates of the average levels of the dependent variables (i.e., intercept) and the level of covariation between fluctuations in affect and the which the dependent variable across days (i.e., slope) as well as

whether there were variance components in each of these effects. The variance components provide information about whether there are significant differences in the average (i.e., intercept) or in the change over time (i.e., slope) of the dependent variable across the entire sample. If so, we were able to run a level 2 model to determine whether these systematic differences occurred as a function of the level 2 variable, benefit finding.

We expected there to be a significant within-person effect for NA indicating that diabetes management was poorer on days when participants reported higher NA. We also expected to find significant variance components in these associations, and investigated the buffering effect of benefit finding by examining whether the covariation between NA and diabetes management was predicted by the level 2 variable of benefit finding. An example level 1 model from Aim I is written as follows with daily blood glucose as the dependent variable and composite NA as the main predictor variable:

$$\text{Level 1: Average Blood Glucose}_{ij} = \beta_{0i} + \beta_{1i}(\text{Composite NA}_{ij}) + \beta_{2i}(\text{Day}) + r_{ij}$$

In the level 1 model, average blood glucose levels for participant *i* for day *j* are predicted by variables β_{0i} (intercept), which is the average blood glucose level for subject *i* when NA is 0 (the variable in the equation) and when day is 0 (the first day), β_{1i}, (slope) which is the relation between NA and blood glucose

means across days for each subject *i*, β_{2i} (day effect) which represents the relationship between diary day and blood glucose level for subject *i* across days, and $r_{ij,}$ which represents variation in blood glucose due to measurement error. For Aim I, we were primarily interested in investigating whether there was significant covariation between NA and the dependent variables (i.e., slope) and whether benefit finding moderated that relationship.

$$\text{Level 2: } \beta_{1i} = F_{10} + F_{11}(\text{Benefit Finding}) + u_1$$

Thus, if a significant variance component existed in the level 1 model, a level 2 model was conducted in which the slope (β_{1i}) from the level 1 model becomes the dependent variable predicted by the level 2 variable, benefit finding.

Aim II (H4-H5): To examine whether benefit finding is associated with different average levels of negative affect or stress.

Similar to measuring negative emotion, there were also multiple approaches to measuring stress: a) number of diabetes stressors, and b) stressor severity. Level 1 models were run such that the variable of interest was predicted only from day, without other level 1 variables. In this model, the intercept represents each person's average score across all days. We examined whether the level 2 variable of benefit finding predicted individual differences in these average scores. The theorized process would be supported if benefit finding

predicted higher levels of average daily NA or of daily stress. The models are shown below:

Level 1: Diabetes $\text{Stress}_{ij} = \beta_{0i} + \beta_{1i}(\text{Day}) + r_{ij}$

In this model, the intercept, $\beta_{0i,}$ represents each participant's average score across all days. We then examined whether the level 2 variable of benefit finding predicted individual differences in these average scores. In the example level 1 model, diabetes stress for participant *i* for day *j* is predicted by variables β_{0i} (intercept), which is the report of diabetes stress for subject *i* when day is 0 (the first day), β_{1i}, (day effect) which represents the relationship between diary day and diabetes stress for subject *i* across days, and $r_{ij,}$ which represents variation in diabetes stress due to measurement error. For Aim II, we were primarily interested in investigating whether average levels of the dependent variables (i.e., intercept) differed across participants as a function of the level 2 variable, benefit finding.

Level 2: $\beta_{0i} = F_{00} + F_{01}(\text{Benefit Finding}) + u_0$

Thus, if a significant variance component existed in the level 1 model, a level 2 model was conducted in which the intercept (β_{0i}) from the level 1 model becomes the dependent variable predicted by the level 2 variable, benefit finding.

Aim II (H6-H7): To determine whether benefit finding is associated with a stronger relationship between daily stress and same-day negative affect and a stronger negative association between stress and next-day negative affect.

Level 1 analyses similar to those described for Aim I were conducted to determine whether benefit finding predicted the relationship between daily stress and daily NA. Hypothesis 6 suggested that reports of higher benefit finding would be associated with a stronger relationship between daily fluctuations in stress predicting daily fluctuations in NA. The level 1 and 2 models for Hypothesis 6 are shown below:

Level 1: $NA_{ij} = \beta_{0i} + \beta_{1i}(\text{Diabetes Stress}_{ij}) + \beta_{2i}(\text{Day}) + r_{ij}$

Level 2: $\beta_{1i} = F_{10} + F_{11}(\text{Benefit Finding}) + u_1$

For Hypothesis 6, we were primarily interested in investigating whether there was significant covariation between daily diabetes stress and daily NA (i.e., slope) and whether benefit finding moderated that relationship. If a significant variance component existed in the level 1 model, a level 2 model was conducted

in which the slope (β_{1i}) from the level 1 model becomes the dependent variable predicted by the level 2 variable, benefit finding.

Finally, Hypothesis 7 was examined by conducting lag analyses at level 1, where stress levels on a given day (Day *j*) were used as predictors of NA on the next day (Day *j* + 1), while controlling for initial NA on Day *j* as well as the day effect and the error term. We then examined whether benefit finding predicted the strength of that relationship. This would allow us to discern whether benefit finding was associated with faster recovery in emotion after experiencing heightened diabetes stress. This level 1 model provided information on whether daily diabetes stress predicted the change in next-day emotion is shown below:

$$\text{Level 1: } NA_{i(j+1)} = \beta_{0i} + \beta_{1i}(\text{Diabetes Stress}_{ij}) + \beta_{2i}(NA_{ij}) + \beta_{3i}(\text{Day}) + r_{ij}$$

If a significant variance component existed in the slope, $\beta_{1i,}$ which represents the relationship between diabetes stress and next-day NA, we were able to run a level 2 model. This model provided information on whether the slope, β_{1i}, is predicted by the level 2 variable, benefit finding:

$$\text{Level 2: } \beta_{1i} = F_{10} + F_{11}(\text{Benefit Finding}) + u_1$$

CHAPTER SIX

RESULTS

Results are presented by aim and/or similarity of HLM models run. Analyses of HLM models are presented in Tables 1-8. The applicable intercept and/or slope of the level 1 model was included in the table depending on the target of investigation. The intercept represents the average of the dependent variable controlling for all other level 1 predictor variables, and the slope represents the variation of the dependent variable as a function of the level 1 predictor variable. If the level 1 model included a significant variance component, a level 2 model was run and statistics of the level 2 model were included in the table.

Benefit finding as moderator of the negative affect and diabetes management association

Aim I examined whether daily levels of NA covaried with daily levels of diabetes management. We initially present findings for diabetes management indexed by average blood glucose values recorded each day, followed by reports of adolescents' perceptions of how well they managed daily diabetes problems.

Daily blood glucose. To examine whether NA significantly predicted adolescents' daily blood glucose, a level 1 model was first used to determine if the intra-individual change in adolescents' daily blood glucose occurred as a function of NA over time. Results of the analysis are summarized in Table 1. Participants

had higher daily blood glucose levels on days they reported greater composite NA, and this association was present specifically for anger and irritability, marginally for anxiety (p = .052), but was not present for depression. The intercept value indicated that the average blood glucose value for participants at day 0 was 204.59, which is higher than currently recommended (ADA, 2009). Thus, these associations suggest participants displayed poorer management on days they experienced more NA.

An examination of random effects (i.e., variance components) were present for the relationship between daily blood glucose and all NA variables, indicating that not all participants had the same level of covariance. Therefore, these relationships were further examined using a level 2 model. As noted in Table 1, benefit finding did not significantly moderate the relationship between daily blood glucose and any affect measure. Thus, although blood glucose was poorer on days with higher NA, there was no evidence that benefit finding buffered the association.

Daily perceived coping effectiveness. Results for adolescents' reports of their effectiveness in managing problems that arose in their diabetes management are displayed in Table 2. Participants reported lower perceived coping effectiveness on days they also reported higher composite NA, particularly greater anger , irritability, depression, and marginally greater anxiety (p = .056).

There were significant variance components in the relationship between daily perceived coping effectiveness and all NA variables. Benefit finding did not significantly moderate the relationship between coping effectiveness and most NA measures. There were two exceptions. First, there was a significant variance component on the relationship between daily perceived coping effectiveness and anxiety (p = .04). In contrast to expectations, however, anxiety was associated with even poorer daily perceived coping effectiveness for those that had higher reports of benefit finding. Second, there was a marginally significant benefit finding x age interaction effect on the anger and daily perceived coping effectiveness relationship (p = 053). This finding indicates that anger was related to even greater declines in daily perceived coping effectiveness for the older adolescents more so than the younger adolescents.

In summary, results do not suggest that benefit finding buffers the associations between daily NA and daily blood glucose. Benefit finding moderated the relationship between daily reports of anxiety and poorer perceived coping effectiveness but in the reverse direction expected.

Benefit finding associations with average levels of daily negative affect and stress

To address Hypotheses 4 and 5 of Aim II, level 1 models were run such that the variable of interest (e.g. daily NA and daily stress) was predicted only

from day, without other level 1 variables[1]. The level 1 model provided information on average levels of the dependent variables (i.e., intercept) across the 14 days as well as whether there were significant variance components in the average of the dependent variable across the entire sample. If so, we ran a level 2 model to determine whether the average level of daily NA or daily stress reported occurred as a function of benefit finding.

Daily negative affect. As displayed in Table 3, there were significant variance components in the average levels of all NA variables, indicating that participants differed on the average amount of NA reported over the 14 days. Level 2 models demonstrated that benefit finding was correlated with reports of greater composite NA, particularly with greater depression and anxiety, and marginally with greater anger (p = .09) but was not associated with irritability.

Daily diabetes stress. Similar models were conducted to determine whether benefit finding was associated with differential experiences of average daily diabetes stress. Results are also displayed in Table 3. There were two approaches to measuring daily diabetes stress, the average rating of the severity of

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1 Exploratory analyses were conducted to examine the relationship between benefit finding and other dependent variables over the two-week daily diary including daily blood glucose, daily perceived coping effectiveness, and positive affect. Benefit finding was associated with increased positive affect. Results are shown in Table 4.

the most stressful event of the day and the average number of diabetes stressors on a given day. Level 1 models indicated that there were significant variance components in the average level of stressor severity and number of daily stressors over the 14 days. However, benefit finding did not predict either stressor severity or number of daily stressors. Thus, there is no evidence that benefit finding was associated with heightened levels of reported stress.

Taken together, results indicate that benefit finding was associated with overall higher reports of daily NA but not higher reports of daily stress.

Benefit finding as a moderator of daily affect and stress associations

Daily diabetes stress and same-day negative affect. To address hypotheses 6 and 7 of Aim II, level 1 analyses similar to those described for Aim I were conducted to determine whether benefit finding predicted the relationship between daily diabetes stress and daily NA.

A level 1 model was used to determine if the intra-individual change in adolescents' daily NA occurred as a function of diabetes stress. Results for stressor severity as the predictor variable are in Table 5 and for number of diabetes stressors as the predictor variable in Table 6. Participants reported higher NA on days they reported higher levels of stressor severity. There were significant variance components present for all NA variables, but benefit finding did not moderate any of these associations.

The average number of daily diabetes stressors was associated with all measures of NA as well. There were variance components present only for associations of number of diabetes stressors with irritability and anxiety. However, benefit finding did not moderate these same-day associations. Thus, benefit finding did not moderate the relationship between daily stress and daily NA.

Daily diabetes stress and next-day negative affect. The level 1 model provided information on whether diabetes stress predicted change in emotion from one day to the *next day*. Results for stressor severity as the predictor variable are in Table 7 and for number of diabetes stressors as the predictor variable in Table 8. Stressor severity appeared to have almost no impact on the change in next-day NA as this relationship was not significant for any of the NA variables. Additionally, there was only a significant variance component in the relationship between stressor severity and anxiety, but benefit finding did not moderate this relationship.

Likewise, there was not a significant relationship between the average number of daily diabetes stressors and any of the next-day NA variables. There were, however, significant variance components for all NA variables. This indicates that the relationship between the number of daily diabetes stressors reported and the change in next-day NA differed across the entire sample. However, benefit finding did not moderate these associations. A benefit finding x

age interaction term marginally predicted the relationship between the number of diabetes stressors and next-day anxiety (p = .053). This finding indicated that for older adolescents, benefit finding was associated with a greater decline in next-day anxiety than for younger adolescents.

Overall, findings demonstrate that benefit finding did not moderate associations between daily stress and same-day NA. It was marginally associated with a stronger negative relationship between number of diabetes problems on a given day and next-day anxiety among older adolescents.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

Discussion

This study was designed to answer several specific questions about how the construct of benefit finding is associated with emotions and illness management in the context of adolescents who are faced with the daily stressors and demands of type 1 diabetes. We found that adolescents with type 1 diabetes who engaged in greater benefit finding reported higher average daily levels of both positive and negative affect across a two-week period. NA was associated with poorer daily levels of blood glucose and perceived coping effectiveness, consistent with the notion that distress and anxiety can undermine one's ability to manage the daily problems of a demanding illness. Although benefit finding did not buffer the adverse associations between NA and poorer diabetes management, there was a hint that it may serve to regulate anxiety across time. These findings are consistent with prior research suggesting that benefit finding occurs in a context of distress and anxiety and may serve as an emotion coping resource. The findings raise questions, however, about whether benefit finding is an active resource that facilitates better management of a serious illness in the context of the daily challenges adolescents face.

Benefit finding associations with heightened daily affect

A clear finding from this study was that benefit finding was related to higher average daily levels of composite NA and PA. These findings are consistent with Tran et al. (2010) findings that benefit finding was associated with stronger negative and positive affective reactions to diabetes stress, and with the broader literature finding both positive (see Helgeson et al., 2006; Linley & Joseph, 2004 for review) and negative associations between benefit finding and emotional well-being (Mohr et al., 1999; Tomich & Helgeson, 2004).

It is possible that these findings occurred because those that engage in greater levels of benefit finding may be more emotional individuals. That is, benefit finding may be a method for less emotionally stable or more neurotic individuals to cope with intense and distressing emotional experiences. In an expressive writing study of rheumatoid arthritis patients, Danoff-Burg et al. (2006) demonstrated that while individuals who scored lower on a trait-anxiety scale reported reduced complaints from fatigue three months after participating in a standard expressive writing intervention task, individuals who scored higher on a trait-anxiety scale benefited more so from a benefit finding writing intervention. Those with higher trait-anxiety and participating in the benefit finding writing task also reported reduced pain levels after a three-month follow-up. Authors posited that for those demonstrating emotional instability, focusing on the positive aspects of the illness, rather than participating in a standard expressive writing

task, may have helped these individuals to confront and express thoughts that were not perceived as distressing or threatening. However, associations with the big five personality characteristics are inconsistent (Helgeson et al., 2009), and there is some evidence that benefit finding is associated with *less* neuroticism (Evers et al., 2001), greater openness to experience, and greater extraversion (Affleck & Tennen, 1996).

Another explanation for these findings could be that benefit finding is associated with heightened NA because individuals with heightened benefit finding are more in-tune with their emotions and thus more inclined to report greater emotional experiences in the daily diary. If so, benefit finding could reflect an adaptive emotional expression process, and past literature has demonstrated that such emotionally expressive coping has been associated with better psychological and physical adjustment to chronic illness (Stanton et al., 2000). Based on previous literature and current findings, it is unclear what types of individuals are more likely to report greater benefit finding or more likely to demonstrate improvement in functioning from the benefit finding process. For example, it is plausible that although more emotionally expressive individuals reported greater benefit finding in this adolescent diabetes sample, those that tended to be overwhelmed by their emotional experiences were attempting to cope and in the process also reported greater benefit finding. As we alluded to above, it would be beneficial for future research to investigate personality

characteristics that may predict benefit finding in adolescents as well as measuring benefit finding longitudinally, which would assist in establishing causality in these findings.

Another hypothesis attempting to clarify the benefit finding-NA relationship was that benefit finding was associated with genuine growth and change, reflected in heightened levels of stress. We investigated whether those reporting greater benefit finding endorsed a greater amount of daily problems or more severe diabetes stressors over a two-week period, but this hypothesis was not supported. The basis for investigating this hypothesis was that past researchers have hypothesized that those engaging in more benefit finding may be more likely to be undergoing a process of ongoing, adaptive, but likely tumultuous change in their lives (Helgeson et al., 2006). Another plausible explanation would have been that benefit finding occurs in response to increased stress. Associations between both objective and subjective disease severity and benefit finding have been found in previous studies (Linley & Joseph, 2004; Siegel & Scrimshaw, 2007; Tomich & Helgeson, 2004). The lack of support for this hypothesis may be due to the methods of measuring daily stress. This study utilized reports of daily diabetes stressors, both the number of daily stressors and severity, as an indicator of stress in adolescents' lives. However, diabetes problems occur on a daily basis and may not be distressing enough to elicit a re-evaluative and meaning-making process that would facilitate benefit finding. It is

more likely that measuring adolescents' functioning around more salient stressors (such as time of diagnosis, urgent medical care, or important feedback from medical providers on HbA_{1c} levels) would more accurately reflect the benefit finding-stress relationship. Finally, further work could investigate whether differential reports of benefit finding are associated with different qualitative reports of stress.

We also tested hypotheses examining whether benefit finding was a marker of emotion regulation. Although benefit finding was not associated with stronger relationships between daily diabetes stress and same-day NA, there was some suggestion that benefit finding was associated with a greater decline in next-day anxiety from the previous day's stress, particularly for older adolescents. This finding should be interpreted with caution because the finding was marginally significant (p=.053) and was not found for any of the other NA variables examined. However, if this finding is replicated in the future, it may demonstrate that benefit finding is related to facilitation of emotional recovery after stress. Previous research has found preliminary evidence that those who report increased benefit finding demonstrate greater left frontal brain activity, an indicator of approach-related motivational tendencies and emotion regulation capabilities (Rabe et al., 2006). Wild and Paivio (2003) suggested that emotion regulation is an important factor in recovery from a significant life stressor. This includes being able to express and manage one's emotions without becoming

overwhelmed. Thus, this evidence provides marginal support for the association between benefit finding and emotion regulation.

The fact that there was some evidence for a benefit finding x age interaction that predicted lower next-day anxiety provides justification for understanding benefit finding in a developmental context. Although previous literature demonstrates inconsistent associations between benefit finding and age (Helgeson et al., 2009), it is clear that cognitive development rapidly occurs during adolescence (Band & Weisz, 1990; Larson et al., 2002). Even though Band & Weisz (1990) demonstrated that formal operational thought was found in children above age nine, Larson et al. (2002) also demonstrated that overall improved emotion management begins in later adolescence, at about grade 10. This may be because older adolescents are better able to master effective coping skills and, thus, better manage their emotions. So it is not surprising that if benefit finding is a mechanism for better emotional recovery, this finding would be found among older adolescents who may be more likely demonstrate more emotional lability (Larson et al., 2002) but also more abstract cognitive skill (Helgeson et al., 2009).

Benefit finding did not moderate associations between daily negative affect and diabetes management

Although benefit finding was associated with heightened emotional experiences on a daily basis, and potentially with anxiety regulation, there was no

evidence that benefit finding buffered the association between daily NA and daily diabetes management. In fact, although benefit finding moderated the relationship between daily anxiety and poorer perceived coping effectiveness, the effect was not in the expected direction. That is, the daily association between heightened anxiety and poorer perceived coping effectiveness was *stronger* among those with higher levels of benefit finding. This finding appears in stark contrast to previous literature indicating that benefit finding has a buffering role between distress and poorer health or psychological outcomes (Danoff-Burg et al., 2006; Pakenham, 2005; Tennen et al., 1992; Tran et al., 2010).

One may posit that benefit finding is *not* an adaptive process after all and that it is simply a form of defensive denial. From this perspective, benefit finding could be considered a way to reduce the threat of negative information (Tomich & Helgeson, 2004; Wiebe & Korbel, 2003). If this is the case, one would expect benefit finding to be associated with other negative outcomes over time, such as maladaptive coping. Studies suggesting that benefit finding is associated with heightened problem-focused coping, emotion-focused coping, acceptance and positive reinterpretation, and religious coping (Linley & Joseph, 2004) do not support this interpretation. It is also not consistent with the lack of an association between benefit finding and daily levels of blood glucose.

The correlational nature of the data create a distinct possibility that adolescents with higher benefit finding experienced more anxiety or distress on

days they believed they did not manage diabetes problems well. This reverse causation explanation would be consistent with Tran et al. (2010) findings that benefit finding was associated with higher reports of both positive and negative affective reactions to diabetes stress. Future research is necessary to discern this possibility, and to examine whether such an association is beneficial. It is possible, for example, that negative affect provides an important source of information and feedback that an individual is not progressing toward a desired outcome, such as a goal of better diabetes management (e.g., Carver & Scheier, 1998). If so, it is possible that those reporting greater benefit finding are more engaged in treatment such that they are more likely to react negatively when poor treatment occurs.

It is important to consider why these findings did not generalize to other negative emotions. It may be that anxiety, even above other emotions, is considered a normal reaction to experiences of stress (NIMH, 2000; Rosen & Schulkin, 1998). Certainly, anxiety can be excessive to the point of pathology, however, normative levels of anxiety are considered evolutionarily adaptive and can motivate individuals to engage in functionally adaptive behavioral and perceptual responses elicited to facilitate appropriate problem-solving responses. Thus, anxiety may be particularly expected in understanding adolescents' responses to stress. Other researchers have found important and unique relationships between benefit finding and anxiety. Danoff-Burg et al. (2006)

found that participation in a benefit finding writing intervention among high trait-anxiety individuals longitudinally predicted reduced pain levels in a rheumatoid arthritis population, while Tran et al. (2010) found that increased benefit finding among adolescents buffered the disruptive association between anxiety reactions to diabetes stress and HbA_{1c} levels. Pakenham (2005) also found evidence for benefit finding as a stress-buffer, moderating the relationship between stress and global measures of anxiety. Finally, although Helgeson et al.'s (2006) meta-analytic review of the benefit finding literature did not find a significant relationship between benefit finding and global measures of anxiety, benefit finding was associated with increased intrusive and avoidant thoughts. Thus, although experiences of worry and anxiety are potentially disruptive, they may also reflect increased cognitive processing (Tedeschi & Calhoun, 2004) and facilitate adaptive attempts to problem-solve. Anxiety may be differentially associated with better adjustment depending on the degree to which it can promote, and lead to, adaptive coping behaviors. The interactive relationship between anxiety and benefit finding should be more closely examined in future studies to determine whether benefit finding may reflect that facilitative process.

There may also be methodological issues to consider as to why there were no moderation effects from the level 2 variable, benefit finding, outside of analyses with daily anxiety. Previous research indicates that benefit finding buffers disruptive associations between distress and more global markers of

physical or psychological well-being (Pakenham, 2005; Siegel & Scrimshaw, 2007; Tran et al., 2010; Tennen et al., 1992). One possibility for this discrepancy is that benefit finding has been theorized to lead to growth and change of *global* processes, such as re-evaluating broad views of one's self and the world (Janoff-Bulman & Frieze, 1983; Taylor, 1983). Thus, stress-buffering properties of benefit finding may be particularly found when measuring global measures of functioning rather than when measuring adjustment to daily, normative stressors. Again, although the diabetes stress variables used in this study can be disruptive, many of these diabetes stressors are a very typical part of these adolescents' lives and may not be severe enough to lead to a re-evaluation process of one's life goals and values. Another possibility for this discrepancy was the conceptualization of benefit finding as a stable, trait-like variable, and utilization of benefit finding as a level 2 predictor in all analyses. Although this study methodology was able to investigate differences in daily experiences and illness management as a function of benefit finding, other researchers have emphasized that engaging in benefit finding is more likely an ongoing process (Tedeschi & Calhoun, 2004). Thus, the relationship between benefit finding and NA is likely a dynamic, interactive one. In the context of a chronic illness, daily benefit finding or 'benefit reminding' (Affleck & Tennen, 1996) may form as an adaptive response to buffer anxiety about an illness. To our knowledge, only one study has examined reports of benefits on a daily basis (Affleck & Tennen, 1996). Examining day-to-day

interactions between benefit finding and NA would be helpful in better understanding this dynamic process and better clarifying how benefit finding may be associated with daily emotion management and coping.

Limitations

There are several limitations of this study that should be noted. Analyses were based on benefit finding measures obtained at one time point, just before adolescents participated in the two-week daily dairy. Thus, we were not able to investigate fluctuations of benefit finding and NA over time. Secondly, although the daily diary data were collected longitudinally over a two-week period, emotion fluctuates more rapidly than a 24-hour cycle (Larson et al., 2002) and diabetes management problems occur frequently throughout the day. Thus, measuring diabetes management, and emotions more frequently may provide a clearer direction of causality.

Aspects of the methodology and sample may limit generalizability of study findings. The sample was primarily middle-class and Caucasian, and findings may not generalize to a sample that has more ethnic and economic diversity. Additionally, this study was conducted as part of the second wave of a larger, longitudinal study examining parent-adolescent relationships and diabetes management. Adolescents who participated in this second wave of data collection reported better adherence and blood glucose levels than those who did not . These factors may have limited variability in this study, providing a conservative

test of the hypotheses. Finally, the benefit finding measure has not been validated on a sample of early adolescents. The benefit finding scale appeared reliable and predicted important indices of adolescent well-being in a related study (Tran et al., 2010). However, measures of benefit finding developed specifically for children and adolescents, or samples with a larger age range, may yield different interpretations.

Implications and Future Research

This study provided important information on the experience of benefit finding in the context of daily experiences of stress, emotion, and diabetes management. In particular, this study was able to identify potentially important relationships between the management of negative emotion, specifically anxiety, and benefit finding. To our knowledge, there are only two previous studies that have examined benefit finding in the context of day-to-day functioning (Affleck & Tennen, 1996; Tennen, Affleck, Urrows, Higgins, & Mendola, 1992). Conducting such research provides insight into how benefit finding may be associated with daily experiences of coping and illness management. This issue is particularly important for particular medical populations such as those with diabetes in which illness management occurs at a daily, ongoing level. Finally, this study contributes to the benefit finding literature among adolescents, for which there is very little pre-existing literature (see Helgeson et al., 2009 for review). Although there were few age effects in this study, it is important to

interpret results of this study in a developmental context, in which factors like perceptions of stress, emotion management, and cognitive processes continue to mature.

Future research should further examine and focus on the relationship between benefit finding and anxiety. This study, in conjunction with previous literature, may provide evidence that benefit finding is uniquely tied to experiences of regulating anxiety. However, this relationship should be further studied and highlighted in the literature. Additionally, the benefit finding literature would benefit from further research on predictors of benefit finding in order to better understand the benefit finding process. There has been some literature that has focused on coping, personality characteristics, and other variables that may facilitate benefit finding (see Affleck & Tennen, 1996; Linley & Joseph, 2004 for reviews). However, further prospective studies should aim to investigate how the context of negative emotion may lead to benefit finding for some but not for others as well as under what circumstances benefit finding may predict better adjustment. This approach would also allow for more precise examination of the interactive relationship between benefit finding, emotion, and illness management. Finally, research should be conducted to better clarify the role of benefit finding in emotion management and emotion-focused coping. Additional study in this area may particularly be helpful in better understanding

benefit finding during adolescence, a period in which skills to cope with, and manage, increased experiences of emotional lability are especially important.

TABLES

Table 1. *Benefit Finding Moderating the Relationship between Daily Negative Affect (NA) and Daily Blood Glucose*

Level 1 HLM Analyses: Daily NA Associations with Daily Blood Glucose
Level 2 HLM Analyses: Benefit Finding Moderating the Relationship between Daily NA and Daily Blood Glucose

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: Composite NA Predicting Blood Glucose				
Intercept	205.09	4.39		
Composite NA	14.13**	4.12	743.31**	27.26
Level 2: Predicting Slope of Composite NA and Blood Glucose				
Benefit Finding	3.03	5.64		
Level 1: Anxiety Predicting Blood Glucose				
Intercept	204.86	4.37		
Anxiety	5.95^{+}	3.04	282.49**	16.81
Level 2: Predicting Slope of Anxiety and Blood Glucose				
Benefit Finding	2.45	4.32		
Level 1: Depression Predicting Blood Glucose				
Intercept	204.87	4.38		
Depression	2.29	2.85	210.32	14.50
Level 2: Predicting Slope of Depression and Blood Glucose				
Benefit Finding	3.38	3.53		
Level 1: Anger Predicting Blood Glucose				
Intercept	205.01	4.40		
Anger	7.41**	2.34	147.30**	12.14
Level 2: Predicting Slope of Anger and Blood Glucose				
Benefit Finding	0.85	3.09		
Level 1: Irritability Predicting Blood Glucose				
Intercept	204.96	4.37		
Irritability	6.88**	2.33	152.58**	12.35
Level 2: Predicting Slope of Irritability and Blood Glucose				
Benefit Finding	2.51	3.26		

Note: Day is included in all analyses. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 2. *Benefit Finding Moderating the Relationship between Daily Negative Affect and Daily Perceived Coping Effectiveness (PCE)*

Level 1 HLM Analyses: Daily NA Associations with Daily PCE
Level 2 HLM Analyses: Benefit Finding Moderating the Relationship between Daily NA and Daily PCE

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: Composite NA Predicting PCE				
Intercept	3.52	0.05		
Composite NA	-0.24*	0.05	0.09**	0.29
Level 2: Predicting Slope of Composite NA and PCE				
Benefit Finding	-0.05	0.05		
Level 1: Anxiety Predicting PCE				
Intercept	3.52	0.05		
Anxiety	-0.07^{+}	0.04	0.03*	0.02
Level 2: Predicting Slope of Anxiety and PCE				
Benefit Finding	-0.09*	0.04		
Level 1: Depression Predicting PCE				
Intercept	3.52	0.05		
Depression	-0.13*	0.03	0.03**	0.16
Level 2: Predicting Slope of Depression and PCE				
Benefit Finding	-0.04	0.04		
Level 1: Anger Predicting PCE				
Intercept	3.52	0.05		
Anger	-0.15*	0.03	0.03**	0.18
Level 2: Predicting Slope of Anger and PCE				
Benefit Finding	-0.03	0.03		
Age	0.01	0.02		
Benefit Finding x Age	-0.04^{+}	0.02		
Level 1: Irritability Predicting PCE				
Intercept	3.52	0.05		
Irritability	-0.10**	0.03	0.03**	0.16
Level 2: Predicting Slope of Irritability and PCE				
Benefit Finding	-0.03	0.03		

Note: Day is included in all analyses. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 3. *Benefit Finding Associations with Daily Diabetes Stress and Daily Negative Affect*

Level 1 HLM Analyses: Mean levels of Daily NA and Daily Diabetes Stress
Level 2 HLM Analyses: Benefit Finding Associations with Daily Diabetes Stress and Daily NA

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: Overall Mean of Composite NA				
Intercept	1.67**	0.05	0.39**	0.63
Level 2: Predicting Mean of Composite NA				
Benefit Finding	0.12*	0.05		
Level 1: Overall Mean of Anxiety				
Intercept	1.61**	0.05	0.39**	0.62
Level 2: Predicting Mean of Anxiety				
Benefit Finding	0.17**	0.05		
Level 1: Overall Mean of Depression				
Intercept	1.49**	0.04	0.38**	0.62
Level 2: Predicting Mean of Depression				
Benefit Finding	0.14*	0.05		
Level 1: Overall Mean of Anger				
Intercept	1.68**	0.05	0.54**	0.73
Level 2: Predicting Mean of Anger				
Benefit Finding	0.11^{+}	0.07		
Level 1: Overall Mean of Irritability				
Intercept	1.87**	0.06	0.63**	0.79
Level 2: Predicting Mean of Irritability				
Benefit Finding	0.04	0.07		
Level 1: Overall Mean of Stressor Severity				
Intercept	2.61**	0.04	0.27**	0.52
Level 2: Predicting Mean of Stressor Severity				
Benefit Finding	0.07	0.06		
Level 1: Overall Mean of # Diabetes Stressors				
Intercept	1.33**	0.07	0.90**	0.95
Level 2: Predicting Mean of # Diabetes Stressors				
Benefit Finding	0.07	0.08		

Note: Day is included in all analyses. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 4. *Benefit Finding Associations with Daily Blood Glucose, Perceived Coping Effectiveness, and Positive Affect*

Exploratory Level 1 HLM Analyses: Mean levels of Daily Blood Glucose, PCE, and PA
Exploratory Level 2 HLM Analyses: Benefit Finding Associations with Daily Blood Glucose, PCE, and PA

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: Overall Mean of Blood Glucose				
Intercept	204.62**	4.32	2915.46**	54.00
Level 2: Predicting Mean of Blood Glucose				
Benefit Finding	3.34	5.40		
Level 1: Overall Mean of PCE				
Intercept	3.52**	0.05	0.39**	0.63
Level 2: Predicting Mean of PCE				
Benefit Finding	-0.11^{+}	0.07		
Level 1: Overall Mean of PA				
Intercept	2.65**	0.07	0.93**	0.94
Level 2: Predicting Mean of PA				
Benefit Finding	0.26**	0.006		

Note: Day is included in all analyses. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 5. *Benefit Finding Moderating the Relationship between Daily Stressor Severity and Daily Negative Affect*

Level 1 HLM Analyses: Daily Stressor Severity Associations with Daily NA
Level 2 HLM Analyses: Benefit Finding Moderating the Relationship between Daily Stressor Severity and Daily NA

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: Stressor Severity Predicting Composite NA				
Intercept	1.70	0.05		
Stressor Severity	0.10**	0.01	0.01**	0.12
Level 2: Predicting Slope of Stressor Severity and Composite NA				
Benefit Finding	0.02	0.02		
Level 1: Stressor Severity Predicting Anxiety				
Intercept	1.62	0.05		
Stressor Severity	0.05**	0.02	0.01**	0.11
Level 2: Predicting Slope of Stressor Severity and Anxiety				
Benefit Finding	0.00	0.02		
Level 1: Stressor Severity Predicting Depression				
Intercept	1.50	0.05		
Stressor Severity	0.12**	0.02	0.02**	0.14
Level 2: Predicting Slope of Stressor Severity and Depression				
Benefit Finding	0.02	0.02		
Level 1: Stressor Severity Predicting Anger				
Intercept	1.68	0.05		
Stressor Severity	0.15**	0.02	0.04**	0.19
Level 2: Predicting Slope of Stressor Severity and Anger				
Benefit Finding	0.01	0.02		
Level 1: Stressor Severity Predicting Irritability				
Intercept	1.88	0.06		
Stressor Severity	0.10**	0.02	0.03**	0.18
Level 2: Predicting Slope of Stressor Severity and Irritability				
Benefit Finding	0.03	0.02		

Note: Day is included in all analyses. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 6. *Benefit Finding Moderating the Relationship between Daily Number of Diabetes Stressors and Daily Negative Affect*

Level 1 HLM Analyses: Daily # Diabetes Stressors Associations with Daily NA
Level 2 HLM Analyses: Benefit Finding Moderating the Relationship between # Diabetes Stressors and Daily NA

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: # Diabetes Stressors Predicting Composite NA				
Intercept	1.67	0.05		
# Diabetes Stressors	0.08**	0.01	0.00	0.07
Level 2: Predicting Slope of # Diabetes Stressors and Composite NA				
Benefit Finding	--	--		
Level 1: # Diabetes Stressors Predicting Anxiety				
Intercept	1.61	0.05		
# Diabetes Stressors	0.07**	0.01	0.01**	0.10
Level 2: Predicting Slope of # Diabetes Stressors and Anxiety				
Benefit Finding	0.02	0.02		
Level 1: # Diabetes Stressors Predicting Depression				
Intercept	1.50	0.05		
# Diabetes Stressors	0.07**	0.13	0.00	0.05
Level 2: Predicting Slope of # Diabetes Stressors and Depression				
Benefit Finding	--	--		
Level 1: # Diabetes Stressors Predicting Anger				
Intercept	1.68	0.05		
# Diabetes Stressors	0.10**	0.02	0.01	0.10
Level 2: Predicting Slope of # Diabetes Stressors and Anger				
Benefit Finding	--	--		
Level 1: # Diabetes Stressors Predicting Irritability				
Intercept	1.87	0.06		
# Diabetes Stressors	0.09**	0.02	0.01*	0.12
Level 2: Predicting Slope of # Diabetes Stressors and Irritability				
Benefit Finding	0.00	0.02		

Note: Day is included in all analyses. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 7. *Benefit Finding Moderating the Relationship between Daily Stressor Severity and Next-day Negative Affect*

Level 1 HLM Analyses: Daily Stressor Severity Associations with Next-day NA
Level 2 HLM Analyses: Benefit Finding Moderating the Relationship between Daily Stressor Severity and Next-day NA

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: Stressor Severity Predicting Next-day Composite NA				
Intercept	1.65	0.05		
Stressor Severity	0.01	0.01	0.00	0.04
Level 2: Predicting Slope of Stressor Severity and Next-day Composite NA				
Benefit Finding	--	--		
Level 1: Stressor Severity Predicting Next-day Anxiety				
Intercept	1.59	0.05		
Stressor Severity	-0.002	0.01	0.00*	0.06
Level 2: Predicting Slope of Stressor Severity and Next-day Anxiety				
Benefit Finding	-0.02	-.01		
Level 1: Stressor Severity Predicting Next-day Depression				
Intercept	1.48	0.05		
Stressor Severity	0.02	0.02	0.00	0.05
Level 2: Predicting Slope of Stressor Severity and Next-day Depression				
Benefit Finding	--	--		
Level 1: Stressor Severity Predicting Next-day Anger				
Intercept	1.66	0.05		
Stressor Severity	0.01	0.02	0.00	0.04
Level 2: Predicting Slope of Stressor Severity and Next-day Anger				
Benefit Finding	--	--		
Level 1: Stressor Severity Predicting Next-day Irritability				
Intercept	1.84	0.06		
Stressor Severity	0.02	0.02	0.00	0.02
Level 2: Predicting Slope of Stressor Severity and Next-day Irritability				
Benefit Finding	--	--		

Note: Day is included in all analyses. Analyses control for previous day affect. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

Table 8. *Benefit Finding Moderating the Relationship between Daily Number of Diabetes Stressors and Next-day Negative Affect*

Level 1 HLM Analyses: Daily # Diabetes Stressors Associations with Next-day NA
Level 2 HLM Analyses: Benefit Finding Moderating the Relationship between Daily # Diabetes Stressors and Next-day NA

	B Coefficient	(SE)	Variance Component	(SD)
Level 1: # Diabetes Stressors Predicting Next-day Composite NA				
Intercept	1.65	0.05		
# Diabetes Stressors	0.01	0.01	0.00*	0.03
Level 2: Predicting Slope of # Diabetes Stressors and Next-day Composite NA				
Benefit Finding	-0.00	0.02		
Level 1: # Diabetes Stressors Predicting Next-day Anxiety				
Intercept	1.59	0.05		
# Diabetes Stressors	0.01	0.01	0.00*	0.02
Level 2: Predicting Slope of # Diabetes Stressors and Next-day Anxiety				
Benefit Finding	-0.01	0.02		
Age	-0.00	0.01		
Benefit FindingXAge	-0.02^{+}	0.01		
Level 1: # Diabetes Stressors Predicting Next-day Depression				
Intercept	1.49	0.05		
# Diabetes Stressors	0.00	0.01	0.01**	0.07
Level 2: Predicting Slope of # Diabetes Stressors and Next-day Depression				
Benefit Finding	0.02	0.02		
Level 1: # Diabetes Stressors Predicting Next-day Anger				
Intercept	1.67	0.05		
# Diabetes Stressors	0.02	0.02	0.01**	0.11
Level 2: Predicting Slope of # Diabetes Stressors and Next-day Anger				
Benefit Finding	0.00	0.03		
Level 1: # Diabetes Stressors Predicting Next-day Irritability				
Intercept	1.84	0.06		
# Diabetes Stressors	0.01	0.02	0.005**	0.07
Level 2: Predicting Slope of # Diabetes Stressors and Next-day Irritability				
Benefit Finding	-0.01	0.02		

Note: Day is included in all analyses. Analyses control for previous day affect. ** = $p < .01$; * = $p < .05$, $^{+}$ = $p < .10$

APPENDIX A

**********BENEFITS OF DIABETES SCALE**********

Instructions: Individuals who have had diabetes sometimes feel that having diabetes makes positive contributions to their lives, as well as causing problems. Circle the number to tell us how much you have experienced each of the following benefits.

Having had diabetes:	Not At all	A little	Moderately	Quite A bit	Extremely
has lead me to be more accepting of things.	1	2	3	4	5
has taught me how to adjust to things I cannot change.	1	2	3	4	5
has helped me take things as they come.	1	2	3	4	5
has brought my family closer together.	1	2	3	4	5
has made me more sensitive to family issues.	1	2	3	4	5
has taught me that everyone has a purpose in life	1	2	3	4	5
has shown me that all people need to be loved.	1	2	3	4	5
has helped me become more focused on priorities, with a deeper snese of purpose in life.	1	2	3	4	5
has made me more aware and concerned for the future of all human beings.	1	2	3	4	5
has taught me to be patient.	1	2	3	4	5
has led me to deal better with stress and problems.	1	2	3	4	5
has led me to meet people who have become some of my best friends.	1	2	3	4	5
has contributed to my overall emotional and spiritual growth.	1	2	3	4	5
has helped me become more aware of the love and support available from other people.	1	2	3	4	5
has helped me realize who my real friends are.	1	2	3	4	5
has helped me become a stronger person, more able to cope effectively with future life challenges.	1	2	3	4	5

**********DAILY DIARY MEASURES**********

Thanks for taking a minute to complete these scales!

ALL QUESTIONS REFER TO YOUR EXPERIENCES <u>SINCE GOING TO BED LAST NIGHT</u>.

LOGIN: _____
DATE: _____
TIME: _____

**********STRESSOR SEVERITY SCALE**********

1. Write a brief (1 sentence) description of the most bothersome stressful event or concern of the last 24 hours (since bedtime last night) dealing with your diabetes. (IF YOU DID NOT HAVE DIABETES STRESS IN THE LAST 24 HOURS, DESCRIBE THE MOST STRESSFUL EVENT OF THE DAY)

   _____

2. Was this event related to your diabetes? (Circle one) **YES** **NO**

3. **********Circle one number to indicate how bad this event was?**********

1	2	3	4	5
Not at all Bad	A little Bad	Somewhat Bad	A lot Bad	As Bad as it can get

4. Was your mother or father actually with you when you experienced this stressful event? (Circle one) **YES** **NO**
   (If no, go to #5)
   If YES, which parent was with you? (Circle one) MOM DAD BOTH PARENTS

5. Circle one phrase that best fits how you think about this event in relation to your mother.
   Stress is mine: *You alone think about the stressful event.*
   My stress affects my mom: The stress is yours, but you feel that it affects your mom.
   Stress is shared with mom: Your mom considers it to be her stress as well.

6. Circle one phrase that best fits how you think about this event in relation to your father.
   Stress is mine: *You alone think about the stressful event.*
   My stress affects my dad: The stress is yours, but you feel that it affects your dad..
   Stress is shared with dad: Your dad considers it to be his stress as well.

7. Now think about the things you did to deal with this event. Circle one number to indicate how well you think you handled this event?

1	2	3	4	5
Very Badly	Badly	O.K.	Good	Very good

**********DAILY DIABETES STRESS SCALE**********

PART II

Below are problems or hassles that teens often have with their diabetes. For each item, indicate whether or not the problem happened to you in the last 24 hours (since going to bed last night). Remember that all answers are completely private. Please answer as honestly as you can.

In the last 24 hours (since bedtime last night) did you: (Circle YES or NO)

1. Forget or skip a blood-sugar test? YES NO
2. Take the wrong amount of insulin? YES NO
3. Have problems exercising or playing sports because of your diabetes? YES NO
4. Have problems eating what you want because of your diabetes? YES NO
5. Feel bad (upset, angry, sad) because of your diabetes? YES NO
6. Have problems managing your diabetes while away from home or family? YES NO
7. Have problems with high blood sugar? YES NO
8. Have problems figuring how much insulin to take based on exercise, meals/snacks, and blood sugar tests? YES NO
9. Have problems with low blood sugar? YES NO
10. (Pump only) Have problems with your pump? YES NO NOT ON PUMP

**********DAILY PERCEIVED COPING EFFECTIVENESS SCALE**********

Now we want to know how well you handled problems when they occurred (*only* the problems you just answered YES to).
How well did you handle each problem in the last 24 hours (since bedtime last night)? (Check one response)

1. Forgetting or skipping a blood-sugar test.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
2. Taking the wrong amount of insulin.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
3. Problems exercising or playing sports because of your diabetes.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
4. Problems eating what you want because of your diabetes.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
5. Feeling bad (such as upset, angry, sad) because of your diabetes.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
6. Problems managing your diabetes while away from home or family.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
7. Problems with high blood sugar.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
8. Problems figuring how much insulin to take based on exercise, meals/snacks, and blood sugar tests.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
9. Problems with low blood sugar.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5
10. Problems with your pump.	VERY BAD 1	KIND OF BAD 2	OKAY 3	PRETTY WELL 4	VERY WELL 5

**********DAILY AFFECT SCALE*********

Instructions: People have different feelings and emotions related to managing diabetes. These words describe different feelings and emotions. For each, tell us how much you felt this way related to your diabetes care since going to bed last night.

How much did you feel:	Not At all	A little	Moderately	Quite A bit	Extremely
Anxious	1	2	3	4	5
Happy	1	2	3	4	5
Sad	1	2	3	4	5
Annoyed	1	2	3	4	5
Mad	1	2	3	4	5
Depressed	1	2	3	4	5
Nervous	1	2	3	4	5
Excited	1	2	3	4	5
Irritated	1	2	3	4	5
Angry	1	2	3	4	5
Loved	1	2	3	4	5
Cared for	1	2	3	4	5
Nagged	1	2	3	4	5
Criticized	1	2	3	4	5

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