The Role of Defensive Pessimism and Anxiety in Glycemic Control in Adults with Type 1 Diabetes

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the faculty of
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of the requirements for the degree
Master of Science

Erin M. Rabideau
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This thesis titled

The Role of Defensive Pessimism and Anxiety in Glycemic Control in Adults with Type 1 Diabetes

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Abstract

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The Role of Defensive Pessimism and Anxiety in Glycemic Control in Adults with Type 1 Diabetes

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Defensive pessimism is a strategy used by individuals to manage anxiety symptoms that facilitates success in an upcoming event. There are currently no studies examining the role of defensive pessimism in affecting glycemic control in adults with type 1 diabetes. Individuals with diabetes are more likely to experience symptoms of anxiety than those without diabetes, which can interfere with diabetes health. The purpose of the current study was to explore the role of defensive pessimism as a moderator in the relationship between anxiety and glycemic control in adults with type 1 diabetes. Adults with type 1 diabetes (n = 41) completed self-report measures prior to an upcoming diabetes-related doctor’s appointment. Results indicated that defensive pessimism was not a moderator in the relationship between trait anxiety and average daily self-monitored blood glucose (SMBG) testing frequency, nor was it a moderator in the relationship between trait anxiety and HbA1c.

Approved: _____________________________________________________________

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Chapter 1: Introduction

Defensive pessimism is a cognitive strategy utilized by individuals as a way of coping with anxiety experienced about the outcome of an upcoming event (Norem & Cantor, 1986a, 1986b). Individuals typically utilize defensive pessimism when approaching stressful events in which the individual desires a specific outcome (Norem & Cantor, 1986a, 1986b). An individual using this strategy will lower his or her expectations of the outcome of an upcoming event, thereby lowering his or her anxiety about the outcome, by mentally simulating possible negative outcomes. This lowering of expectations allows the individual to protect against blows to his or her self-esteem if the outcome of the event was not as was hoped (Norem & Cantor 1986a, 1986b). Showers and Ruben (1990) also note that defensive pessimism motivates individuals to put forth extra effort toward preventing negative outcomes. Figure 1 summarizes the steps involved in utilizing defensive pessimism.

Defensive pessimism is considered to be a strategy that different individuals will use at various times and situations. It is not considered to be a trait that some individuals use exclusively (Norem, 2001). However, Norem and Cantor (1986a, 1986b) have found that some individuals use defensive pessimism to a greater degree than others. These individuals use defensive pessimism as a general style of reacting to upcoming situations. Several studies have observed that individuals who utilize defensive pessimism tend to be “highly anxious” and typically experience more anxiety overall than strategic optimists, or individuals who typically approach events with high expectations about their performance (Norem & Cantor, 1986b; Cantor, Norem, Niedenthal, & Brower, 1987;
Cantor & Norem, 1989; Norem & Illingworth, 1993; Sanna, 1996; Thompson & le Fevre, 1999).

One important factor that has been shown to affect levels of anxiety, and consequently, may affect individuals’ tendency to utilize defensive pessimism in the current study, is self-esteem. Campbell and Fairey (1985) found that individuals who had low self-esteem and were preoccupied with their lack of self-confidence about an anagram task were more likely to have poorer performance on the task. Thus, self-esteem may be a potential confound that should be considered when examining defensive pessimism. It is possible that individuals who characterized by high levels of defensive pessimism and trait anxiety as well as low levels of self-esteem will have poorer glycemic control in comparison to those who have high self-esteem as well as high levels of defensive pessimism and trait anxiety. In other words, at low levels of self-esteem, defensive pessimism may not be an effective strategy for protecting against the adverse effects of anxiety on glycemic control.

It is widely accepted that high levels of trait anxiety negatively affect performance (Eysenck, 1985) and that positive expectations about outcomes will improve performance (Seipp, 1991). However, Norem and Cantor (1986a) found that when individuals who experience anxiety symptoms use defensive pessimism when preparing for events, these individuals perform as well as individuals who use strategic optimism. In other words, individuals with anxiety who used defensive pessimism performed well, despite their experience of anxiety and low expectations of their performance. Currently, there is no evidence to suggest that one could use defensive pessimism too often or to an excessive
degree, but rather, individuals use the strategy in situations where the strategy is deemed useful, and use other strategies when another is more useful (Norem, 2001). However, Norem and Cantor (1986a, 1986b) have found that some individuals use this strategy more often than others, and these individuals have become known as defensive pessimists in the social psychology literature.

Few studies have considered defensive pessimism in a health-related context (Siegel & Schrimshaw, 2000; Kelly et al., 2003). Siegel and Schrimshaw (2000) investigated specific coping mechanisms employed to manage negative emotions associated with having HIV/AIDS, using a semi-structured interview protocol, which was administered to 144 men with this diagnosis. Defensive pessimism was qualitatively examined post hoc, and the results indicated that between 10-30% of participants utilized defensive pessimism when approaching a doctor’s appointment. The authors suggested that these men used defensive pessimism to cope with the anxiety surrounding the possibility of receiving news that their T-cell counts had increased. However, defensive pessimism was not directly examined in this study and the researchers did not assess for the proactive behaviors in preparation for the stressful event that are an intrinsic part of defensive pessimism.

Additionally, Kelly and colleagues (2003) suggested post hoc that defensive pessimism may have played a role in medical decision-making in 99 Ashkenazi Jewish women who were being tested for the presence of genetic mutations (BRCA1; BRCA2), which are associated with the development of breast and ovarian cancer. A majority of participants (62.2%) felt that their chances of testing positively for at least one of the
mutations was greater than or equal to 100%, even after individuals participated in
genetic counseling to examine each individual’s likelihood of testing positively for the
presence of one or both genetic mutations. Only 20% of the sample received a positive
test for one or both mutations (Kelly, et al., 2003). The authors postulated *post hoc* that
these women used defensive pessimism to cope with the anxiety surrounding the
upcoming receipt of the test results and to prepare themselves for the possibility of the
test results being positive. It is important to note, however, that defensive pessimism was
not quantified in this study, but rather was suggested as an explanation for the
participants’ behavior based on the researchers’ observations. The authors observed that
the behavior of the women about to receive their test results (Kelly et al., 2003) was
consistent with the behavior observed in defensive pessimists in studies by Norem and
Cantor (1986a, 1986b). Few studies have examined defensive pessimism in health-
related contexts, and those that have taken defensive pessimism into account have not
directly quantified it. Support for the utilization of defensive pessimism within health-
related contexts is relatively weak (albeit encouraging) to date, and no findings have yet
been reported addressing the role of defensive pessimism in the relationship between
anxiety and physical health.

Between 5-10% of the 23.6 million adult Americans with diabetes have type 1
diabetes, a disease often accompanied by a host of medical complications (American
Diabetes Association, 2008). The Diabetes Control and Complications Trial (DCCT)
found that glycemic control plays a critical role in reducing the risk of developing the
complications associated with type 1 diabetes (DCCT, 1993). Research has demonstrated
that reductions in a long-term measure of blood glucose levels, known as HbA1c, are associated with reductions in the progression of the complications associated with diabetes (Centers for Disease Control and Prevention, 2007). A number of factors must be considered when doctors and patients create blood glucose management plans, such as an individual’s diet and exercise routines, medication doses and adherence, as well as blood glucose testing schedules (Banion & Valentine, 2006). Several researchers have found frequent, daily self-monitored blood glucose (SMBG) testing to be associated with improved HbA1c levels (Davidson, Hebblewhite, Bode, Steed, and Steffes, 2004; Haller, Stavely, and Silverstein, 2004; Nyomba, Berard, and Murphy, 2003; Schafer, Glasgow, McCaul, and Dreher, 1983). Both HbA1c values and daily SMBG testing provide vital information to aid in healthy blood sugar management and to delay the onset of the complications associated with diabetes.

Research indicates that glycemic control is complicated by issues related to mental health. Anderson et al. (2003) found that increased blood glucose was related to the presence of an anxiety disorder. Anxiety symptoms have been shown to have a significant, adverse impact on the development of diabetes-related complications (Niemcryk, Speers, Travis, & Gary, 1990; Anderson et al., 2003; Sultan, Epel, Sachon, Vaillant, & Hartemann-Heutier, 2008). Additionally, anxiety disorders (including specific phobias) and anxiety symptoms have been shown to be more prevalent within the diabetes population than in the general population (Arnarson, Gudmundsdóttir, & Boyle, 1998; Berlin et al., 1997; Friedman & colleagues, 1998; Hermanns et al., 2005; Grigsby et al., 2002; Kessler et al., 2005a, b; Lin & Von Korff, 2008; Peyrot & Rubin, 1997;
Sultan & Heurtier-Hartemann, 2001). Lin and Von Korff (2008) performed an international study investigating the prevalence of psychological disorders in the diabetes population compared to the general population in 17 countries \((n = 85,088)\), and found that individuals with diabetes are 20% more likely to develop anxiety disorders than those in the general population \((OR = 1.20, 95\% \text{ CI} = 1.01-1.42)\). Similarly, Sultan and Heurtier-Hartemann (2001) found that individuals in a sample of 97 French adults with type 1 diabetes experienced significantly more trait anxiety than did healthy adults in the general population \((t = -2.97, p < .01; \text{Sultan}, \& \text{Heurtier-Hartemann, 2001; Spielberger, 1983})\). However, no studies, as of yet, have investigated the possible protective effect of defensive pessimism on the relationship between anxiety symptoms and blood glucose control.

**The current study**

The current study is designed to investigate defensive pessimism as a potential moderator of the relationship between trait anxiety and blood glucose control. In this study, blood glucose control is broken into two factors: (1) long-term blood glucose control (i.e., HbA1c); and (2) behavior that promotes glycemic control (i.e., average daily self-monitored blood glucose [SMBG] testing frequency).

**Study aims**

To examine the hypothesized role of defensive pessimism in the relationship between anxiety and blood glucose control, the current study included 9 main aims; 5 of which serve to replicate previous findings, and 4 of which are novel hypotheses that have not yet been tested:
1. To evaluate the relationship between daily SMBG frequency and HbA1c values in adults with type 1 diabetes. Based on the work by several researchers (Davidson, Hebblewhite, Bode, Steed, and Steffes, 2004; Haller, Stavely, and Silverstein, 2004; Nyomba, Berard, and Murphy, 2003; Schafer, Glasgow, McCaul, and Dreher, 1983), HbA1c levels were predicted to have an inverse relationship with daily SMBG testing frequency.

2. To examine the relationship between defensive pessimism and trait anxiety in adults with type 1 diabetes. Based on the results of various studies, scores of trait anxiety were predicted to be positively related to defensive pessimism (Cantor, Norem, Niedenthal, & Brower, 1987; Norem, 2001; Norem & Illingworth, 1993; Norem & Cantor, 1986a).

3. To examine the relationship between defensive pessimism and self-esteem in adults with type 1 diabetes. Based on the results of previous research, scores on self-esteem were predicted to be negatively related to defensive pessimism scores (Campbell, & Fairey, 1985).

4. To evaluate the relationship between trait anxiety and HbA1c values in adults with type 1 diabetes. Based on work by several researchers (Niemcryk, Speers, Travis, & Gary, 1990; Anderson et al., 2003; Sultan, Epel, Sachon, Vaillant, & Hartemann-Heutier, 2008), HbA1c levels were predicted to be positively related to scores of trait anxiety.
5. To examine the relationship between defensive pessimism and HbA1c values in adults with type 1 diabetes. Defensive pessimism scores were predicted to be negatively related to HbA1c levels.

6. To evaluate the relationship between trait anxiety and daily SMBG testing frequency in adults with type 1 diabetes. Scores of trait anxiety were expected to be negatively related to SMBG frequency.

7. To examine the relationship between defensive pessimism and daily SMBG testing frequency in adults with type 1 diabetes. Defensive pessimism scores were predicted to be positively related to SMBG frequency.

8. To evaluate whether defensive pessimism moderates the relationship between trait anxiety and daily SMBG testing frequency in adults with type 1 diabetes (Figure 2). At high levels of trait anxiety and high levels of defensive pessimism, SMBG testing frequency was expected to be higher; whereas at high levels of trait anxiety and low levels of defensive pessimism, SMBG testing frequency was expected to be lower.

9. To evaluate whether defensive pessimism moderates the relationship between trait anxiety and HbA1c in adults with type 1 diabetes (Figure 3). At high levels of trait anxiety and high levels of defensive pessimism, HbA1c was expected to be lower; whereas at high levels of trait anxiety and low levels of defensive pessimism, HbA1c was expected to be higher.


Chapter 2: Method

Participants

A sample of 41 participants was gathered from the patient records of local endocrinologists in Athens, OH, Belpre, OH, and surrounding areas. Participants of the current study met the following eligibility criteria: individuals must have 1) had a diagnosis of type 1 diabetes, 2) had received this diagnosis over 2 years prior to participation, 3) been able to provide informed consent, 4) been fluent in the English language, 5) been at least 18 years of age, and 6) had their most recent HbA1c value below 10%.

A power analysis, conducted using the program Samplepower (version 2.0, Samplepower), indicated that 60 participants were necessary to achieve 80% power with an alpha of 0.05, 3 predictor variables (defensive pessimism, trait anxiety, and the interaction between defensive pessimism and trait anxiety), and an estimated effect size of 0.19. This effect size was derived from the results of a meta-analysis performed by Anderson et al. (2003) that examined the relationship between anxiety and glycemic control (see Table 2). However, preliminary analyses conducted with the presently obtained sample of 41 participants indicated that the results would not approach significance if recruitment proceeded to enroll the remaining 19 of the proposed 60 participants. A post hoc power analysis conducted using G-power (Erdfelder, Faul, & Buchner, 1996) indicated that, on the basis of the presently obtained effects, a total sample size of 277 participants would be required to achieve significance at 80% power in an analysis examining the moderational role of defensive pessimism in the relationship
between trait anxiety and HbA1c ($F^2 = 0.04$). A total sample size of 203 participants would be required to achieve significance at 80% power in an analysis examining the moderational role of defensive pessimism in the relationship between trait anxiety and average daily SMBG frequency ($F^2 = 0.06$).

**Measures**

All participants were asked to complete a demographics form. Two measures were used to assess glycemic control: daily average SMBG testing frequency from the preceding week and current HbA1c levels. The Defensive Pessimism Questionnaire (DPQ; see below) and a diabetes-adapted version of the DPQ were used to assess levels of defensive pessimism, and the trait version of the State Trait Anxiety Inventory (STAI) was used to measure trait anxiety.

**Demographics Questionnaire** (Appendix A-1). Demographic information was collected through a self-report, paper and pencil questionnaire. The demographics form inquired about a participant’s gender, age, marital status, education level, ethnicity, income, work status, diabetes treatment regimen, and health insurance.

**Defensive Pessimism Questionnaire** (DPQ, Appendix A-2). The DPQ is a 12-item questionnaire that assesses whether individuals use defensively pessimistic strategies to cope with the anxiety associated with upcoming stressful events (Norem & Cantor, 1986a, 1986b; Norem, 2001). The revised version that will be used in this study correlates strongly with the original Optimism-Pessimism Prescreening Questionnaire ($r = .65$) and has been shown to have improved internal consistency ($\alpha = .78$) in comparison to the former scale. It has also been demonstrated to have acceptable convergent validity
based on the strength of its correlation with rumination ($r = .52$) and self-handicapping ($r = .49$; Norem, 2001). The internal consistency of the DPQ in the current sample was good ($\alpha = .81$).

**SMBG-related Defensive Pessimism Questionnaire** (SMBG-DPQ; Appendix A-3). Participants in the current study were asked to fill out a version of the DPQ adapted by the author to assess for defensive pessimism associated with SMBG-related behaviors. Norem (2001) expressed that the original DPQ is intended to be adapted to suit different domains, in that an individual may use different cognitive strategies based on the type of situation or event which he/she is facing. The current study was particularly concerned with the effect of diabetes-related defensive pessimism on glycemic control, and thus, it was appropriate to adapt a version of the DPQ to assess for the use of defensive pessimism in diabetes-related situations. Internal consistency analyses of the SMBG-DPQ in the current study indicated that its reliability would be improved (from $\alpha = .73$ to .78) by the removal of item number 16 (see Appendix A-9). Thus, the SMBG-DPQ was analyzed with item 16 removed for all study analyses. The convergent validity of the SMBG-DPQ was indirectly supported by a moderate correlation with trait anxiety in the present sample ($r = .32$, $p = 0.04$; see Table 3).

**State Trait Anxiety Inventory – Trait version** (STAI; Appendix A-4). The trait version of the State Trait Anxiety Inventory (STAI) form Y-2 was used to measure trait anxiety (Speilberger, 1983). The trait version of the STAI utilizes a 20-item, Likert-type scale to assess long-lasting trait anxiety (items 21-40). Items have 4 response options each, with higher scores indicating higher levels of anxiety. The minimum score of the
trait version of the STAI is 20 and the maximum score is 80. The STAI has acceptable reliability and validity (Speilberger, 1983). The trait version of the STAI has shown good test-retest reliability in males and females over the course of 20 days ($rs = .86$ and $.76$, respectively) and 104 days ($rs = .73$ and $.77$, respectively; Speilberger, 1983). The trait version also shows good internal consistency (median $\alpha = .90$), and has demonstrated good convergent validity due to strong correlations with other anxiety measures among neuropsychiatric patients and college students (ranging from $r = .73$ to $r = .85$; Speilberger, 1983). The internal consistency of the STAI-Y-2 in the current sample was excellent ($\alpha = .95$).

The Center for Epidemiologic Studies Depression Scale (CES-D; Appendix A-5). The CES-D will be used to measure self-reported depressive symptoms (Radloff, 1977). The CES-D is a 20-item pencil and paper measure that assesses for the presence and severity of depressive symptoms over the preceding 7 days on a 4-item Likert-type scale ranging from 1 (rarely or none of the time [$\leq 1$ day]) to 4 (most of the time [5–7 days of the past week]). The minimum total score on the CES-D is 0 and the maximum score is 60, with higher scores indicating the presence of greater depressive symptoms (Radloff, 1977). The CES-D has been found to have good internal consistency in samples of the general population through inter-item and item-scale correlations ($\alpha = .85$; Goodnick et al., 1997). CES-D scores have also been shown to be reliable over an 8-week period with test-retest correlations of $r = .57$ (Radloff, 1977). The internal consistency of the CES-D in the current sample was excellent ($\alpha = .94$).
The Rosenberg Self-Esteem Scale (RSES; Appendix A-6). The RSES was used to measure self-reported self-esteem. The RSES is a 10-item measure that assesses individuals’ level of agreement with statements about the self on a Likert-type scale (0 = strongly disagree, 3 = strongly agree). The minimum total score possible on the RSES is 0 and the maximum is 30. Higher scores indicate higher self-esteem. This scale has demonstrated good internal consistency (α = .87; Rosenberg, 1979). The internal consistency of the RSES in the current sample was acceptable (α = .92). The RSES was included in the present study to examine the relationship between self-esteem and SMBG-related defensive pessimism. Participants’ self-esteem may influence their expectations for their blood glucose levels (i.e., individuals with high self-esteem may have high expectations for their blood glucose levels, and individuals with low self-esteem may have low expectations for their blood glucose levels), which then, in turn, could affect whether individuals use defensive pessimism to cope with their anxiety around blood glucose control – specifically, individuals with lower self-esteem would be expected to utilize defensive pessimism at an increased frequency (see Appendix A-6).

HbA1c. Current HbA1c values were obtained from participants’ medical charts with patient consent. The assay used to calculate HbA1c values was the same as that recommended by the DCCT (1987), and the HbA1c concentrations were analyzed according to the guidelines set forth by the DCCT (1987).

Daily SMBG Frequency. SMBG frequency was also collected from participants. This was achieved by obtaining individuals’ SMBG values from the week preceding the appointment through glucometer print-outs or handwritten logs and calculating an
average daily testing frequency value from these numbers. The accuracy of each individual glucometer is monitored by the owner using pre-calibrated control solution. The DCCT (1993) indicated that SMBG values correspond well with HbA1c. For example, an HbA1c value of 7% roughly corresponds to an average SMBG value of 155 mg/dL.

**Procedure**

Prospective participants were initially invited to participate in the study through mailings from their diabetes physician, physician referral, and/or live recruitment by lab representatives in the doctor’s office. Individuals were asked to call the Diabetes and Depression Lab at Ohio University to learn about the study and to be assessed for eligibility. Eligible participants were pre-consented over the phone and scheduled to meet with study investigators 45 minutes prior to their next scheduled endocrine appointment. Participants either provided a waiver of signature and went through the questionnaire packet over the phone with the principle investigator or were mailed a packet one month prior to the appointment, which contained the informed consent and medical authorization form, a demographics questionnaire, the trait version of the State Trait Anxiety Inventory, copies of the original Defensive Pessimism Questionnaire, and the SMBG-related version of the Defensive Pessimism Questionnaire. Participants were asked to review and complete the forms in this packet 2 to 4 weeks before the scheduled meeting. During the meeting, an investigator obtained informed consent, reviewed the medical authorization forms with the participants, and answered any questions participants had about the study. Participants were paid $20 for their time. The
investigator then collected the participant’s SMBG results from the preceding week and obtained current HbA1c values from the participant’s medical record.

**Analyses**

The analyses of this study were conducted using SPSS 17.0 (SPSS Inc., 2007). The data were assessed for kurtosis, homoscedasticity, skewness, and multicollinearity prior to analysis. Analyses were conducted to test the following hypotheses:

1. To evaluate the relationship between daily SMBG frequency and HbA1c values in adults with type 1 diabetes. Based on work by several researchers (Davidson, Hebblewhite, Bode, Steed, and Steffes, 2004; Haller, Stavely, and Silverstein, 2004; Nyomba, Berard, and Murphy, 2003; Schafer, Glasgow, McCaul, and Dreher, 1983), HbA1c levels were predicted to have an inverse relationship with SMBG frequency. A Pearson’s correlation was used to determine the strength and direction of the relationship between daily SMBG frequency and HbA1c.

2. To examine the relationship between defensive pessimism and trait anxiety in adults with type 1 diabetes. Based on the results of various studies, scores of trait anxiety were predicted to be positively related to defensive pessimism scores (Cantor, Norem, Niedenthal, & Brower, 1987; Norem, 2001; Norem & Illingworth, 1993; Norem & Cantor, 1986a). A Pearson’s correlation was used to determine the strength and direction of the relationship between defensive pessimism and trait anxiety.

3. To examine the relationship between defensive pessimism and self-esteem in adults with type 1 diabetes. Based on the results of previous research, scores of
self-esteem were predicted to be negatively related to defensive pessimism scores (Campbell, & Fairey, 1985). A Pearson’s correlation was used to determine the strength and direction of the relationship between defensive pessimism and self-esteem.

4. To evaluate the relationship between trait anxiety and HbA1c values in adults with type 1 diabetes. Based on work by several researchers (Niemcryk, Speers, Travis, & Gary, 1990; Anderson et al., 2003; Sultan, Epel, Sachon, Vaillant, & Hartemann-Heutier, 2008), HbA1c levels were predicted to be positively related to scores of trait anxiety. A Pearson’s correlation was used to determine the strength and direction of the relationship between trait anxiety and HbA1c.

5. To examine the relationship between defensive pessimism and HbA1c values in adults with type 1 diabetes. Defensive pessimism scores were predicted to be negatively related to HbA1c levels. A Pearson’s correlation was used to determine the strength and direction of the relationship between defensive pessimism and HbA1c.

6. To evaluate the relationship between trait anxiety and daily SMBG testing frequency in adults with type 1 diabetes. Scores of trait anxiety were expected to be negatively related to daily SMBG frequency. A Pearson’s correlation was used to determine the strength and direction of the relationship between trait anxiety and daily SMBG testing frequency.

7. To examine the relationship between defensive pessimism and daily SMBG testing frequency in adults with type 1 diabetes. Defensive pessimism scores
were expected to be positively related to daily SMBG frequency. A Pearson’s correlation was used to determine the strength and direction of the relationship between defensive pessimism and daily SMBG testing frequency.

8. To evaluate whether defensive pessimism moderates the relationship between trait anxiety and daily SMBG testing frequency in adults with type 1 diabetes. At high levels of trait anxiety and high levels of defensive pessimism, SMBG testing frequency was expected to be higher; whereas at high levels of trait anxiety and low levels of defensive pessimism, SMBG testing frequency was expected to be lower. According to Baron and Kenny (1986), the moderational role of a variable may be assessed by performing a regression analysis with a predictor variable, the potential moderator variable, and the interaction between the predictor and moderator variables as predictors in the model. The potential moderator may be confirmed if the amount of variance in the outcome variable accounted for by the interaction variable is above and beyond what the other variables account for alone (Baron & Kenny, 1986). Thus, a regression analysis was performed to test the current hypothesis with defensive pessimism, trait anxiety, and the interaction between defensive pessimism and trait anxiety in the model as predictors of SMBG frequency (see Figure 2).

9. To evaluate whether defensive pessimism moderates the relationship between trait anxiety and HbA1c in adults with type 1 diabetes. At high levels of trait anxiety and high levels of defensive pessimism, HbA1c was expected to be lower; whereas at high levels of trait anxiety and low levels of defensive pessimism,
HbA1c was expected to be higher. The procedure used in hypothesis 8 was used to test defensive pessimism as a moderator in the relationship between trait anxiety and HbA1c (Baron & Kenny, 1986). Specifically, a regression analysis was performed with defensive pessimism, trait anxiety, and the interaction between defensive pessimism and trait anxiety in the model as predictors of HbA1c values (see Figure 3).
Chapter 3: Results

Response rates

Of the 612 individuals who were contacted, 67 were screened for eligibility for the current study. A total of 53 of the individuals that were screened were eligible. Of this group, 41 individuals were enrolled in the study and 12 individuals declined to participate. There were no systematic differences between the individuals who were enrolled in the study and those who declined enrollment in the study in terms of gender, age, or self-reported glycemic control. A total of 14 individuals were ineligible for the study, of which 6 were ineligible because their HbA1c values were above 10%, 7 were ineligible because they had type 2 diabetes, and 1 individual was ineligible because she had a Pervasive Developmental Disorder and was unable to provide consent for participation.

Sample characteristics

Patient demographic and health data may be found in Tables 1 and 2. The mean age of this sample (n = 41) of adults with type 1 diabetes was 51.98 ($SD = 14.83$), and the individuals were diagnosed with diabetes a mean of 24.54 years ($SD = 14.44$) before participation in the current study. The majority of the participants in this sample reported being female (n = 22, 53.70%), having some college education or less (n = 24, 58.50%), making less than $61,000 annually (n = 28, 68.30%), and being currently married (n = 24, 58.50%). All participants in this sample reported being Caucasian (n = 41, 100%). Most participants reported using an insulin pump to treat their diabetes (n = 27, 65.90%) and most reported having valid health insurance (n = 39, 95.10%).
An overall correction of \( p < .01 \) was applied to the correlational analyses. Correlational analyses indicated that HbA1c was inversely related to average daily SMBG frequency, which was consistent with hypothesis 1, but that HbA1c was not related to trait anxiety or SMBG-related defensive pessimism, which was contrary to hypotheses 4 and 5 respectively. Correlations also demonstrated that SMBG-related defensive pessimism was not related to trait anxiety or average daily SMBG frequency, which was contrary to hypotheses 2 and 7 respectively. However, SMBG-related defensive pessimism was inversely correlated with self-esteem, which was consistent with hypothesis 3. These results are summarized in Table 3.

**Moderation model results**

All variables in the moderational analyses were examined for skewness, kurtosis, homoscedasticity, and outliers. The level of skewness was within the acceptable range for all variables: STAI-T (SK = .46, \( SD = .37 \)), HbA1c (SK = .18, \( SD = .37 \)), daily SMBG testing frequency (SK = .85, \( SD = .37 \)), and SMBG-DPQ (SK = .002, \( SD = .37 \)). Most variables were found to have acceptable levels of kurtosis: HbA1c (KU = -.20, \( SD = .72 \)), STAI-T (KU = -.81, \( SD = .72 \)), and SMBG-DPQ (KU = -.51, \( SD = .72 \)). Average daily SMBG frequency was found to be positively kurtotic (KU = 1.80, SE = .72). A square root transformation was performed; and the transformed SMBG frequency values exhibited tolerable kurtosis (KU = .61, SE = 0.72). Both main effect variables (trait anxiety and SMBG-related defensive pessimism) were centered prior to creating the interaction terms and testing the hypothesized models in order to correct for
multicollinearity between the main effect variables and the interaction terms (Jaccard, Wan, & Turrisi, 1990).

The results of the multiple regression analyses indicated that SMBG-related defensive pessimism did not moderate the relationship between trait anxiety and average daily SMBG frequency ($\beta<0.001$, $SE = 0.001$), nor did it moderate the relationship between trait anxiety and HbA1c ($\beta<0.001$, $SE = 0.001$). The results from these models are summarized in Table 4. The results did not change when HbA1c was treated as a dichotomous variable (7.0% and below, 7.1% and above; $\beta<0.001$, $SE < 0.001$; ADA, 2009). The results also did not change when the analyses were restricted to those with current HbA1c values equal to 7% or lower ($\beta<0.001$, $SE = 0.001$; ADA, 2009). These analyses were attempted in an effort to investigate whether the role of defensive pessimism in the relationship between trait anxiety and HbA1c would change based on different levels of HbA1c.
Chapter 4: Discussion

The ultimate purpose of the current study was to examine whether defensive pessimism is relevant to the experiences of individuals managing type 1 diabetes and if it is associated with blood glucose control.

A number of characteristics of the current sample are notable. First of all, the ethnic background of the individuals enrolled in this study was 100% Caucasian, which limits generalizability of the obtained findings. It is also important to note that the overall mean HbA1c for the current sample ($\bar{x} = 7.4\%$) was above the American Diabetes Association’s (2009) standard for diabetes health, which is less or equal to 7.0%.

However, the results did not change when HbA1c was treated as a categorical variable (7.0% and below, 7.1% and above). The results also did not change when the analyses were restricted to those with current HbA1c values equal to 7% or lower.

Correlational analyses indicate that two of the hypothesized relationships in the current study were significant (see Table 3). HbA1c was inversely related to average daily SMBG frequency, and self-esteem was inversely related to defensive pessimism. No significant relationship existed between defensive pessimism and HbA1c or daily SMBG testing frequency. Furthermore, the correlation found between SMBG-related defensive pessimism and HbA1c was so low ($r = -.001$) that it may actually highlight the ineffectiveness of defensive pessimism as a strategy for coping with anxiety in blood glucose testing situations (see below for further details). It should also be noted that the scores obtained on the measures of self-esteem, depression, and anxiety in the present sample were highly intercorrelated. This may inhibit clear interpretations of the obtained
results because this indicates that these instruments did not measuring independent constructs in the present study sample (see Table 3).

The results of the multiple regression analyses examining defensive pessimism as a potential moderator in the relationship between trait anxiety and blood glucose control also yielded null findings. Follow-up regression analyses were performed using HbA1c as a categorical variable (7.0% and below, 7.1% and above) in order to obtain a clearer picture of the role of defensive pessimism in the relationship between HbA1c and trait anxiety. Follow-up analyses were also conducted using only individuals whose HbA1c values fell at 7.0% and below in order to restrict the sample to only those who were considered to have good diabetes health according to the American Diabetes Association (2009). However, these attempts did not yield significant interactions. These analyses were attempted in an effort to investigate whether the role of defensive pessimism in the relationship between trait anxiety and HbA1c would change if the analyses compared individuals at or below the benchmark for diabetes health (7.0%; ADA, 2009) with individuals who had HbA1c values above the benchmark for diabetes health or if the analyses were restricted to only individuals at or below the benchmark for diabetes health.

The findings of the current study contrast with those obtained by Siegel and Schrimshaw (2000). This contrast in and of itself may provide important information about the experience of anxiety in individuals with type 1 diabetes. However, it is also important to acknowledge that limitations involved with measurement of defensive pessimism in the study performed by Siegel and Schrimshaw (2000) may render their
results difficult to compare with the results from the current study (see Introduction). Characteristics of diabetes management may also eliminate the usefulness of defensive pessimism in a blood glucose testing situation.

Although defensive pessimism serves to decrease anxiety in the short term, the overall increased baseline of trait anxiety in individuals who commonly use defensive pessimism may actually make blood glucose control more difficult, due to the inverse relationship previously demonstrated between blood glucose control and trait anxiety. Additionally, it is important to note that anxiety specifically related to blood glucose testing was not assessed in this study. It is possible that individuals who score highly on trait anxiety may or may not experience anxiety symptoms related to blood glucose testing (Niemcryk, Speers, Travis, & Gary, 1990; Anderson et al., 2003; Sultan, Epel, Sachon, Vaillant, & Hartemann-Heutier, 2008). A measure specifically designed to test anxiety related to blood glucose testing may have yielded different results in the analyses employed in this study. The null findings obtained in the present study may also reflect that defensive pessimism has more commonly been tested in novel stress-provoking situations (such as academic testing scenarios and laboratory tasks; Norem & Cantor, 1986a, 1986b) and may not be a useful strategy in stressful situations that are not novel. Because blood glucose testing is an activity that individuals with diabetes carry out frequent, it may not induce the same experience of anxiety that has accompanied tasks utilized in previous studies examining defensive pessimism.

The nature of managing diabetes is such that an individual is constantly monitoring changes in his or her body. As explained earlier, blood glucose management
is facilitated by frequent, daily blood glucose testing. Given the evidence for exposure therapy as an effective treatment for a range of anxiety disorders (e.g., see Barlow, Allen, & Choate, 2004), it is reasonable to hypothesize that the high frequency of diabetes care behaviors involved in managing the disorder over-exposes individuals to events such as testing blood glucose, thereby decreasing an individual’s anxiety around the event. This could render defensive pessimism as far less useful in blood glucose testing situations than it may be in other less frequent events (e.g., test anxiety in academic situations; Norem & Cantor, 1986b). The constant management involved in caring for diabetes may be more intensive than that which is involved in caring for other chronic medical disorders. This may serve to habituate individuals with diabetes to the tasks and challenges involved in maintaining diabetes health. Also, given the frequency with which individuals with diabetes are prescribed to engage in behaviors such as blood glucose testing, an individual may find defensive pessimism too stressful to engage in every time he or she performs a blood glucose test. This would also render the strategy less useful, as it could expose the individual to more stress instead of reducing arousal, opening the individual up to utilize other strategies to cope with anxiety (e.g., strategic optimism; Norem, 2001).

Also, glycemic control may have been difficult to predict in the current study because diabetes management has been shown to be affected by a wide range of factors in an individual’s environment and routine (Gonder-Frederick, Cox, & Ritterband, 2002). Gonder-Frederick, Cox, and Ritterband (2002) summarized the literature on the self-management of diabetes and identified 6 individual difference variables (e.g., coping
abilities, personality, and demographics), 6 social variables (e.g., social support, family characteristics, and sociodemographic factors), and 5 environmental variables (e.g., healthcare system, the work/school environment, and cultural factors), which all simultaneously affect self-management and clinical outcomes in diabetes, such as blood glucose management. Despite the evidence demonstrating that blood glucose management is difficult to accurately predict, glycemic control and HbA1c remain critical outcome variables in the diabetes literature, in that the Diabetes Control and Complications Trial (1993) has found that HbA1c is associated with the presence or absence of the complications associated with diabetes. However, challenges exist in predicting HbA1c and glycemic control in general because it is so widely affected by a number of factors in the lives of individuals diagnosed with diabetes.

The concept of realistic pessimism is another issue to consider in the context of individuals with diabetes. Realistic pessimism is characterized by an individual expecting negative outcomes when he or she has experienced negative outcomes in similar situations in the past; whereas defensive pessimism is characterized by an individual expecting negative outcomes when he or she has generally experienced positive outcomes in similar situations in the past (Norem & Cantor, 1986a, 1986b; Norem, 2001). Individuals who resemble realistic pessimists tend to have lower levels of performance than defensive pessimists (Norem, 2001). Even for individuals with diabetes who receive HbA1c values in the healthy range, all individuals with diabetes will receive blood glucose values outside of their target range at some points, particularly after meals (Goldstein et al. 2004). Also, doctors prescribe individuals with diabetes to
test their blood glucose when they feel as though their blood glucose level is outside of the target range. Individuals with diabetes may test more often when they feel off-target than when they feel on-target, which may provide these individuals with a negatively skewed perspective on their blood glucose management. Thus, individuals with diabetes may resemble realistic pessimists more than they would resemble defensive pessimists, in that there is a realistic chance that an individual’s blood glucose level would lie outside of his or her target range at any given blood glucose test due to the wide range of factors that affect glycemic control. Realistic pessimism would undoubtedly interfere with the utilization of defensive pessimism as a strategy in coping with the anxiety surrounding diabetes management.

Another point to consider might be the inverse relationship between SMBG-related defensive pessimism and self-esteem. In other words, individuals who scored highly on SMBG-related defensive pessimism were also likely to have lower self-esteem. This may be critical to the course of defensive pessimism as a successful strategy in people with type 1 diabetes. As discussed previously, individuals with lower self-esteem who overly focus on the anxiety they experience and their lack of self-confidence have been found to have poorer performance (Cambell, & Fairey, 1985). Regarding the current study, individuals with diabetes are likely to receive blood glucose values both within and outside their target range on a regular basis, and because of this exposure may experience a heightened focus on their inability to maintain glycemic control. This may contribute to a lack of motivation to engage in the behaviors that serve to support blood
glucose management. Future studies may consider the relationship between self-esteem and defensive pessimism as it relates to blood glucose control.

Another important factor may be the difficulty involved in detecting moderational effects in field studies rather than experimental tests. McClelland and Judd (1993) found that field studies have lower statistical power for detecting interactions and moderator effects than experimental tests. McClelland and Judd suggested that this may be due to the reduced control field researchers have over many aspects of studies, decreasing the likelihood of obtaining optimal distributions of observations in the predictor variables that comprise interactions. Accordingly, suboptimal distributions of predictors can reduce the residual variance of the product of the predictors, and thereby reduce the overall efficiency of the moderator, making effects more difficult to detect. Researchers conducting experimental tests have more control pertaining to inclusion of extreme observations, avoiding scores in the middle categories, and concentrating observations at the extremes. These latter strategies can contribute to increasing variability in the predictors that make up the interaction, which in turn increases the residual variance of the product considerably due to the act of multiplication. McClelland and Judd suggest several ways of improving a field researcher’s ability to detect an interaction, such as using a method of recruitment other than random sampling and increasing the sample size. This is pertinent to the current study given that it is likely that even the originally proposed sample size was not sufficient to effectively detect a moderator. This is evidenced by the posthoc G-Power analysis indicating that over 200 observations would be necessary for detecting significance on the basis of the obtained findings. Future
studies should consider expanding recruitment and focusing recruitment on individuals who score at the extremes of both anxiety and defensive pessimism in order to optimize the effectiveness of defensive pessimism as a moderator.

One limitation of the current study is that individuals who were enrolled in the study were unselected with regard to experience of anxiety symptoms. This may have diluted the effect of anxiety on blood glucose control by resulting in a low overall base rate of anxiety symptoms in the present sample, and consequently made the role of defensive pessimism in the relationship between anxiety and glycemic control more difficult to discern. The overall mean trait anxiety score for the current study ($\bar{x} = 43.76$, $SD = 14.60$) fell between the norms for healthy working adults ($\bar{x} = 34.89$, $SD = 9.19$) and neuropsychiatric patients with anxiety reactions ($\bar{x} = 48.08$, $SD = 10.65$; Spielberger, 1983). Although the mean trait anxiety score for the current sample fell closer to that for individuals with clinically-severe anxiety than that for healthy working adults, it is possible that a sample of individuals with diabetes and clinically-severe anxiety disorders could yield different results. The effect could be further elucidated by the addition of a non-anxious control group. The current study was also restricted by sample size and the availability of participants. The addition of more participants would allow for more comprehensive statistical models that would account for a greater number of variables that affect glycemic control.

Another limitation of the current study is that the participants completed the questionnaire packets at home or over the phone. This could have influenced response tendencies of the participants, resulting in biased responding. Also, the temporal
proximity of participants having completed the questionnaire packet to their doctor’s appointment was not consistent across participants, and varied widely from 1-4 weeks prior to the appointment. This may have affected participants’ experience of defensive pessimism prior to the appointment (e.g., by 1 week prior to the appointment, participants may have already compensated for the anxiety they experienced pertaining to the doctor’s appointment via the utilization of defensive pessimism).

Future studies might consider examining defensive pessimism in a clinically anxious sample in good diabetes health. The combination of these two factors may better highlight the role of defensive pessimism in the relationship between anxiety and glycemic control. It is possible that using different statistical methods, such as structural equation modeling, would allow for the inclusion of more of the factors that affect glycemic control, such as those identified by Gonder-Frederick, Cox, and Ritterband (2002) (e.g., personality, social support, and cultural factors). The use of confirmatory factor analyses may yield different results with regard to the role of defensive pessimism in the relationship between anxiety and glycemic control. Also, although the internal consistency of SMBG-related DPQ is comparable to the original DPQ, the internal consistency level is still relatively low compared to the levels of internal consistency found for the other self-report measures used in the current study. This may indicate that it would be appropriate for future studies to develop an additional measure to address this issue. Enhancing the collective knowledge about the factors that influence glycemic control is critical for physicians, health psychologists, patients, and researchers in order to accurately target, analyze, and treat the factors that contribute to poor control and may
place individuals with type 1 diabetes at risk for developing the complications associated with diabetes.
References


Appendix A: Measures

Appendix A-1: Demographics Questionnaire

Demographic Characteristics

For the following questions, please FILL IN THE BLANK or CIRCLE the answer that best describes you. All of the information you provide will be used only for research purposes. It will not be shared with your doctor.

1. What is your age? _______________ (years)

2. What is your gender/sex? (circle one)
   1. Male
   2. Female

3. How old were you when you were diagnosed with diabetes? Age:_______

4. What type of diabetes do you have? (Circle only one. If you are not sure, ask the researcher to help you).
   1. Type 1 diabetes (insulin dependent or juvenile onset diabetes)
   2. Type 2 diabetes (non-insulin dependent or adult onset diabetes)

5. How do you take care of your diabetes? (Circle one.)
   1. Diet only
   2. Pills
   3. Insulin injections
   4. Pills and insulin injections
   5. Insulin Pen
   6. Insulin pump
Appendix A-1: Demographics Questionnaire

6. Have you participated in a diabetes education program in the last two years? (circle one)
   1. Yes  2. No

7. If yes, about how many hours of diabetes education have you received in the last two years?
   ________ Hours

8. How many office visits have you made to your primary care doctor in the last two years?
   ________ Total Medical Visits

9. Of these, how many visits have you made specifically for your diabetes?
   ________ Total Diabetes-Related Visits

10. How many visits have you made to a diabetes specialist such as endocrinologist, diabetologist, or diabetes educator in the last two years?
    ________ Total Diabetes-Specific Visits

11. How many visits to the Emergency Room have you made for your diabetes in the last two years?
    ________ Total Diabetes-Related Emergency Visits

12. How many visits to Express Care have you made for your diabetes in the last two years?
    ________ Total Diabetes-Related Express Care Visits
Appendix A-1: Demographics Questionnaire

13. Have you had a glycosylated hemoglobin (HbA1c or average blood sugar) checked by your doctor?
   1. Yes  2. No

14. If Yes, when was your most recent test? (Please fill in date)____________________

15. What were the results?  __________________________  __________________________

16. How many years of education do you have (circle one)?
   Less than high school
   High school diploma or GED
   Trade School after High School
   Part College
   4-year College Degree
   Masters or Post-Degree Education
   Other: __________________________

17. Do you work outside the home?
   1. Yes  2. No

18. If YES, please tell us your job title: _________________________________

19. If you have a spouse, partner or other adult living in the home that helps pay the bills, does she/he work outside the home?
   1. Yes  2. No
Appendix A-1: Demographics Questionnaire

20. What is your annual income BEFORE taxes? Please CIRCLE the range that best describes your TOTAL yearly household income.
   
   0 - $10,000
   $10,000-$20,000
   $21,000-$40,000
   $41,000 - $60,000
   $61,000 - $80,000
   $81,000 - $100,000
   More than $100,000

21. How many people are supported by this income: ________________ People

22. Do you own your own home/apartment/mobile home?
   
   1. Yes  2. No

23. Do you have a checking account?
   
   1. Yes  2. No

24. Do you have a savings account?
   
   1. Yes  2. No

25. How hard is it to make ends meet each month?
   
   1. Very Hard
   2. Hard
   3. Not Hard, Not Easy
   4. Easy
   5. Very Easy
Appendix A-1: Demographics Questionnaire

26. Do you have difficulty paying your bills?

   1. Yes       2. No

27. During the last few years, how would you describe your financial situation?

   1. Getting better
   2. Staying the same
   3. Getting worse

28. So far as you and your family are concerned, how satisfied are you with your present financial situation?

   1. Very Satisfied
   2. Somewhat Satisfied
   3. Neither Satisfied or Dissatisfied
   4. Somewhat Dissatisfied
   5. Very Dissatisfied

29. How hopeful are you about your financial situation?

   1. Pretty hopeful
   2. More or less hopeful
   3. Not hopeful at all

30. My ethnicity is:
   a) White, Caucasian, European, not Hispanic
   b) Asian, Asian-American, Pacific Islander or Oriental
   c) Black or African American
   d) Hispanic or Latino
   e) American Indian
   f) Mixed; parents are from two different groups.
   g) Other (write in): ___________________________
Appendix A-1: Demographics Questionnaire

31. My father’s ethnicity is: (write in letters from above list)_______________________

32. My mother’s ethnicity is: (write in letters from above list)_______________________

33. What is your marital status (Please circle one)?
   a) Married
   b) Living with a partner
   c) Single
   d) Divorced
   e) Separated
   f) Widowed
   g) Other

Health Care Coverage

The following questions ask about the type of health care coverage you may have. Please give us your honest answers about your experience with your health care providers. This information will not be shared with your doctors/providers.

34. Do you currently have health insurance benefits (e.g. PPO, health maintenance organization, Medicare, Medicaid) (Circle one)?
   1. Yes Please list:________________________________________________________
   2. No ________________________________________________________________
   3. Not Sure ____________________________________________________________

35. Do you currently have mental health benefits as part of your health insurance?
   1. Yes
   2. No
   3. Not Sure
Appendix A-1: Demographics Questionnaire

36. Do you feel your mental health benefits are adequate for your mental health care needs?
   1. Yes
   2. No
   3. Not Sure

37. How satisfied are you with your health insurance?
   1. Very Satisfied
   2. Somewhat Satisfied
   3. Neither Satisfied or Dissatisfied
   4. Somewhat Dissatisfied
   5. Very Dissatisfied

38. Do you currently have a primary care provider (for example, an internist, family practitioner, nurse practitioner, private physician)?
   1. Yes  2. No

39. How long have you been seeing this person? ____________ Months/Years
   (circle one)

40. Do you currently see a separate provider for your diabetes (for example, an endocrinologist, diabetes educator, diabetologist)?
   1. Yes  2. No

41. How long have you been seeing this person? ____________ Months/Years
   (circle one)
Appendix A-2: Defensive Pessimism Questionnaire (DPQ)

When you answer the following questions, please think about how you prepare for, and think about social situations. Each of the statements below describes how people sometimes think or feel about these kinds of situations. In the blanks beside each statement, please indicate how true it is of you, in social situations.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all true of me</th>
<th>Very true of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I go into these situations expecting the worst, even though I know I will probably do OK.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2. I generally go into these situations with positive expectations about how I will do.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3. I've generally done pretty well in these situations in the past.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>4. I carefully consider all possible outcomes before these situations.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>5. When I do well in these situations, I often feel really happy.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>6. I often worry in these situations that I won't be able to carry through my intentions.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>7. I often think about how I will feel if I do very poorly in these situations.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>8. I often think about how I will feel if I do very well in these situations.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>9. When I do well in these situations, it is usually because I didn't get too worried about it beforehand.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix A-2: Defensive Pessimism Questionnaire (DPQ)

<table>
<thead>
<tr>
<th></th>
<th>Not at all true of me</th>
<th>Very true of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. I often try to figure out how likely it is that I will do very poorly in these situations.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>11. I'm careful not to become overconfident in these situations</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>12. I spend a lot of time planning when one of these situations is coming up.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>13. When working with others in these situations, I often worry that they will control things or interfere with my plans.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>14. I often try to figure out how likely it is that I will do very well in these situations.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>15. In these situations, sometimes I worry more about looking like a fool than doing really well.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>16. Prior to these situations, I avoid thinking about possible bad outcomes.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>17. Considering what can go wrong in academic situations helps me to prepare.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

Note: See Norem & Cantor, 1986a.
Appendix A-3: SMBG Defensive Pessimism Questionnaire (SMBG-DPQ)

When you answer the following questions, please think about how you prepare for and think about testing your blood sugar. Each of the statements below describes how people sometimes think or feel about these kinds of situations. In the blanks beside each statement, please indicate how true it is of you as you test your blood sugar.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all true of me</th>
<th>Very true of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When I go to test my blood sugar, I expect the worst even though I know it will probably be OK.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2. I generally go into blood sugar testing situations with positive expectations about how I will do.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3. My blood sugar values have been generally good in the past.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>4. I carefully consider all possible outcomes before testing my blood sugar.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>5. When I receive a blood sugar value in my target range, I often feel really happy.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>6. I often worry, when testing my blood sugar, that I won't be able to reach my blood sugar management goals.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>7. I often think about how I will feel if I receive blood sugar values far outside of my target range.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>8. I often think about how I will feel if I receive blood sugar values within my target range.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix A-3: SMBG Defensive Pessimism Questionnaire (SMBG-DPQ)

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. When I receive blood sugar values within my target range, it is usually because I didn't get too worried about it beforehand.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I often try to figure out how likely it is that I will receive a blood sugar values outside of my target range.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I'm careful not to become overconfident my blood sugar control.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I spend a lot of time planning when a blood sugar test is coming up.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. When working with others to gain control over my blood sugar, I often worry that they will dominate the situation or interfere with my plans.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I often try to figure out how likely it is that I will receive blood sugar values in my target range.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. When testing my blood sugar, sometimes I worry more about looking like a fool than doing really well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Prior to testing my blood sugar, I avoid thinking about possible bad outcomes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Considering what can go wrong in controlling my blood sugar helps me to prepare.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix A-4: The Center for Epidemiologic Studies Depression Scale (CES-D)

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name __________________________ Date __________

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate you generally feel.

1 = Almost Never, 2 = Sometimes, 3 = Often, 4 = Almost Always

21. I feel pleasant ........................................................................................................... 1 2 3 4
22. I feel nervous and restless ....................................................................................... 1 2 3 4
23. I feel satisfied with myself ..................................................................................... 1 2 3 4
24. I wish I could be as happy as others seem to be ................................................... 1 2 3 4
25. I feel like a failure .................................................................................................... 1 2 3 4
26. I feel rested ............................................................................................................... 1 2 3 4
27. I am “calm, cool, and collected” ............................................................................ 1 2 3 4
28. I feel that difficulties are piling up so that I cannot overcome them ...................... 1 2 3 4
29. I worry too much over something that really doesn’t matter .................................. 1 2 3 4
30. I am happy ............................................................................................................... 1 2 3 4
31. I have disturbing thoughts ..................................................................................... 1 2 3 4
32. I lack self-confidence ............................................................................................. 1 2 3 4
33. I feel secure ............................................................................................................. 1 2 3 4
34. I make decisions easily .......................................................................................... 1 2 3 4
35. I feel inadequate ..................................................................................................... 1 2 3 4
36. I am content ........................................................................................................... 1 2 3 4
37. Some unimportant thought runs through my mind and bothers me ................. 1 2 3 4
38. I take disappointments so keenly that I can’t put them out of my mind ............. 1 2 3 4
39. I am a steady person .............................................................................................. 1 2 3 4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests ........................................................................................................... 1 2 3 4

Note: See Speilberger, 1983.
## Appendix A-5: The Center for Epidemiologic Studies Depression Scale (CES-D)

**INSTRUCTIONS:** Listed below are ways you might have felt or behaved. Please tell us **HOW OFTEN** you have felt this way during the **PAST WEEK.** We are interested in your honest opinion. There are no right or wrong answers.

<table>
<thead>
<tr>
<th>Question</th>
<th>None or Less than 1 day</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>5-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was bothered by things that usually don’t bother me.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I did not feel like eating; my appetite was poor.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. I felt that I could not shake off the blues even with help from my family or friends.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. I felt that I was just as good as other people.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I had trouble keeping my mind on what I was doing.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I felt depressed.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I felt that everything I did was an effort.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I felt hopeful about the future.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I thought my life had been a failure.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I felt fearful.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. My sleep was restless.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. I was happy.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. I talked less than usual.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. I felt lonely.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. People were unfriendly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. I enjoyed life.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17. I had crying spells.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. I felt sad.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
### Appendix A-5: The Center for Epidemiologic Studies Depression Scale (CES-D)

<table>
<thead>
<tr>
<th>Question</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. I felt that people dislike me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. I could not “get going.”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: See Radloff, 1977.
Appendix A-6: The Rosenberg Self-Esteem Scale

Instructions: Below is a list of statements dealing with your general feelings about yourself. If you strongly agree with the statement, circle 3. If you agree with the statement, circle 2. If you disagree with the statement, circle 1. If you strongly disagree with the statement, circle 0.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On the whole, I am satisfied with myself.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. At times, I think I am no good at all</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. I feel that I have a number of good qualities.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. I am able to do things as well as most other people.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I feel I do not have much to be proud of.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I certainly feel useless at times.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I feel that I am a person of worth, at least on an equal plane with others.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I wish I could have more respect for myself.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. All in all, I am inclined to feel that I am a failure.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I take a positive attitude toward myself.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: See Rosenberg, 1979.
Appendix B: Forms

Appendix B-1: Ohio University Informed Consent to Participate in Research

Title of Research: The Role of Defensive Pessimism and Anxiety in Glycemic Control in Adults with Type 1 Diabetes

Principal Investigator: Erin Rabideau, B. A.
Co-Investigators: Frank Schwartz, M.D., FACE, Jay Shubrook, D.O., Justin Weeks, Ph.D., Mary de Groot, Ph.D
Departments: Psychology; College of Osteopathic Medicine

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to sign it. This will allow your participation in this study. You should receive a copy of this document to take with you.

Explanation of Study

Purpose of the research

The purpose of this study is to better understand how people with type 1 diabetes feel about their blood sugars and how that affects blood sugar control.

Procedures to be followed

You will be asked to fill out a packet of 5 pencil and paper questionnaires that will ask you questions about your background, your feelings about diabetes, and anxiety symptoms. You will also be asked to meet with a study investigator 45 minutes before your regularly scheduled diabetes-related doctor’s appointment. Your medical records will also be reviewed for information about your diabetes health. You may later receive a follow-up letter from the investigators if your scores on the questionnaires related to depression indicate that you may benefit from counseling services.
Appendix B-1: Ohio University Informed Consent to Participate in Research

Duration of participation

You must meet with an investigator of the study 45 minutes prior to your next doctor’s appointment. You will also need to set aside approximately 40 minutes to complete the questionnaire packet 1 month before your scheduled meeting with the study investigator.

Identification of specific procedures that are experimental

There are no experimental procedures in this study. This study is designed to gather information to better understand the connection between anxiety and blood sugar control in adults with type 1 diabetes.

Risks and Discomforts

There are no anticipated risks associated with this study. In the event that you feel uncomfortable answering any of the questionnaires, you are free to stop at any time. Your decision to participate the study or stop participation in the study will not affect the quality of care you receive from Drs. Schwartz and Shubrook.

Benefits

While there are no anticipated direct benefits to you from this study, the indirect benefits of this study will be to better understand the connection between anxiety and blood sugar control. In addition, information gathered from this study will be used to design materials to assist individuals with diabetes to better cope with anxiety.

Confidentiality and Records

The Principal Investigator and immediate study personnel will be the only people who have access to the information that you provide to this study. Confidentiality is very important. Each person who participates in the study will not have his/her information shared with anyone, including their doctor. Your name will not appear in any reports about the study and that all the information that is collected will be used solely for research purposes. Drs. Schwartz and Shubrook will not have access to any of the questionnaires you fill out over the course of this study. The Principal Investigator will retain control of all data collected, including questionnaires, audiotapes, and transcribed notes. Data will be stored in a locked file drawer and in a locked office that is accessible only to the Principal Investigators and study personnel. Original data will be retained for at least 7 years after collection.

Compensation
If you agree to complete the questionnaires and allow the principal investigator access to your medical record for the agreed upon items, you will be paid $20.00 for your time and effort. You will receive this payment after you return the signed consent forms and completed questionnaire packet to the investigator you meet with before your doctor’s appointment.

Appendix B-1: Ohio University Informed Consent to Participate in Research

Contact Information

If you have any questions regarding this study, please contact Justin Weeks, Ph.D., Assistant Professor, Department of Psychology, Ohio University, (740) 593-1094.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

By signing below, you are agreeing that:

• you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions
• known risks to you have been explained to your satisfaction.
• you understand Ohio University has no policy or plan to pay for any injuries you might receive as a result of participating in this research protocol
• you are 18 years of age or older
• your participation in this research is given voluntarily
• you may change your mind and stop participation at any time without penalty or loss of any benefits to which you may otherwise be entitled.

Signature_________________________________________ Date_______

Printed Name_________________________________________ Version

Date: 1/1/10
Appendix B-2: Authorization to Use and Disclose Protected Health Information

Ohio University Authorization to Use and Disclose Protected Health Information

The privacy law, Health Insurance Portability and Accountability Act (HIPAA), protects my individually identifiable health information (protected health information). The privacy law requires me to sign an authorization (or agreement) in order for researchers to be able to use or disclose my protected health information for research purposes in the study entitled, The Role of Defensive Pessimism and Anxiety in Glycemic Control in Adults with Type 1 Diabetes.

I authorize Erin Rabideau, B.A. and her research staff to use and disclose my protected health information for the purposes described below. I also permit my doctors and other health care providers to disclose my protected health information for the purposes described below.

My protected health information will be taken from the medical record from my doctor. The information that may be used and disclosed includes:

- The 2 most recent average blood sugar values (glycosylated hemoglobin, HbA1c).
- Self-monitored blood glucose values for the week preceding this doctor’s appointment.

My protected health information will be used:

- To better understand the role that coping plays in the relationship between anxiety and blood sugar control. Gathering information from my medical record will enable the researcher to meet the goals of the study.

The researchers may use and share my health information with:

- Ohio University’s Institutional Review Board/Office of Research Compliance
- Government representatives, when required by law
- O’Bleness Hospital or Ohio University representatives
- Dr. Jay Shubrook or Dr. Frank Schwartz

Once my health information has been disclosed to anyone outside of this study, the information may no longer be protected under this authorization.
Appendix B-2: Authorization to Use and Disclose Protected Health Information

The researchers agree to protect my health information by using and disclosing it only as permitted by me in this Authorization and as directed by state and federal law.

I do not have to sign this Authorization. If I decide not to sign the Authorization:

- It will not affect my treatment, payment, enrollment in any health plans, or affect my eligibility for benefits.
- I will not be allowed to participate in the research study.

After signing the Authorization, I can change my mind and:

- Not let the researcher disclose or use my protected health information (revoke the Authorization)
- If I revoke the Authorization, I will send a written letter to: Erin Rabideau, B.A., Department of Psychology, Ohio University, 200 Porter Hall, Athens, OH 45701 to inform her of my decision.
- If I revoke this Authorization, researchers may only use and disclose the protected health information already collected for this research study.
- If I revoke this Authorization, my protected health information may still be used and disclosed should I have an adverse event (a bad effect).
- If I change my mind and withdraw the authorization, I may not be allowed to continue to participate in the study.

This Authorization will expire when there is no longer a need to examine this data related to the study.

If I have not already received a copy of the Privacy Notice, I may request one. If I have any questions or concerns about my privacy rights, I should contact the Ohio University Privacy Officer at (740) 593-2626.

I am the subject or am authorized to act on behalf of the subject. I have read this information, and I will receive a copy of this form after it is signed.

Signature of research subject or research subject’s legal representative*  Date
Appendix B-2: Authorization to Use and Disclose Protected Health Information

Printed name of research subject or research subject’s legal representative*  Date

*Please explain representative’s relationship to patient and include a description of representative’s authority to act on behalf of patient:
Appendix B-3: Phone Script: Informed Consent To Participate in Research

Ohio University Phone Script: Informed Consent To Participate in Research

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. I will describe the purpose, procedures, possible benefits, and risks of the study. I will also explain how your personal information will be used and protected. Once I have gone over this information with you and your questions about the study are answered, you will be asked to provide consent to participate and agree to a waiver of signature, since we are going over this information over the phone. This will allow your participation in this study. You will receive a copy of the original consent form for the study for your records. Please feel free to stop me at any time to ask questions.

Are you ready?
YES: proceed with script
NO: stop to answer the individual’s questions

The purpose of this study is to better understand how people with type 1 diabetes feel about their blood sugars and how that affects blood sugar control.

The procedure of this study is to go through 5 questionnaires over the phone, which will take approximately 45 minutes. The questionnaires will ask you questions about your background, your feelings about diabetes, and anxiety symptoms. You will also be asked to meet with a study investigator 45 minutes before your regularly scheduled diabetes-related doctor’s appointment. Your medical records will also be reviewed for information about your diabetes health. You may later receive a follow-up letter from the investigators if your scores on the questionnaires related to depression indicate that you may benefit from counseling services.

There are no experimental procedures in this study. This study is designed to gather information to better understand the connection between anxiety and blood sugar control in adults with type 1 diabetes.

There are no anticipated risks associated with this study. In the event that you feel uncomfortable answering any of the questionnaires, you are free to stop at any time. Your decision to participate the study or stop participation in the study will not affect the quality of care you receive from Drs. Schwartz and Shubrook.

While there are no anticipated direct benefits to you from this study, the indirect benefits of this study will be to better understand the connection between anxiety and blood sugar
control. In addition, information gathered from this study will be used to design materials to assist individuals with diabetes to better cope with anxiety.

Confidentiality is very important. Each person who participates in the study will not have his/her information shared with anyone, including their doctor. The Principal Investigator and immediate study personnel will be the only people who have access to the information that you provide to this study. Your name will not appear in any reports about the study and that all the information that is collected will be used solely for research purposes. Drs. Schwartz and Shubrook will not have access to any of the questionnaires you fill out over the course of this study. The Principal Investigator will retain control of all data collected, including questionnaires, audiotapes, and transcribed notes. Data will be stored in a locked file drawer and in a locked office that is accessible only to the Principal Investigators and study personnel. Original data will be retained for at least 7 years after collection.

If you agree to complete the questionnaires and allow the principal investigator access to your medical record for the agreed upon items, you will be paid $20.00 for your time and effort. You will receive this payment after you return the signed consent forms and completed questionnaire packet to the investigator you meet with before your doctor’s appointment.

If you have any questions regarding this study, please contact Justin Weeks, Ph.D., Assistant Professor, Department of Psychology, Ohio University, (740) 593-1094.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

By waiving your signature and agreeing to participate, you are agreeing that:
• you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions
• known risks to you have been explained to your satisfaction.
• you understand Ohio University has no policy or plan to pay for any injuries you might receive as a result of participating in this research protocol
• you are 18 years of age or older
• your participation in this research is given voluntarily
• you may change your mind and stop participation at any time without penalty or loss of any benefits to which you may otherwise be entitled.

☐ Provided waiver of signature and agreed to participate       Date ______________
Appendix B-3: Phone Script: Informed Consent To Participate in Research

☐ Refused to provide a waiver of signature  Date ______________

Version Date: 02/12/10
### Appendix C: Tables

**Appendix C-1: Table 1 - Sample demographics (n = 41)**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>46.30%</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>53.70%</td>
</tr>
<tr>
<td><strong>Diabetes treatment type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin injections</td>
<td>10</td>
<td>24.40%</td>
</tr>
<tr>
<td>Insulin pen</td>
<td>4</td>
<td>9.80%</td>
</tr>
<tr>
<td>Insulin pump</td>
<td>27</td>
<td>65.90%</td>
</tr>
<tr>
<td><strong>Valid health insurance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>95.10%</td>
</tr>
<tr>
<td><strong>Mental healthcare benefits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>43.90%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school diploma</td>
<td>1</td>
<td>2.40%</td>
</tr>
<tr>
<td>High school diploma or GED</td>
<td>8</td>
<td>19.50%</td>
</tr>
<tr>
<td>Trade school after high school</td>
<td>5</td>
<td>12.20%</td>
</tr>
<tr>
<td>Part college</td>
<td>10</td>
<td>24.40%</td>
</tr>
</tbody>
</table>
## Appendix C-1: Table 1 - Sample demographics (n = 41)

<table>
<thead>
<tr>
<th>Education</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-year college degree</td>
<td>5</td>
<td>12.20%</td>
</tr>
<tr>
<td>Masters or post-graduate degree</td>
<td>12</td>
<td>29.30%</td>
</tr>
</tbody>
</table>

### Income

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0-10,000</td>
<td>7</td>
<td>17.10%</td>
</tr>
<tr>
<td>$10,000-20,000</td>
<td>3</td>
<td>7.30%</td>
</tr>
<tr>
<td>$21,000-40,000</td>
<td>6</td>
<td>14.60%</td>
</tr>
<tr>
<td>$41,000-60,000</td>
<td>12</td>
<td>29.30%</td>
</tr>
<tr>
<td>$61,000-80,000</td>
<td>8</td>
<td>19.50%</td>
</tr>
<tr>
<td>$81,000-100,000</td>
<td>3</td>
<td>7.30%</td>
</tr>
<tr>
<td>More than $100,000</td>
<td>2</td>
<td>4.90%</td>
</tr>
</tbody>
</table>

### Ethnicity – Caucasian

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>41</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Marital status

<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>24</td>
<td>58.50%</td>
</tr>
<tr>
<td>Living with partner</td>
<td>2</td>
<td>4.90%</td>
</tr>
<tr>
<td>Single</td>
<td>6</td>
<td>14.60%</td>
</tr>
<tr>
<td>Divorced</td>
<td>7</td>
<td>17.10%</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>4.90%</td>
</tr>
</tbody>
</table>
Table 2

Sample means and standard deviations of study variables (n = 41)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>51.98</td>
<td>14.83</td>
</tr>
<tr>
<td>Years since diabetes diagnosis</td>
<td>24.54</td>
<td>14.44</td>
</tr>
<tr>
<td>Most recent HbA1c</td>
<td>7.4%</td>
<td>0.95</td>
</tr>
<tr>
<td>Average daily SMBG frequency</td>
<td>4.67</td>
<td>2.56</td>
</tr>
<tr>
<td>Depression symptoms (CES-D)</td>
<td>18.80</td>
<td>14.89</td>
</tr>
<tr>
<td>Trait anxiety symptoms (STAI-T)</td>
<td>43.76</td>
<td>14.60</td>
</tr>
<tr>
<td>Self-Esteem (RSES)</td>
<td>18.17</td>
<td>6.86</td>
</tr>
</tbody>
</table>
### Appendix C-3: Table 3 - Correlations among all study measures (n = 41)

**Table 3**

*Correlations among all study measures (n = 41)*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Trait Anxiety (STAI-T)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 SMBG-related Defensive Pessimism</td>
<td>.32</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Square-Rooted Mean SMBG Frequency</td>
<td>-.20</td>
<td>-.10</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Current HbA1c</td>
<td>-.17</td>
<td>-.01</td>
<td>-.60*</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Depression (CES-D)</td>
<td>.91</td>
<td>.35*</td>
<td>-.26</td>
<td>.16</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>6 Self-Esteem (RSES)</td>
<td>-.88*</td>
<td>-.46*</td>
<td>.14</td>
<td>-.16</td>
<td>-.85*</td>
<td>---</td>
</tr>
</tbody>
</table>

Note: *p* < 0.01 = *.
Table 4

*Moderational analyses (n = 41)*

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>p</th>
<th>β</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1: Daily SMBG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait anxiety</td>
<td>-0.007</td>
<td>0.007</td>
<td>-0.998</td>
<td>0.325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMBG-DPQ</td>
<td>&lt;0.001</td>
<td>0.008</td>
<td>-0.097</td>
<td>0.923</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait anxiety X</td>
<td>&lt;0.001</td>
<td>0.001</td>
<td>-0.607</td>
<td>0.547</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMBG-DPQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 2: HbA1c</strong></td>
<td>0.485</td>
<td>0.695</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait anxiety</td>
<td>0.013</td>
<td>0.011</td>
<td>1.194</td>
<td>0.240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMBG-DPQ</td>
<td>-0.003</td>
<td>0.012</td>
<td>-0.283</td>
<td>0.779</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait anxiety X</td>
<td>&lt;0.001</td>
<td>0.001</td>
<td>-0.389</td>
<td>0.699</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Daily SMBG frequency is the outcome variable of Model 1 and HbA1c is the outcome variable of Model 2. No predictors were significant.
Appendix D: Figures

Appendix D-1: Figure 1 - The cognitive processes behind defensive pessimism

Figure 1. The cognitive processes behind the strategy of defensive pessimism.
Appendix D-2: Figure 2 - Diagrammed hypothesis 8

![Diagram](image)

*Figure 2. Diagrammed hypothesis 8.*
Appendix D-3: Figure 3 - Diagrammed hypothesis 9

Figure 3. Diagrammed hypothesis 9.