COPING, CONTROL, AND ADJUSTMENT IN TYPE 2 DIABETES

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Abstract

Research on people with type 1 diabetes has shown that high perceived control and the use of task-oriented coping resulted in lower depression and anxiety, and better blood glucose control, than low perceived control and use of emotion-oriented coping (Smari & Valtysdottir, 1997). Other research on chronic illnesses has not, however, found perceived control to be of importance (Felton and Revenson, 1984). Very little research has systematically investigated the relationship between perceived control over diabetes and coping strategies in people with type 2 diabetes, and hence, this study investigated the role of these variables in psychological and physical adjustment to type 2 diabetes.

Data were collected from 115 adults (65 women, 50 men, 35-81 years of age) diagnosed with type 2 diabetes a minimum of 6 months prior to participating. Participants answered questionnaires on coping strategies, perceived control, and state and trait depression and anxiety. Blood glucose control (self-reported Hemoglobin A_{1c}, or HbA_{1c}) was used as a diabetes-specific outcome measure. It was hypothesized that individuals with type 2 diabetes who use instrumental coping would be less depressed and anxious and have better blood glucose control, than those who use emotion-oriented or avoidance coping. It was further hypothesized that outcomes and coping strategies would vary as a function of perceived control.

Results of correlation analyses showed that emotion-oriented coping strategies were positively related to depression and anxiety, whereas perceived control was negatively related to these outcome variables. None of the predictor variables were significantly correlated with HbA_{1c}.

Regression analyses showed emotion-oriented coping and palliative coping to be positive predictors of depression, whereas instrumental and distraction coping were negative predictors of depression. Emotion-oriented coping was a positive predictor and distraction coping a negative predictor of state anxiety. Perceived control was involved in both main effects and interaction effects for trait anxiety in physical danger and ambiguous situations. Only perceived control was a predictor of HbA_{1c} for all analyses.

Results of mediation tests showed that ruminative coping mediated the negative relationships between perceived control and both depression and anxiety. Emotional preoccupation was also a mediator, but only for depression. Results are discussed in terms of other research findings, theoretical and practical implications, and future research directions.

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Chapter 1

INTRODUCTION

Chronic illnesses are becoming increasingly represented in causes of mortality, accounting for approximately 80% of deaths in Western countries (Maes, Leventhal & DeRidder, 1996). These chronic illnesses include conditions such as cancer, heart disease, asthma, rheumatoid arthritis, and diabetes, all of which share the basic characteristics of being high in prevalence, duration, and great cost to the medical system and to society as a whole. Research on chronic illnesses shows that the various symptoms and strict treatment regimens associated with these illnesses can be the source of much psychological distress for the individual (e.g., Wilkinson, 1991). This is further evidenced by research showing high rates of psychiatric disorders, particularly depression and anxiety, in people with physical illnesses. For example, Wells, Golding and Burnam (1988) found a 41% increased risk in having any type of psychiatric disorder in people with physical illnesses, and Lustman (1988) found that depression and anxiety account for 87% of psychiatric disorders in this group. These statistics show the negative impact that physical illness can have on an individual's psychological adjustment, and the need for research to determine the best and most appropriate coping strategies to deal with the stress of illness.

The coping strategies used to deal with chronic illnesses can play a key role in the maintenance and duration of, and psychological adjustment to, a chronic illness (Aldwin, 1994; Endler, Parker & Summerfeldt, 1993, 1998; Reid, Dubow, Carey & Dura, 1994; Taylor, 1999). In terms of which coping strategies are used to deal with an illness,

there is much debate as to whether the individual's appraisal of the illness as controllable or uncontrollable plays a role in choice of coping strategy and in the outcomes associated with the illness (e.g., depression or anxiety; see, for example, Felton & Revenson, 1984). In response to these issues, this study investigated illness-specific coping strategies, and their relationship to perceived control over the condition and psychological and illness-specific outcome factors. More specifically, this research project focused on type 2 diabetes[1], and investigated whether coping responses are directly related to psychological adjustment (the absence of depression and anxiety) and a diabetes-specific measure of control (blood glucose levels). In addition, this study investigated whether the patient's appraisal of the condition as controllable or uncontrollable is involved in the relationship between coping and psychological and physical adjustment, or whether perceived control and coping act directly, and independently of each other. The following section illustrates the main concepts investigated in this study, and their relationship to research on health problems.

Stress and Coping

Stress is a term used to refer to the experience people have with demands and challenges in their lives, whether they are chronic, everyday occurrences (e.g., job workload demands; dealing with diabetes treatment regimen), or significant life events (e.g., losing a loved one; being diagnosed with terminal cancer; Lazarus, 1993). Thus, individuals experience different degrees of stress and the term itself can encompass many

[1] Type 2 diabetes is usually diagnosed in people over 30 years of age, and results from high blood sugar levels, which can generally be controlled through diet and exercise. Type 1 diabetes is usually diagnosed in people under 30 years of age, and high blood sugar levels in this group must be controlled through insulin injections. More detail to follow in the section entitled: "Classification of Diabetes Mellitus."

different meanings. Cohen, Kessler and Underwood-Gordon (1995) define stress as "a process in which environmental demands tax or exceed the adaptive capacity of an organism, resulting in psychological and biological changes that may place persons at risk for disease" (p. 3). Thus, stress is a multidimensional term that characterizes reactions to many different situations - from the birth of a child to being diagnosed with a debilitating illness – and can result in negative psychological and physical outcomes (e.g., depression, anxiety, somatic complaints, and illness). The coping strategies people employ to deal with these various situations can be important in reducing associated psychological distress, and can mediate between stressful events and negative outcomes in psychological and physical health (Endler & Parker, 1994; Endler & Parker, 1990).

Coping has been defined in the literature as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141), and can also include efforts at regulating emotions (Summerfeldt & Endler, 1996). The coping mechanisms people use can be classified as either resources or processes (Moos & Schaeffer, 1993). Coping processes or strategies are the "cognitive and behavioral methods people employ in specific stressful circumstances" (Pearlin & Schooler, 1982, p. 110). The strategies people use to diminish stress in their lives are made up of personal and social resources people have available to them, including cognitive appraisal, friend support, and family support (Macrodimitris, Durup, Donaldson, & Waldman, 1996; Macrodimitris, Durup & Hamlin, 1997). In a process-oriented model, the use of these cognitive and behavioral strategies is assumed to be conscious, and thus, can be assessed

through self-report inventories (Endler & Parker, 1994; Parker & Endler, 1992). This study focused on coping processes, and, in particular, on the personal cognitive and behavioral mechanisms people with type 2 diabetes use to deal with stressors specific to their condition.

The coping strategies people employ to deal with stressful events were first placed into specific categories by Lazarus and Folkman (1984). These researchers have distinguished theoretically (Lazarus & Folkman, 1984) and empirically (Folkman & Lazarus, 1980) between problem-focused and emotion-focused coping. Problem-focused coping strategies include those cognitions and behaviors that manage the problem causing the distress. Through this approach, thought and action are initiated to deal with the stressor, and because of this direct approach to the problem, "psychological stress may also be changed for the better" (Lazarus, 1993, p. 8). The existence of this coping response is supported by other research finding a similar coping construct. For example, in factor analyzing the items of the Coping Inventory for Stressful Situations (CISS), Endler and Parker (1999a) distinguished a factor called "task-oriented coping", which involves "efforts aimed at solving the problem, cognitively restructuring the problem or attempts to alter the situation" (Endler & Parker, 1999a, p. 35). As illustrated in this description, the underlying concept of task-oriented coping is the same as that of Lazarus and Folkman's problem-focused coping (Endler & Parker, 1994). The existence of this coping strategy has been well-established in the literature, and is generally associated with positive outcomes (e.g., less depression or anxiety), particularly when used in response to stressors that are perceived as controllable (see below).

Emotion-focused coping, the second main coping strategy distinguished by Lazarus and Folkman (1984), involves regulating the emotion and distress associated with the stressor. Lazarus (1993) describes this coping strategy as one which changes "only the way we attend to or interpret what is happening" (p. 8) rather than being an active attempt at solving the problem. As with problem-focused or task-oriented coping, this coping strategy is also well-established as a separate construct in the literature on stress and coping. For example, factor analyses of the CISS yielded another factor that Endler and Parker (1999a) labeled emotion-oriented coping, which includes emotional responses and self-preoccupation. Although the aim of this coping strategy is to reduce stress, both Lazarus (1993) and Endler and Parker (1999a) agree that this response can actually have the opposite effect in the long run – that of increasing stress and producing negative outcomes (e.g., more likely to be anxious and depressed). Thus, this coping strategy is generally useful only in the short term, and is often used in response to stressors that are perceived as uncontrollable (e.g., death in the family).

Rumination, a concept that has gained more attention in recent years (e.g., Wyer, 1996), is generally conceptualized as being part of the self-focused attention associated with emotion-focused coping (Summerfeldt & Endler, 1996). This concept is defined in the literature as "conscious thinking directed toward a given object for an extended period of time" (Martin & Tesser, 1989, p. 306), and is characterized by "a continual focus on the negative aspects of the event, attention to the possible causes and consequences of the event, and an inability to arrive at positive solutions" (Schiaffino & Revenson, 1995, p. 602). Recent research has pointed to the importance of investigating

this aspect of emotion-focused coping as a possible predictor of depression and other maladaptive outcomes (Nolen-Hoeksema, 1996). One of the main findings in this line of research is that people who ruminate in response to depressive episodes tend to be more depressed, and have longer, more enduring depressive episodes than those who engage in distraction (Nolen-Hoeksema & Morrow, 1991; 1993). In other research, Wilson and Schooler (1991) found that excessive introspection prior to decision making can focus one's attention on negative outcomes and lead to poor choices. This is consistent with research by Nolen-Hoeksema (1996) which shows that ruminative responses can interfere with concentration, attention, and the maintenance of active coping behaviors. Thus, as stated above, it seems that emotion-focused responding, of which rumination is one aspect, generally results in more negative outcomes. Summerfeldt and Endler (1996) note the importance and utility of expanding the concept of emotion-focused coping by including measures of different aspects of this coping strategy, like rumination. Thus, rumination was investigated in this study on coping with type 2 diabetes as a way to further investigate the construct of emotion-focused coping in this particular population.

Recent research on coping has included a third main coping mechanism: avoidance coping (Endler & Parker, 1990; 1999a; 1994; Latack, 1986; McRae, 1984). This type of coping "serves as a form of escape from the unpleasant stressful situation" (Parker & Endler, 1992, p. 326). Within the concept of avoidance coping, Endler and Parker (1999a) further distinguish between those mechanisms that are person-oriented, or focused on <u>social diversion</u> (e.g., avoiding work through being with others), and those mechanisms that are task-oriented, or focused on general <u>distraction</u> (e.g., avoiding

writing a paper by watching TV) (Parker & Endler, 1992). Generally, avoidance coping is found to be maladaptive in the long run, particularly in situations where the stressor is controllable, and is associated with increased psychological distress (e.g., McRae, 1984), although some research has failed to find this result (e.g., Smari & Valtysdottir, 1997). Other research has found that the distraction aspect of avoidance coping can be adaptive in the short-run, when compared to emotion-focused coping, and particularly ruminative responding, although task-oriented coping is generally still more adaptive than either of these responses (Parker & Endler, 1992; Nolen-Hoeksema & Morrow, 1993). The inconclusiveness of research on this coping strategy shows the need for further research to investigate the role of avoidance coping in adjustment. This research project investigated the adaptiveness of problem-focused, avoidance, and emotion-focused coping, with a closer look at the ruminative aspect of the latter coping response, in dealing with a chronic, controllable condition. Before delving into the specific aspects of the present study, the literature connecting "control" and "coping" and the importance of an individual's appraisal of the stressor, or perception of control, in coping and adjustment, will be discussed.

Coping, appraisal, and adaptation. Research on the adaptiveness of each of the coping variables discussed above indicates that cognitive appraisal of the stressor may play a role in how one reacts to a stressor (Lazarus & Folkman, 1984; Taylor, Lichtman & Wood, 1984). According to Lazarus and Folkman (1984), individuals go through primary and secondary appraisal when dealing with a problem. Through primary appraisal, a stressor can be cognitively appraised as either a challenge, a threat, or as

something that may cause actual harm or loss. For stress to be of harm, unresolvable damage must have already occurred (e.g., onset of blindness in a person with diabetes). A threat, on the other hand occurs from "damage that is anticipated, and may or may not be inevitable" (McRae, 1984, p. 920). Examples of this are an impending job layoff, or the threat of later kidney disease in an individual newly diagnosed with diabetes. A demand as a challenge is one which puts a definite strain on one's resources, but is seen as something that can be overcome by the effective utilization of one's resources (e.g., a person with diabetes maintaining normal blood sugar levels). Lazarus and Folkman's (1984) concept of secondary appraisal involves evaluating one's available coping resources and options. They describe this form of appraisal as a "complex evaluative process that takes into account which coping options are available, the likelihood that a given coping option will accomplish what it is supposed to, and the likelihood that one can apply a particular strategy or set of strategies effectively" (p. 35). This type of appraisal relates more to the specific stressor (e.g., type 2 diabetes in this study) and, hence, is of interest to the present study.

Intrinsic in each of these appraisal processes is the concept of perceived control. Perceived control can be defined as "the belief that one has at one's disposal a response that can influence the aversiveness of an event" (Thompson, 1981, p. 89). Lazarus and Folkman (1984) and Folkman (1984) distinguish two main aspects of perceived control, and each is associated with one of the two appraisal processes. The first type of perceived control is "locus of control," and is described as most applicable to the primary appraisal process. This type of perceived control is part of an individual's stable personality

disposition, and involves general beliefs about whether one is able to control situations of importance. Individuals may have an internal locus of control (i.e., the belief that events are caused by the individual's own behavior), whereas others may have an external locus of control (i.e., the belief that events are due to chance, luck, fate, or actions of others) (Folkman, 1984; Lazarus, 1993; Lazarus & Folkman; 1984). In connecting locus of control to primary appraisal, one's locus of control can influence whether a stressor is perceived as a challenge, threat, or loss, and this type of perceived control is most often used in ambiguous situations (see Lazarus & Folkman, 1984). In other, non-ambiguous situations, situation-specific perceived control is more likely to prevail. Situational control is defined as "the extent to which a person believes he or she can shape or influence a particular stressful person-environment relationship" (Lazarus & Folkman, 1984, p. 69), and is the type of perceived control of interest to this research project. This type of control is process-oriented, and hence, relates to the process-oriented model of coping discussed above. In this research project, perceived control over type 2 diabetes was investigated in terms of its influence on choice of coping strategy and adjustment (psychological and physical) in people with this condition.

Much research has been generated that supports the connection among perceptions of control, coping strategies, and outcome variables (e.g., Endler, Speer, Johnson & Flett, 1998a,b), and theories have also been proposed to account for these connections. One theory that has gained much attention in recent years is the "goodness of fit" hypothesis (Conway & Terry, 1992). This hypothesis contends that stressors perceived as controllable are best dealt with through more active coping strategies,

whereas stressors perceived as uncontrollable are better dealt with using avoidance or emotion-oriented coping strategies (Compas, Banez, Malcarne & Worsham, 1991; Conway & Terry, 1992; Endler et al., 1998a; Forsythe & Compas, 1987). Experimental research generally shows support for the goodness of fit hypothesis. For example, McCrae (1984) found that active, task-oriented coping strategies were used more often in dealing with challenging, but controllable events, such as workload, whereas avoidance and emotion coping were used more often to deal with threats and losses, such as burnout. Carver, Scheier and Weintraub (1989) found similar results in a group of undergraduates, who reported using more active coping strategies when dealing with a controllable event. In terms of adaptiveness of using particular coping strategies to deal with particular stressors, Vitaliano, DeWolfe, Maiuro, Russo and Katon (1990) found a negative relationship between problem-focused coping and depressed mood (their measure of maladaptiveness) when the stressor (psychiatric, physical health, work, or family problems) was perceived by the participants as changeable. On the other hand, emotion-oriented coping was positively related to depression when the stressor was seen as changeable (see also Conway & Terry, 1992 for similar results). These factors may be implicated in the coping strategies people use to deal with health problems. That is, this research and the goodness of fit hypothesis imply that problem-oriented coping strategies may be used more and may be more adaptive when an illness is perceived as controllable rather than uncontrollable. The following section discusses the role of illness as a stressor, and research linking control, coping and adjustment in people with chronic illnesses.

Coping and Perceived Control in Chronic Illnesses

"In many ways, coping with the diagnosis of a chronic illness is like coping with any other severely stressful event" (Taylor, 1999, p. 336). This recognition in the field of stress and coping has led to a surge in research investigating coping with health problems in recent years (Endler, Parker & Summerfeldt, 1998). The results of many of these studies show the salubrious effects that certain coping strategies can have on the psychological and physical adjustment to illnesses (see, for reviews, Taylor, 1999; Maes, Leventhal & DeRidder, 1996). In addition, and also consistent with research on stress and coping, studies in this area show the importance of cognitive appraisal of an illness as controllable or uncontrollable in the application of certain coping strategies, and in adjustment (Taylor, Lichtman & Wood, 1984). Research in this area generally distinguishes between those illnesses that are acute, or of short duration, leading to immediate difficulties or to quick recovery (e.g., cardiac arrest; 24-hour flu), and those that are chronic, or of long duration (e.g., arthritis, cancer, diabetes) (Endler, Parker & Summerfeldt, 1998; Taylor, 1999). This research shows that coping strategies used vary according to whether the illness is chronic or acute, with people who have chronic illnesses using both more emotion-focused and task-oriented coping than those with acute illnesses (see Endler, Parker & Summerfeldt, 1998). This research project focused on type 2 diabetes, a chronic illness (see later in discussion for a more specific definition), so the discussion here will be limited to control and coping in chronic illnesses.

Some chronic illnesses (e.g., cancer) are associated with the use of more emotion-focused or avoidance coping strategies, largely because of the many uncontrollable

factors related to the condition (Taylor, 1999), whereas others are associated with more problem-focused coping strategies (e.g., diabetes; Maes, Leventhal & DeRidder, 1996). Thus, research in this area often investigates a variety of different chronic illnesses in one study, and makes comparisons with respect to how they are appraised (as controllable or uncontrollable), the coping strategies used, and psychosocial adjustment (e.g., Felton & Revenson, 1984). For example, Bombardier, D'Amico and Jordan (1990) studied a group of 101 patients with a variety of chronic illnesses (from lower back pain to gastrointestinal problems) on their coping responses, illness appraisals, and psychological adjustment. The findings showed first that emotion-focused coping was related to poor psychological adjustment, including depression, for all of the illnesses. Appraisal was measured through a combination of amount of disability, how much the illness caused the individuals to "hold back" from other activities, and beliefs in being able to change the condition. Illnesses appraised as "holding one back" (which could be construed as low perceived control) predicted the use of emotion-focused coping and poor illness adjustment. Problem-focused coping, on the other hand, was not related to illness adjustment, but was predicted both by "the belief that one could change the condition" and "that one must accept and get used to it." These findings showed that coping strategies and appraisals are related in people with chronic illnesses, but that only emotion-focused coping strategies predict adjustment, which lends partial support to the goodness of fit hypothesis in a chronic illness group.

In another study of control, coping, and adjustment to chronic illness, Felton and Revenson (1984) studied patients with rheumatoid arthritis and cancer (determined,

through aggregated scores of perceived illness control, to be "uncontrollable" chronic illnesses) and hypertension and diabetes (perceived as "controllable" diseases), as a way of testing the goodness of fit hypothesis. Findings showed direct relationships to psychological adjustment for both coping strategies (information seeking showing a positive relationship with adjustment, wish-fulfilling fantasy showing a negative relationship), and perceived controllability (high control related to higher scores on positive affect, lower scores on negative affect, and greater acceptance, than low control), but, unlike the findings of Bombardier et al. (1990), perceived illness controllability was not related to coping strategies used. Thus, this study did not find support for the goodness of fit hypotheses. One main weakness to this study and the other studies discussed here is that comparisons of perceived controllability were only made between different types of chronic illnesses. In other words, these researchers made no attempt to determine whether there are within-illness variations in perceived control and coping response used. The present study attempted to overcome this weakness by studying coping strategies and perceived control within a group of individuals with one particular chronic condition, type 2 diabetes.

The studies described above share a basic problem in methodology with other research in the area of coping with health problems. That is, each of the studies described above use an inter-individual approach to measure coping with a situation-specific stressor. The inter-individual approach to coping focuses on general or dispositional approaches to coping with problems, and includes the coping strategies discussed earlier (i.e., problem-focused, emotion-focused, and avoidance coping strategies) (Endler &

Parker, 1999a; Endler, Parker & Summerfeldt, 1998; Parker & Endler, 1992). The problem with this approach to measuring coping in people with specific health problems is that many of the items in an inter-individual measure may not be applicable to the particular health problem, and as a result, the measure may be modified to suit the needs of the research, thus decreasing its reliability (Endler & Parker, 1999b; Endler, Parker & Summerfeldt, 1998; see, for example, Felton & Revenson, 1984). For this line of research, it is more appropriate instead to take an intra-individual approach to measuring coping, which attempts to measure the process of coping across different situations. This is the approach taken in Endler and Parker's (1999b) measure of coping with health problems, entitled the Coping with Health Injuries and Problems (CHIP) scale. This scale was used to measure coping in the present study in an attempt to improve on previous research by taking an intra-individual approach to measuring coping strategies. (see "Measures" section for more information on this scale).

The inconsistent findings of the studies described thus far on control, coping, and adjustment to chronic illness made it difficult to predict how these variables might relate in a sample of individuals with type 2 diabetes. On the one hand, one study (Bombardier et al., 1990) showed that appraisal and coping do work together to produce outcomes, whereas other studies have shown that perceived control may have a direct effect on outcomes (Felton & Revenson, 1984; Taylor, Lichtman & Wood, 1984), rather than acting through coping strategies (Felton & Revenson, 1984). It was pointed out, however, that there are certain methodological weaknesses in these studies, and that research in this area is limited, warranting further investigation of these issues. Some research has been

conducted investigating in control, coping, and adjustment in people with diabetes mellitus (although primarily type 1). Before delving into the research in this area, the next section will describe epidemiological, etiological, and adjustment factors that are of importance to understanding type 2 diabetes as a stressor, and to understanding why variables like control, coping and adjustment are important to research in type 2 diabetes.

Epidemiology and Etiology of Diabetes Mellitus[2]

Diabetes mellitus affects approximately 100 million people around the world, with one and a half million Canadians alone having the disease (Canadian Diabetes Association, CDA, 1997). It is estimated that a further 750,000 Canadians have the disease but have not yet been diagnosed. Diabetes mellitus is a major cost to the health care system, and to individuals with the condition and their families, mainly as a result of the demanding treatment regimens and the complications that may result. The costs of diabetes mellitus include direct costs of medication, care, medical equipment, and laboratory tests; indirect costs of transportation, child care resulting from time taken for extra medical visits or hospital care, and higher insurance rates; and non-medical costs of work absenteeism, decreased work productivity, and loss of earnings. It is estimated that 4-5% of health budgets around the world are devoted to diabetes-related care and illness, and an individual with diabetes mellitus has approximately 2-5 times higher medical costs than a person without diabetes (CDA, 1997).

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[2] The term "diabetes mellitus" is used in the literature to refer generally to both type 1 and type 2 diabetes (e.g., CDA, 1997; DCEC, 1997), and hence, the same approach will be taken here. When referring to research specifically on type 1 or type 2 diabetes, the classification will be clearly distinguished in the text (i.e., referring to "type 1 diabetes" or "type 2 diabetes"). Much research on diabetes combines both types together, so discussing research on diabetes mellitus in general is very important to this study which is focused on type 2 diabetes.

Diabetes mellitus is a chronic metabolic disorder resulting from inadequate production or utilization of insulin, leading to problems in glucose or energy metabolism (Kaplan, Sallis & Patterson, 1993). When food is eaten, the sugars are extracted by the body and circulate in the blood stream. These blood sugars act as energy or metabolic fuel for cell functioning (Stricker & Verbalis, 1993), but need to be extracted from the blood in order to act on the cells of the body. Insulin is a hormone produced by the beta cells of the Islets of Langerhans, located in the pancreas, and works by promoting the transport of glucose (sugar), amino acids, and potassium into muscle cells for use, and for storage in the liver and adipose (fat) tissue (May, 1991; Stricker & Verbalis, 1993; Taylor, 1999). When there is little or no insulin produced by the pancreas, glucose and other important proteins are not properly utilized or metabolized. In other words, the main effect of a lack of insulin is that glucose cannot gain entry into the cells and instead, continues to build up in the blood stream, creating a condition known as hyperglycemia, which ultimately leads to "a condition similar to starvation" (May, 1991, p. 215). This occurs because glucose is not properly metabolized, causing the body to instead metabolize long-term stored energy components of fat and protein in order to create food for the body. Eventually, the body feeds too much on these stored substances, leaving glucose unused and causing the extremely high blood glucose levels characteristic of people with diabetes.

In the short term, this problem with insulin use or production leads to the symptoms associated with diabetes mellitus, which are similar in each type of diabetes mellitus, although more severe in individuals with type 1 diabetes (CDA, 1997). These

symptoms include frequent urination, excessive thirst, fatigue, blurry vision, changes in appetite, weight loss, irritability, irregular menstruation, impotence, loss of sensation, and tingling in the hands and feet (CDA, 1997; Taylor, 1999). In the long term, however, this condition can lead to severe and life threatening complications (e.g., kidney disease, blindness). Without appropriate treatment and control of blood glucose levels, the life expectancy of an individual with diabetes mellitus is approximately two years (Kaplan, Sallis & Peterson, 1993).

Classification of Diabetes Mellitus

There are two main types of diabetes patients who present with the symptoms described above: Those with type 1 diabetes (also referred to as Insulin-Dependent Diabetes Mellitus (IDDM) or Juvenile-Onset Diabetes), and those with type 2 diabetes (also referred to as Non-Insulin-Dependent Diabetes Mellitus (NIDDM) or Maturity-Onset Diabetes) (Newberry, Jaikins-Madden & Gerstenberger, 1991; Olson, 1988). Other types of diabetes include gestational diabetes, which occurs in pregnancy and usually disappears post-delivery; diabetes resulting from other conditions and syndromes, including pancreatic disease, certain medications, genetic syndromes, and insulin receptor abnormalities; and diabetes insipidus, a rare form of diabetes resulting from a lack of vassopressin, a hormone that is crucial in the body's water retention (Carlson, 1994; DCEC, 1997). This discussion will focus on the two main types of diabetes.

Type 1 (IDDM) diabetes. Type 1 diabetes is often described as the more severe of the two main types of diabetes (e.g., Taylor, 1999) and is also more rare, accounting for approximately 10% of diabetes patients (CDA, 1997; Kaplan, Sallis & Patterson, 1993).

Its onset generally occurs before the age of 30 (DCEC, 1997), appearing mostly in children, adolescents and young-adults. This type of diabetes occurs as a result of few, if any, beta cells being present in the pancreas, resulting in little to no production of insulin. As described above, this leads to glucose not being taken up by the cells, and has the added effect of enhancing the production of glucose and of ketones, which are derived from free fatty acids and are used as energy when glucose is not properly utilized (Newberry, Jaikins-Madden & Gerstenberger, 1991). The larger causes of type 1 diabetes are not well understood, but theories suggest that it may result from viral or bacterial damage to the pancreas, or from autoimmune dysfunction, both of which destroy the beta cells in the pancreas (Newberry, Jaikins-Madden & Gerstenberger, 1991; Taylor, 1999). There is also a genetic or hereditary component to type 1 diabetes, with high rates within families (Newberry, Jaikins-Madden & Gerstenberger, 1991; Shilltoe, 1988; Taylor, 1999), and studies showing a 20-50% concordance rate for type 1 diabetes in monozygotic twins (Kaplan & Atkins, 1983).

The hyperglycemia that results from the deficiencies in insulin production must be treated by insulin injections several times per day, and insulin injections must be carefully balanced with diet and exercise. This is because diet and exercise are key factors in blood glucose levels, and hence, blood glucose must be monitored to determine when insulin is actually needed. Too much insulin can lead to the opposite problem, hypoglycemia, where "glucose leaves the blood stream faster than it is replaced" (Shilltoe, 1988, p. 13). This must be treated immediately through food intake to increase blood sugar levels, as it can result in difficulty with concentration, as well as confusion,

weakness, and eventually unconsciousness and death if not treated. Another result is ketoacidosis, which is unique to type 1 diabetes and results when ketones, released as a metabolic by-product when cells burn fat, are released into the blood, and cause the blood to become acidic. Severe cases of this condition can lead to death (Kaplan, Salis & Patterson, 1993). Thus, there is a delicate balance in type 1 diabetes between diet, exercise, and insulin injections, and people with this condition must constantly monitor their blood glucose levels to ensure they are within the normal range. These types of treatment are also important to type 2 diabetes, the focus of this research project.

Type 2 (NIDDM) diabetes. Type 2 diabetes is almost always diagnosed in adults over the age of 30 and is the most common form of diabetes, accounting for approximately 90% of all people with diabetes (CPA, 1997; Fore, 1995; Kaplan, Sallis & Patterson, 1993; Norris, 1995; Taylor, 1999). Originally, this type of diabetes was distinguished from type 1 by the fact that exogenous insulin injection was not a requirement in the control of blood glucose levels. However, it is now recognized that insulin treatment is required for some individuals with type 2 diabetes, particularly those who are older and have had the condition for a number of years, although it is still generally not required for survival, as it is for type 1 diabetes (Fore, 1995; Kaplan & Atkins, 1983). Unlike type 1 diabetes, where the destruction of beta cells and deficient production of insulin is the primary problem, in type 2 diabetes, the problem seems to be related to improper utilization of insulin (Newberry, Jaikins-Madden & Gerstenberger, 1991). Thus, insulin is produced by the pancreas, but either not enough is produced or the body may be insulin resistant (Fore, 1995). This means that the cells generally do not

respond to insulin with the uptake of glucose. In fact, people with type 2 diabetes may have abnormally high levels of insulin (Newberry, Jaikins-Madden & Gerstenberger, 1991). The majority (60-90%) of people with this type of diabetes are obese (Kaplan, Sallis & Patterson, 1993; Taylor, 1999; Fore, 1995)[3]. Obesity is defined as having a body mass index, which is the relationship of weight (in kilograms) to height (in square meters), of greater than 30kg/m^2 (Denisoff & Endler, 1997; National Institutes of Health, 1998). It is believed that obesity contributes to the development and maintenance of type 2 diabetes, and this is evidenced by the fact that diet and exercise both play a key role in the control of this type of diabetes (see below). Unlike type 1 diabetes, ketoacidosis is rarely if ever a problem for type 2 diabetes, and this is "possibly because there is enough insulin to block glucagon's stimulation of ketone production" (Newberry, Jaikins-Madden & Gerstenberger, 1991, p. 203).

Although not well understood, there are definite genetic components associated with the etiology of type 2 diabetes. This is evidenced through studies showing extremely high concordance rates between monozygotic twins: Kaplan and Atkins (1983) report 100% concordance rates, whereas Norris (1996) reports 70-90% concordance. The genetic component is further evidenced by the high rates of diabetes in specific ethnic groups. For example, the Pima natives of the United States have a 50% rate of type 2 diabetes in their population. Also, rates of type 2 diabetes are much higher in North American Natives than in the general population (Olson, 1988), and have even been

[3] The studies referenced here reported different percentages for the number of people with type 2 diabetes who are obese. However, studies reviewed for this project found no less than 60% of people with type 2 diabetes are obese. The general consensus of the literature reviewed here is that people over 30 who are over weight have a greater chance of developing type 2 diabetes than those who are not overweight.

described as reaching epidemic proportions in at least one Canadian Native community ("Virtual Epidemic", 1997). Thus, there seem to be both biological (genetic) and environmental (obesity, physical inactivity, high-fat diet, etc.) risk factors for this type of diabetes.

As mentioned above, type 2 diabetes is primarily treated by strictly controlled diet and by exercise, both of which have key behavioral components and are difficult to change even in people without diabetes (Cox & Gonder-Frederick, 1992). Because a large proportion of adults with type 2 diabetes are obese, diet and exercise are usually the first forms of treatment attempted, as bringing down one's weight has been found to eradicate signs of diabetes in some patients (DCEC, 1997). Often, due to the difficulties in changing behavior or to severity of the condition, controlling type 2 diabetes by diet and exercise alone is not realistic, so other means must be used. Oral tablets are often used as a next step to controlling blood glucose levels, and are usually prescribed in conjunction with modifying diet and exercise. These tablets, containing a hypoglycemic-acting agent called sulfonylurea, essentially aid in the control of hyperglycemic levels without producing more insulin (Olson, 1988). This is crucial to individuals with type 2 diabetes who often do produce enough insulin but just do not utilize it properly. Insulin injections must be utilized in severe cases where diet, exercise, and/or oral hypoglycemic agents are unsuccessful in controlling blood glucose levels. Insulin is generally used when there is a threat of development of ketoacidosis in the patient, indicating a lack of insulin in the body and an increase in severity of the condition (Olson, 1988).

Diabetes Mellitus: Control and Complications

The relationship between control of diabetes mellitus and future diabetes-related complications has been the focus of much research and debate since the 1950s (Kaplan & Atkins, 1983; Olson, 1988). "Control" of diabetes mellitus primarily means maintaining blood sugar levels so that they are as close as possible to normal, or so that "normoglycemia" is achieved (Tchobroutsky & Elgrably, 1983). Good control in type 2 diabetes is defined as "an average glucose level of 150 mg/dL, or a hemoglobin A_{1c} of 7% to 8% (normal range less than 6.05%)" (Fore, 1995, p. 288). Hemoglobin A_{1c} (HbA_{1c}) reflects "the extent of glucose bound to hemoglobin in the blood, and thus, levels of glucose over time" (Fisher, Delamater, Bertelson & Kirkley, 1982, p. 994). The half-life of hemoglobin is approximately 8-10 weeks, so HbA_{1c} represents the general level of glycemic control over this period. Patients are usually asked to have this test done 4 times per year as a test of adequate blood glucose control. HbA_{1c} is also often used in behavioral research with diabetes as a measure of actual control (rather than perceived control, as distinguished in the discussion above) and physical adjustment to the condition.

Why is blood glucose control so important for people with diabetes? In the short term, good control is associated with fewer symptoms of diabetes mellitus, allowing the individual to live a relatively normal life. In the long run, good control is related to fewer of the severe complications associated with both of the main types of diabetes mellitus (DCCT, 1993; Fore, 1995; Tchobroutsky & Elgrably, 1983; UKPDS, 1998). The complications that have been shown to be directly related to chronic hyperglycemia, or

poor glucose control, are microvascular, and include retinopathy (a vision problem that can lead to blindness), neuropathy (deficiencies in nerve sensitivity), and nephropathy (kidney disease) (DCEC, 1997; DCCT, 1993; Kaplan & Atkins, 1983; Kaplan, Sallis & Patterson, 1993; Taylor, 1999; UKPDS, 1998). In fact, diabetes mellitus is the leading cause of blindness, with 80% of people with the condition developing retinopathy 10-15 years post-diagnosis. This is particularly the case for people who do not consistently maintain good blood glucose control (UKPDS, 1998). Further, the probability of amputation due to decreased nerve sensitivity is 15 times greater in people with diabetes than those without the condition; 50% of all male diabetes patients develop impotence; and, finally, people with diabetes are 17 times more likely to develop kidney disease, and account for most of the patients requiring dialysis treatment (Kaplan, Sallis & Patterson, 1993).

Macrovascular complications, such as coronary artery disease, are also higher in prevalence in people with diabetes, and although not directly related to hyperglycemia (Fore, 1995), recent research (DCCT,1993; UKPDS, 1998) has shown an increased risk of macrovascular complications when blood glucose levels are not well-controlled in both of the main types of diabetes. Unlike type 1 diabetes, which occurs suddenly and early in life, the slow onset of type 2 diabetes may result in macrovascular and microvascular complications occurring prior to diagnosis, increasing the importance of aggressive treatment of type 2 diabetes once diagnosed (Fore, 1995). Each of these factors point to the incredible importance of actual glucose control in diabetes, and hence,

the test of long-term blood glucose control mentioned previously (HbA_{1c}) was used in this study as a measure of physical adjustment to type 2 diabetes.

The multitude of factors an individual with diabetes is faced with (e.g., treatment, management, and threat of future complications) can be overwhelming. Many people with the condition are able to sufficiently cope with these variables and can go on leading relatively normal lives after a short adjustment period (MacLean & Oram, 1987). Others, however, have difficulty coping and this can lead to or be complicated by psychological factors, such as depression and anxiety.

Psychological Adjustment to Diabetes Mellitus

As indicated earlier in the introductory comments, depression and anxiety account for a significant proportion of psychological difficulties in people with chronic illnesses (Lustman, 1988). This is consistent in patients with both type 1 and type 2 diabetes. For example, depression is three times more prevalent in people with diabetes than the general population, with approximately 15-20% of these patients affected (Lustman, Griffith & Clouse, 1996). People with diabetes often show elevations in depression and anxiety immediately after diagnosis, as part of the adjustment to the condition (Cox & Gonder-Frederick, 1992; Rubin & Peyrot, 1996). However, relapse rates, particularly in depression, have been shown to be eight times greater in those with diabetes than in the general population (Goodnick, Henry & Buki, 1995). The persistence of these psychological symptoms beyond initial diagnosis may be associated with poor metabolic control (Boswell, Anfinson & Nemeroff, 1997; Lustman, Amado & Wetzel, 1983; Rubin & Peyrot, 1996). The demanding treatment regimen, the loss of sense of control over

one's life, and the limitations imposed by the condition (e.g., not being able to eat favorite foods) are all factors that may contribute to symptoms of anxiety and depression in people with diabetes.

Anxiety and diabetes mellitus. Anxiety is a common problem in people with diabetes mellitus. Its etiological factors are probably complex, and may result from psychological factors associated with having sole responsibility over managing the disease, or it may have been a problem already present, but was exacerbated by the increased stress of the illness (Lustman, 1988). Regardless of its etiology, anxiety is clearly elevated in people with diabetes. Lustman (1988) reported a study where he and his colleagues found a prevalence of generalized anxiety disorder to be approximately six times greater in diabetes patients than in the general population, with no differences in rates between type 1 and type 2 diabetes. The ratio of anxiety in women to men with diabetes was 2:1. This increased anxiety was also related to poor glycemic control and to reporting more clinical symptoms of diabetes.

Research connecting anxiety and diabetes often includes a discussion of the possible effects that psychological stress can have on glycemic control (see Beardsley & Goldstein, 1993; Taylor, 1999; Wilkinson, 1991), linking stress and anxiety to each other. Although stress and anxiety are often equated in the literature, anxiety is usually brought on as a result of stress in one's life (Endler, Edwards & Vitelli, 1991). Psychological stress in individuals with diabetes can include basic day-to-day stressors, like workload at work, and additionally, day-to-day monitoring of diet and exercise; acute stressors, like a death in the family, or hypoglycemic reaction; or other, more chronic stressors directly

associated with illness, such as the possibility of developing complications. Although there has been much debate as to how stress can effect diabetes, recent research has shown that stress is associated with hyperglycemia in people with this condition, probably resulting from increased catecholamine secretion in response to stress (Taylor, 1999) or to disturbances in food absorption, and hence, to insulin absorption (Wilkinson, 1991). Although the specific mechanisms through which psychological stress can effect diabetes mellitus are not well-known, stress has been linked to poor glycemic control (Cox & Gonder-Frederick, 1992), decreased exercise (Goetsch, Abel & Pope, 1994), and even to the onset of the illness, particularly in people with type 2 diabetes (Lustman, 1988; Rubin & Peyrot, 1992). The relationship between stress and diabetes is, however, reciprocal, with stress affecting diabetes mellitus, and diabetes mellitus affecting levels of stress (Cox & Gonder-Frederick 1992). The research in this area, although not conclusive as to the effects of stress on diabetes, does seem to show a negative relationship, which indicates that effective coping with stress may be an important factor in circumventing the negative effects of stress and anxiety on people with diabetes.

Anxiety as a multidimensional construct. The general research on anxiety indicates that it is a multidimensional concept, as evidenced by differences between one's anxiety response in a given situation (state anxiety) versus one's generally stable anxiety "proneness" (trait anxiety) (Endler, Edwards & Vitelli, 1991; Endler, Edwards, Vitelli & Parker, 1989; Endler, Parker, Bagby & Cox, 1991; Spielberger, 1995) in non-stressful situations. These two main types of anxiety have each been found to be multifaceted. For example, state anxiety has been conceptualized as those reactions that are "autonomic-

emotional" (e.g., "heart beats faster"), or those that are "cognitive-worry" (e.g., "unable to concentrate") in focus. Similarly, trait anxiety has been conceptualized as general reactions to Social Evaluation (situation where someone is being evaluated by others), Physical Danger (situation of potential harm to the individual), Ambiguous (new situations), and Daily Routines (everyday events) situations (see Endler, Edwards & Vitelli, 1991). Research connecting anxiety and diabetes often fails to account for the multidimensional aspects of anxiety, rarely differentiating between state and trait anxiety, and no research was found that investigates the various facets of state and trait anxiety in people with diabetes. Consistent with the research on general anxiety and diabetes, Okada, Hamada, Ishii, Ichiki, Tanokuchi & Ota (1995) found higher state and trait anxiety in a group of people with type 2 diabetes when compared to a healthy control group. These findings are consistent with normative research which shows that, in general, people high in trait anxiety tend to also be higher in state anxiety when involved in stressful situations (Endler, Edwards & Vitelli, 1991). In particular, this research shows elevations in state anxiety are related to elevations in Social Evaluation-trait anxiety and Ambiguous-trait anxiety. Based on the study by Okada et al. (1995), individuals with type 2 diabetes should show similar elevations, and perhaps elevations on the other facets of trait anxiety as well (Physical Danger and Daily Routines). Because no literature was found linking the various facets of state and trait anxiety to diabetes, this aspect of the study was exploratory in nature. However, consistent with the general literature on state and trait anxiety, it was expected that there would be elevations on each of the facets of state and trait anxiety in people with type 2 diabetes, but that people who

used more adaptive coping strategies (i.e., instrumental) and people who had higher perceptions of control over the condition, would not show elevations anxiety (see below).

Depression and diabetes mellitus. Depression, with or without anxiety, is the most common psychiatric disorder in patients with diabetes, with those suffering from complications (e.g., retinopathy or nephropathy) being at a particular risk for developing depression (Wilkinson, 1991). Some researchers investigating depression in people with diabetes indicate that it is equally common in type 1 and type 2 diabetes (e.g., Lustman, Griffith & Clouse, 1996), whereas others indicate that it is usually more prevalent in type 1 diabetes, due to the severity of its onset (e.g., Cox & Gonder-Frederick, 1992). In general, however, research linking depression and diabetes mellitus tends to either focus on one particular type of diabetes, or to group them together, without comparing between the different types (Lustman, Griffith, Gavard & Clouse, 1992). There is some evidence, however, that depression is more likely to precede the diagnosis in people with type 2 diabetes (Lustman et al., 1992), whereas its onset often occurs concurrent with or post-diagnosis in those with type 1 diabetes (Boswell, Anfinson & Nemeroff, 1997). Each of these factors highlight the complex etiology linking depression and diabetes mellitus.

As with anxiety, depression in people with diabetes may occur for several different reasons, including in response to the psychosocial hardships of the disease, biological changes directly related to the condition, or from previous biological or genetic factors making the individual vulnerable to depression (Lustman et al., 1992). Depression has been found to effect illness management, such as not completing weight control programs, in people with type 2 diabetes, and to result in increased complications as a

result of inadequate glycemic control. It is also more prevalent in women with diabetes, suggesting possible gender differences (Boswell, Anfinson & Nemeroff, 1997; Goodnick, Henry & Buki, 1995).

One of the difficulties in diagnosing depression in people with diabetes is that many of the symptoms of depression, such as weight loss, changes in appetite, and fatigue, are also symptoms of diabetes and its treatment (Lustman, Amado & Wetzel, 1983; Lustman et al., 1992). Thus, inventories often used to diagnose depression in people without physical illness (e.g., Beck Depression Inventory II (BDI-II), Beck, Steer & Brown, 1996) are not appropriate for measuring depression in individuals with diabetes, although they are often still used in research linking diabetes and depression (e.g., Roglic, Pibernik-Okanovic, Prasek & Metelko, 1993). Also, research on depression in diabetes fails to account for the multidimensionality of depression, using global measures rather than measures implicating both state (at the moment of testing) and trait (general, overall response) depression (Spielberger, 1995). These weaknesses were addressed by studying general, state, and trait depression in a sample of people with type 2 diabetes. Although no research was found investigating state and trait depression, it was expected that there would be elevations in both types of depression in people with type 2 diabetes (consistent with the research investigating general depression and diabetes), but that coping strategies and perceived control may mediate these elevations (see below).

Coping, Perceived Control, and Diabetes Mellitus

The above discussion on the psychological factors associated with diabetes mellitus indicates that decreasing psychological distress in people with diabetes could

play an important role in improving psychological (depression and anxiety) and physical (glycemic control) adjustment (e.g., Boswell, Anfinson & Nemeroff, 1997; Cox & Gonder-Frederick, 1992). Research described earlier on coping with chronic illnesses indicates that coping strategies may be important in decreasing psychological distress, and in increasing glycemic control. This is supported by research finding differential relationships of various coping strategies to psychological and physical outcomes in people with diabetes.

Coping, adjustment, and diabetes mellitus. Most of the research linking coping strategies to outcome measures of blood glucose control, depression, and anxiety, has been focused on people with type 1 diabetes (Cox & Gonder-Frederick, 1992). Research in this area generally shows the use of active coping strategies to relate positively to glycemic control, and negatively to depression and anxiety (Maes, Leventhal & DeRidder, 1996). For example, in a two year study of individuals with type 1 diabetes, Spiess et al. (1994) found a direct relationship between control-based coping strategies and metabolic control, and that this type of coping strategy was significantly related to decreased depression and anxiety. Unfortunately, it is difficult to know if the results of studies like this one, with individuals with type 1 diabetes, can be generalized to people with type 2 diabetes. For example, age differences in onset of these two types of diabetes may play a role in the types of coping strategies used to deal with each type of diabetes. However, one study (Kvam & Lyons, 1991) compared coping strategies used by both people with type 1 and people with type 2 diabetes, and found that for both groups, well-being was generally higher if problem-focused coping strategies were used, rather than

escape coping strategies (e.g., wish-fulfillment). In general, this study also found people with type 2 diabetes to score higher on well-being than those with type 1 diabetes. Unfortunately, this is one of very few studies comparing the two types of diabetes on coping and outcome variables. A few studies were found linking coping variables to outcome factors in individuals with type 2 diabetes, but the results are inconclusive. For example, Goetsch, Abel, and Pope (1994) actually found an increase in blood glucose levels when more active coping strategies were used, but the small number of subjects used (n = 8) makes the generalizability of the results questionable. Roglic et al. (1993) found no relationship between coping strategies and blood glucose control, but higher depression and self-reported stress when more passive coping strategies were used. The limitations and inconclusiveness of these studies indicated the importance of further investigating coping strategies used by people with type 2 diabetes.

Further to the above-mentioned weaknesses in this area of research, no studies were found on type 2 diabetes that used health-specific coping measures, and of the studies that have been conducted, there was no consistency regarding the coping variables investigated. These extreme limitations in research on coping with type 2 diabetes indicated the importance of conducting a systematic investigation illness-specific coping strategies used by individuals with type 2 diabetes, and in determining which are more adaptive in dealing with the condition. It was postulated, based on the literature with type 1 diabetes, the literature on coping with chronic illness in general, and on the information presented about type 2 diabetes, that instrumental coping responses would be related to better psychological and physical adjustment than emotion-oriented

(emotional preoccupation, rumination) or avoidance (distraction, palliative) coping strategies.

Coping, perceived control, and adjustment in diabetes mellitus. The question that may be asked at this point is: Why investigate the role of perceived control in adjustment to type 2 diabetes, a condition that is actually controllable? There is a large body of research which supports the notion that, although a situation may be objectively controllable, individual differences in environment, cognitions, and behaviors may cause an individual's perception of the situation to vary from the objective knowledge about the stressor (Edwards, 1984). In fact, some researchers have found that perceived control can be just as or more important than actual control in reducing both physiological and psychological distress (see, for example, Blankstein, 1984; Mineka & Henderson, 1985; Taylor, 1999). This was one finding in a study by Taylor et al. (1984) on adjustment to breast cancer. Briefly, even though cancer is generally not a disease perceived as personally controllable, 56% of the women studied perceived that they had a certain level of personal control over their cancer, and this perception of control was related to better adjustment, as measured in terms of levels of depression, anxiety, anger, and fear. Similarly, Helgeson and Franzen (1998) found that perceptions of control and perceptions of threat in a group of people with type 1 diabetes were both related to adjustment, and this result was mediated by health behavior. These findings point to the importance of determining an individual's own perceptions or appraisal of the stressor situation, rather than assuming that the individual will or will not perceive it as controllable. It also shows that perceived control may act directly to produce better outcomes, rather than only

through coping strategies. This line of research is particularly important in research on diabetes, a condition for which control is of such importance.

Although limited, some research has been conducted in an attempt to link coping strategies and perceived control to psychological adjustment in people with diabetes. For example, Tennen, Affleck, Allen, McGrade and Ratzan (1984) investigated the role of disease causal attributions and perceived control over illness outcomes in illness-specific coping (measured through external rating of overall coping, from "very poor" to "excellent") and adjustment, in a group of adolescents with type 1 diabetes. Results showed that perceived control was not related to causal attributions, or to better coping, but that internal causal attributions, or "self-blame", was related to better coping. The researchers in this study note, however, that their measure of perceived control may not have been appropriate to a population of patients with diabetes, as it may not have accounted for many of the "internal controls" that would be assumed to be related to outcomes. In another, more systematic study of these variables, Smari and Valtysdottir (1997) used the CISS (Endler & Parker, 1999a) to measure the relationship of dispositional coping to depression, anxiety and perceived and actual illness control in people with type 1 diabetes. In general, results showed better outcomes on almost all measures when task-oriented coping was used, whereas emotion-oriented coping strategies were related to higher levels of anxiety and depression, lower perceived disease control, and higher actual blood glucose levels (showing poor actual control). However, slightly different results were found for men and women. For example, perceived disease control was related to task-oriented coping in men only, and there was no relationship

between perceived control and coping in women. Avoidance coping was not found to factor into any of the outcome variables. This study indicates that some coping strategies (most notably task-oriented coping strategies) may be more adaptive in dealing with type 1 diabetes than others (most notably emotion-oriented), and that higher perceived control is related to more task-oriented coping, at least in men.

The literature reviewed here specifically investigating coping, perceived control, and diabetes clearly showed (a) the inconclusiveness of results with individuals with type 1 diabetes, and (b) a general lack of research investigating these variables with people with type 2 diabetes. It is difficult to know why type 2 diabetes is often ignored in this line of research; perhaps it is because of the general perception that type 1 diabetes is more rare and more severe, and, hence, requires more investigation. However, the fact that type 2 diabetes affects such a large number of people, and can produce the same psychological and physiological complications as type 1 diabetes, makes it a condition that is just as or perhaps even more important to be studied. Thus, this research project was an attempt to systematically investigate which coping strategies are most adaptive in dealing with type 2 diabetes, and whether illness appraisal may play a role in choice of coping strategies. The results of this study could have significant clinical application, particularly, for example, in diabetes education programs, by showing which coping variables should be encouraged, and whether instilling a sense of control over the illness may be related to which coping strategies are used, and adjustment to the condition.

The Present Study

In summary, the primary purpose of this study was to determine the relationship among coping, illness control (perceived and actual), and psychological adjustment (measured in terms of anxiety and depression) in a sample of people with type 2 diabetes. The predictor variables investigated were coping strategies (distraction, palliative, instrumental, emotional preoccupation, rumination), and perceived control. The outcome variables were state and trait depression and anxiety (psychological adjustment), and glycemic control (Hemoglobin A_{1c}, which is an indicator of diabetes-specific or actual physical adjustment to the condition). Also included as part of this investigation was the participants' perceived level of stress associated with having diabetes. Thus, perceived stress was also a predictor variable in this study, although it was used just as a way to confirm whether or not people actually found diabetes to be stressful, and what variables were related to whether or not diabetes was perceived to be stressful.

This project focused on individuals with type 2 diabetes largely because of the lack of research systematically investigating which coping strategies are most adaptive in this group of patients, and on the role that appraisals have in coping strategies used and adjustment to the condition. The literature reviewed showed that, generally, more task-focused (instrumental) coping strategies lead to better outcomes, and that high perceived control over a stressor is often associated with the use of this type of coping strategy. Emotion-focused coping seemed to be more maladaptive, as did avoidance coping, when dealing with illnesses. Further, some research showed that the appraisal of a stressor as controllable or uncontrollable may directly predict psychological and physical

adjustment. On the basis of the literature reviewed on coping, control, and diabetes mellitus, the following research hypotheses were investigated.

Summary of Hypotheses

Hypothesis 1: Coping strategies and outcome variables. It was predicted that the use of illness-specific instrumental coping would be negatively correlated with depression and anxiety (both state and trait)[4] and blood glucose control (i.e., lower Hemoglobin A_{1c} results, indicating better blood glucose control, when instrumental coping is used). Emotion-focused coping (emotional preoccupation, rumination) and avoidance coping (distraction, palliative) will be positively correlated with depression, anxiety, and blood glucose control (i.e., higher Hemoglobin A_{1c} results, indicating poor blood glucose control, when these coping strategies are used).

Hypothesis 2: Perceived control and outcome variables. Perceived control over diabetes would be negatively correlated with depression and anxiety (both state and trait) and to blood glucose control (higher perceived control related to lower Hemoglobin A_{1c} results, showing better blood glucose control).

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[4] Specific predictions as to the various facets of state anxiety (cognitive-worry, autonomic emotional) and trait anxiety (social evaluation, physical danger, ambiguous, daily routines) were difficult to make because of the lack of research investigating these variables in people with diabetes. Thus, predictions were made regarding the general trends expected when investigating state and trait anxiety as outcome variables (i.e., people with type 2 diabetes will be high on both state and trait anxiety in general), rather than differentiating the specific facets. Research reported by Endler, Edwards & Vitelli (1991) supported the positive relationship between state anxiety and social evaluation trait and ambiguous trait anxiety in stressful situations. Because diabetes is a stressor, it was predicted that state and trait anxiety will be similarly related and elevated in this group. Because no previous data were available as to elevations on the other facets of trait anxiety for individuals with diabetes, it was assumed that physical danger and daily routines may also be elevated for this group. In short, because of the lack of conclusive research in this area with people with diabetes, the investigation of the relationship between the various facets of state and trait anxiety, and the predictor variables in this study (coping and perceived control) was exploratory in nature.

Hypothesis 3: Relationships between main predictor variables. There would be a positive relationship between perceived control and instrumental coping responses, and a negative relationship between perceived control and avoidance (distraction, palliative) and emotion-focused (emotional preoccupation, rumination) coping responses. Also, it was predicted that the various emotion-oriented coping strategies would be positively correlated with each other (i.e., emotional preoccupation, rumination), as would the avoidance-oriented coping strategies (i.e., distraction, palliative). Finally, it was predicted that instrumental coping would be either unrelated or negatively related to the other coping strategies investigated in this study.

Hypothesis 4: Perceived control as a moderator. The effects of coping on outcome variables would be moderated by perceived control, such that high perceived control would moderate the effects of emotion-oriented coping and avoidance-oriented coping to produce better outcomes (e.g., high perceived control interacting with high ruminative coping would lead to less depression, less anxiety, and better blood glucose control than low perceived control interacting with high emotion-oriented coping). It was also hypothesized that perceived control would act with instrumental coping to produce better outcomes. In sum, it was hypothesized that people who had high perceived control, in conjunction with using any of the coping strategies, would have better outcomes than those who had low perceived control over the condition.

Hypothesis 5: Coping as a mediator of perceived control. It was predicted that the various facets of coping would differentially act as mediators between perceived control and outcomes (depression, anxiety, actual blood glucose control). In particular, it was

predicted that emotion-oriented (i.e., emotional preoccupation, rumination) and avoidance-oriented coping strategies would be negatively related to perceived control, and positively related to depression, anxiety, and blood glucose levels. On the other hand, it was hypothesized that instrumental coping would be positively related to perceived control, and negatively related to depression, anxiety, and actual blood glucose levels.

Multidimensional Interaction Model of Stress, Anxiety, and Coping

The variables investigated in this study fit well into the Multidimensional Interaction Model of Stress, Anxiety, and Coping, proposed by Endler (1997). Figure 1 shows the relationships between the predictor and outcome variables, and includes other, more general variables that may also play a role, but were not investigated in this research project. Briefly, this model shows that person variables (e.g., trait anxiety, trait depression in this study) interact with situational variables (e.g., illness or type 2 diabetes in this study), and each of these variables also play a role in reactions to changes in arousal (e.g., coping responses and blood glucose levels in this study). Further, appraisals (perceived control over illness) and changes in arousal (e.g., state anxiety, state depression in this study) are involved in the relationship between person and situational variables and reactions to changes in arousal (see Figure 1 for more detail). The applicability of this model to the variables in this study was investigated through the above-mentioned hypotheses, and is discussed further in the discussion section of this manuscript.

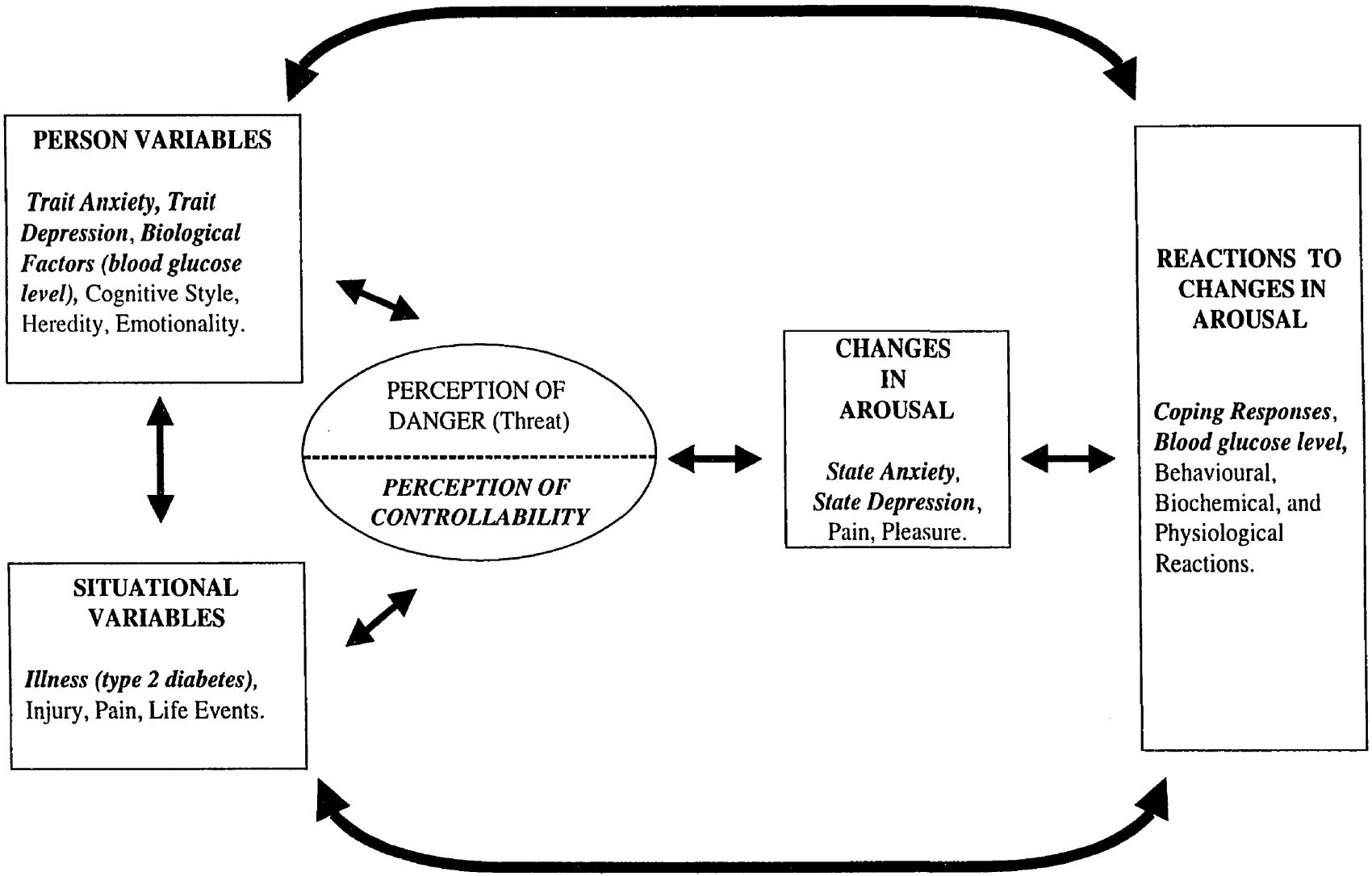

Figure 1. The Multidimensional Interaction Model of Stress, Anxiety, and Coping, showing the interaction between person and situational variables, their relationship to reactions to changes in arousal, and the mediating role that perception of control and changes in arousal each play in this relationship. Specific variables used in this study are italicized and in bold. Adapted from "Stress, anxiety and coping: The multidimensional interaction model," by N. S. Endler, 1997, Canadian Psychology, 38, p. 149. Copyright 1997 by the Canadian Psychological Association. Adapted with permission.

Chapter 2

METHOD

Participants

Questionnaire responses were received from a total of 135 people with type 2 diabetes. Of these, nine were excluded as a result of too much missing data (including, in each case, the HbA_{1c} report), and two more were excluded because they had been diagnosed with type 2 diabetes less than six months before participating (which violated a criterion for participation; see below). Of the 124 remaining, nine more questionnaires were excluded because these participants had been diagnosed with depression (as indicated in the "other illness" category of the Diabetes Information Questionnaire).

The participants included in the data analyses in this study were 115 adults. Sixty-five of the participants were women, with an average age of 58.95 years (SD = 10.26; range = 34-78 years), and 50 of the participants were men, with an average age of 60.64 years (SD = 11.46; range = 39-81 years). Participants were recruited through: (a) a hospital-based outpatient Diabetes Education Center (DEC; n = 46), (b) a Diabetes Chapter Meeting (CM; n = 29), (c) a large Diabetes Workshop or Symposium (n = 17), or (d) an ad in a Diabetes-information magazine (n = 14). A small number of participants were personally solicited by the researcher (n = 3) and another small portion of the sample (n = 6) came from a mail-out to Canadian Diabetes Association members, which is part of a larger study being conducted for future research. Some participants (51.1%, or n = 69, of the total sample) were paid $10.00 for their participation (see Procedure section for more detail). The majority of the participants were married (77.4%). Overall,

the participants were quite well educated (22.6% completed college or university, and 23.5% had some college or university education). Family income was normally distributed, with similar proportions of the sample earning $20,000-39,999 (21.7%), $40,000-59,999 (26.1%), and $60,000-79,999 (21.7%). Most of the participants were Protestant (46.1%), Jewish (20.9%), or Catholic (14.8%), and the majority were Caucasian (80.9%). Many of the participants were retired (40.9%) due to the high average age of the sample. The sample was investigated for differences based on the main biographical variables (i.e., age, gender, and recruitment, or how participants became involved) and the main diabetes-specific demographic variables (i.e., time since diagnosis, presence of complications, treatment type, and presence of another illness). These analyses are reported in the results section, below.

Measures

Demographic information. Two types of demographic information about the participants were obtained through questionnaire format: (1) Personal information including age, sex, occupation, and income was collected through the General Information Questionnaire (see Appendix A); (2) Information specific to the participant's type 2 diabetes, including time since diagnosis and primary treatment regimen used, was collected through the Diabetes Information Questionnaire (Appendix B). Participants were asked to provide their most recent (taken no more than 4 months ago) Hemoglobin A_{1c} (HbA_{1c}) report as part of this information questionnaire, and space was provided for this at the end of the questionnaire. More information regarding HbA_{1c} is provided below.

Coping with Health Injuries and Problems scale. The Coping with Health Injuries and Problems scale (CHIP; Endler & Parker, 1999b; Endler, Parker & Summerfeldt, 1998; see Appendix C) was used in this study to assess coping strategies used by the participants. This questionnaire measures "basic coping reactions for individuals experiencing a wide variety of health problems" (Parker & Endler, 1992, p. 338), and includes four basic coping dimensions, each of which are related to the main inter-individual coping mechanisms (i.e., task-oriented, emotion-oriented, and avoidance coping) described in the introductory section of this study (Endler, Parker & Summerfeldt, 1998). These are: Distraction, which measures coping through focusing on other, more pleasant objects or situations, and is related to avoidance coping; Palliative, which is also related to avoidance coping, and measures efforts to lessen the unpleasantness of the health problem; Instrumental coping, which measures task-oriented approaches to dealing with health problems; and Emotional preoccupation, which assesses whether an individual focuses on the emotional aspects of the health problem, and is related to emotion-oriented coping and rumination (Endler, Parker & Summerfeldt, 1998). This measure has 32-items and is broken into four subscales (distraction, palliative, instrumental, and emotional preoccupation) with 8 items each. As part of the scale, participants are normally asked to list their most recent illness, sickness, or injury, and to indicate the severity of the illness. This aspect of the scale was modified slightly, since the focus in this study was on type 2 diabetes, and illness duration and severity were already reported through the Diabetes Information Questionnaire (see Appendix C for specific instructions). Using this scale, participants rated, on a 5-point Likert-type

scale (1 = not at all; 3 = somewhat; 5 = extremely), the extent to which they engaged in the items listed when dealing with their type 2 diabetes. Examples of items from each scale are: (a) Distraction: "Be with other people"; (b) Palliative: "Make sure I am comfortable"; (c) Instrumental: "Find out more information about the illness"; and (d) Emotional Preoccupation: "Worry that my health might get worse". The factor structure of this scale has been cross-validated in medical patients (which included patients with diabetes), and in samples from the general population (Endler, Parker & Summerfeldt, 1998). Endler and Parker (1999b) also found moderate to high reliabilities, which were stable across the general sample, and the patient sample studied. For each of the subscales, alpha values ranged from a low of .70 to a high of .88. The scale also has good construct validity, as indicated by similarities in coping responses in people with acute and chronic illnesses, and in comparison to general coping variables.

Rumination and Distraction Questionnaire. Because the CHIP does not specifically address the concept of rumination (although rumination has been shown to be related to Emotional preoccupation; $r = .56$ in Endler, Parker & Summerfeldt, 1998, p. 203), the Rumination Subscale of the Rumination and Distraction Questionnaire (RDQ; Nolen-Hoeksema, Morrow & Frederickson, 1993), was used to assess the degree of rumination used in response to one's experience with diabetes (see Appendix D). This scale, which was originally used to measure degree of rumination and its relationship to depressed mood, consists of 10 items measuring ruminative thoughts and 6 items measuring ruminative behaviors, with the total scale giving an overall level of rumination. Instructions were modified to ensure that the participants were focusing on

their type 2 diabetes when filling out the questionnaire (see Appendix D). Examples of items measuring ruminative thoughts are: "Why can't I handle things better?"; "I need to understand these feelings"; "I won't be able to concentrate if I keep feeling this way". Examples of items measuring ruminative behaviors are: "Sit at home and think about how I feel"; "Talk to others about how I'm feeling"; "Isolate myself and think about the reasons I'm feeling this way". Participants were asked to indicate the degree to which they react with these thoughts and behaviors in response to their type 2 diabetes on a 5-point (1 = Not at all; 3 = Moderately; 5 = Very Much) Likert-type scale. Information on the reliability and validity of this scale was not provided in the original study measuring depression. However, in analyses used for normative data for the CHIP Manual, Endler and Parker (1999b) found acceptable reliabilities for both the thoughts ($\alpha = .87$) and behaviors ($\alpha = .77$) subscales, using a sample of 138 people with a variety of illnesses (e.g., cold, flu, cancer, diabetes).

Event Perception Measure. Perceived control (PCON) over type 2 diabetes was measured using the Event Perception Measure (Conway & Terry, 1992), plus one item asking respondents to indicate their perception of their degree of blood glucose control over the past 2-6 months (see Appendix E). The Event Perception Measure was originally used to measure the appraised controllability of the outcome of an event, and how this related to coping strategies. The scale contains 6 items, which participants respond to on a scale of 1 (Not at All) to 5 (Very Much) regarding their perception of control over a particular situation. An example of an item in this measure is "How much do you feel that your abilities will influence the outcome of the situation?" In order to make this scale

directly applicable to perceived control over diabetes, the term "the situation" was replaced with "your type 2 diabetes" in each item. Internal consistency of this scale was reported by Conway and Terry (1992) to be good (.79).

Perceived Stress. In order to determine whether, in fact, the experience of diabetes was stressful for the individual, an item was included in the Event Perception Measure section, which asked participants directly whether they consider having diabetes to be stressful (see Appendix E). This was included partially as a check of the patient's perceptions of the condition and also as a way to determine whether in fact this condition is stressful to individuals.

Endler Multidimensional Anxiety Scales. Anxiety was assessed using the Endler Multidimensional Anxiety Scales (EMAS; Endler, Edwards, & Vitelli, 1991), which measure both State and Trait anxiety. The EMAS-State scale is a 20-item measure which asks participants to indicate, on a scale of 1 (Not at All) to 5 (Very Much), how they feel "at this particular moment" (see Appendix F). Items are summed to produce an overall measure of state anxiety. Factor analysis of this scale has also yielded two independent factors that are measured by this scale. These are Autonomic-Emotional (10 items) and Cognitive-Worry (10 items). Examples of items from the Autonomic-Emotional subscale are "Hands feel moist"; "Feel tense"; and "Mouth feels dry". Examples of items on the Cognitive-Worry subscale are "Distrust myself"; "Fear defeat"; and "Feel incompetent". Internal consistency has been found to be high for the scale as a whole (alphas of .89-.94) and for each of the two subscales (alphas of .82-.91) (Endler, Edwards, Vitelli & Parker, 1989).

The EMAS-Trait is a 60 item scale, measuring trait anxiety in four specific situations (15 items each): Social Evaluation situation (SE); Ambiguous situation (AM); Physical Danger situation (PD); and Daily Routines. Each of the four situations are made up of the same 15 items, but each response pertains to the specific situation (see Appendix G). Examples of the items are: "Seek experiences like this"; "Feel comfortable"; and "Feel nervous". Similar to the other scales, participants indicate their degree of agreement on a scale of 1 (Not at All) to 5 (Very Much). Endler, Edwards, Vitelli, and Parker (1989) also found high internal consistency for each of these scales, ranging from .87 to .96. Both the state and trait measures were used to get an indication of the multidimensionality of anxiety in people with type 2 diabetes.

Spielberger State-Trait Depression Inventory. Depression was assessed through three separate measures. The first two were Spielberger's (1995) measures of state (S-Dep) and trait (T-Dep) depression (see Appendices H and I), which are newly constructed subscales of the eighty-item State-Trait Personality Inventory (STPI). The form measuring state depression contains 10 items (e.g., "I feel strong"; I feel sad"; "I feel gloomy"), and participants indicate the extent to which they feel the way the items suggest on a 4-point (1 = Not at All; 4 = Very Much So) Likert-type scale. The form measuring trait depression also contains 10 items (e.g., "I feel happy"; "I feel peaceful"; "I feel hopeless"), measured on the same 4-point scale as the state form, and participants are to respond based on how they generally feel. Spielberger (1995) found both the state and trait measures to have high internal consistency for both men and women (alpha

levels for state ranging from .91 (women) to .93 (men), and for trait, from .87 (women) to .93 (men)), indicating that this is a reliable measure of state and trait depression.

Center for Epidemiological Studies Depression scale. Another measure of depression, the Center for Epidemiological Studies Depression Scale (CES-D; Sawyer-Radloff, 1977; Appendix J), was also included as a measure of general depression (DEP). This is a 20-item scale asking participants to relate how often they felt a certain way (e.g., "I felt fearful"; "I enjoyed life") over the past month, on a scale of 0 (rarely, or less than one week) to 3 (most of the time, or 3-4 weeks). This scale measures symptoms of depression, and Sawyer-Radloff found the CES-D to be a reliable and valid measure of depressive symptoms across various subgroups (α = .85 to .90). More recently, Devins, Orme and Costello (1988) found the scale was also reliable across a variety of different general and illness populations (e.g., students, cancer patients, and patients with end stage renal disease; mean α = . 87), making it particularly appropriate for this study. As with the Spielberger (1995) scales, most of the items on the CES-D are non-physiological, meaning that little overlap of symptoms of diabetes and symptoms of depression was expected.

Hemoglobin A_{1c} (HbA_{1c}). Finally, Glycosylated Hemoglobin or Hemoglobin A_{1c}, (HbA_{1c}) test results were reported by participants (see Appendix B). As indicated earlier in this proposal, HbA_{1c} is a blood test which shows an individual's blood glucose levels over the 2-3 months before the test is taken, giving an indication of "long term" blood glucose control for that individual (Gonen, Rubenstein, Rochman, Tanegam & Horwitz, 1977; Shilltoe, 1988). "Good control" in someone with diabetes is equated with HbA_{1c}

values of 7-8% (Fore, 1995). However, normal range (i.e., in someone without diabetes) is 4-6%, and a person with diabetes reporting HbA_{1c} results within this range would be considered to have "excellent control." Thus, in this study, HbA_{1c} results from 4-6.5% indicated "excellent control", 6.6-8.0% indicated "good control" and HbA_{1c} results of 8.0% or higher indicated "poor or subnormal control." This distinction seems to be consistent with other research on good vs. poor levels of glycemic control (e.g., Kavanagh, Gooley & Wilson, 1993).

Questionnaire order. Questionnaires were presented in two sections: Section 1 contained all questionnaires related to general functioning (General Information Questionnaire, T-Dep, EMAS-Trait, and CES-D), and Section 2 contained those questionnaires directly related to diabetes (Diabetes-specific Information Questionnaire, including HbA_{1c} report, Event Perception Measure, RDQ, CHIP, S-Dep, and EMAS-State).

Procedure

Participant recruitment. Participants were recruited in five main ways. First, the bulk of the participants ($n = 46$) were approached while attending a Diabetes Education Center (DEC) at one of four hospitals in the Greater Toronto Area (Peel Memorial Hospital, Sunnybrook Hospital, Toronto East General Hospital, and Women's College Hospital). Formal ethics approval to conduct the study was obtained at each site. Participants were approached by the researcher or by a Diabetes Educator at the coffee break of a Diabetes Education Seminar, and asked to participate. Potential participants were then provided with a consent form and a questionnaire package, and were instructed

to return the completed package either to the DEC or to the researcher by mail (postage-paid addressed envelopes were provided for this, and most participants chose this option). Participants were asked to return the package no more than one month from sign up, to allow them time to fill in the questionnaire and to obtain their HbA_{1c} report, as this was not always available to them as part of the education program. Signs (see Appendix K). were also posted at these sites to advertise the research project.

Another large sub-set of participants (n = 29) was recruited through a Diabetes Chapter Meeting (Jewish Chapter). Diabetes Chapters are community-based support and information groups set up through the Canadian Diabetes Association. There are three of these chapters in Toronto, Ontario, but only one was approached for the purposes of this study. At this meeting, a table was set up with signs advertising and describing the project. Potential participants approached the table and the researcher provided information about the study. Interested participants were provided with a postage-paid addressed envelope, informed consent form, and questionnaire package, and were also asked to return it within a month. The same procedure was followed for the third main group of participants, all of whom were attending a Diabetes Workshop or Symposium (n = 17). Tables were set up at two such sites, and the same procedure was followed as at the Chapter Meeting.

Fourteen more participants became involved through responding to a 75-word ad placed in the winter issue (November, 1998) of the Diabetes Dialogue, a publication sent out by the CDA to all of its membership across Canada. A phone line with voicemail was set up for interested participants to leave their name and address and to speak to the

researcher, and questionnaire packages with return envelopes were sent to the participants. A $10.00 payment was added at this point in the study as incentive for participation, both through the ad and at the other main sites. A total of 69 participants were provided with payment for participating. Also, names and phone numbers were obtained from participants through each of these four data collection procedures, and follow-up calls were made if questionnaires were not received within the one-month period. Participants were identified through the consent form, which they were instructed to return in the envelope with their questionnaire package, strictly for purposes of mailing the payment. To maintain confidentiality, the questionnaire package and consent form were separated once received in the lab, and each questionnaire was given a code number. Finally, a few questionnaire responses ($n = 3$) were personally solicited by the researcher, and another few were obtained through part of a mail-out that is being used for other research purposes ($n = 6$). Procedure was similar to that described for responses to the ad in the Diabetes Dialogue.

Participants were eligible for the study if they were diagnosed with type 2 diabetes at least 6 months prior to participating. This criteria was set in an attempt to ensure that initial adjustment to the "shock" of diagnosis had already taken place. Another criteria of the study was that participants were willing to report the results of their most recent Hemoglobin A_{1c} (HbA_{1c}) test, obtained no more than 4 months prior to participating in the study. This latter criterion was put in place to ensure that the HbA_{1c} reflected blood glucose levels within 2-6 months of the study, and so that coping mechanisms reported here would closely approximate or be the same as those used at the

time reflected in HbA_{1c} report. The entire recruitment process, including obtaining approval for the study at the various hospitals, took approximately five months.

For each data collection method, once participants were recruited, they were provided with a participation/informed consent form which outlined the purpose of the study, the criteria for participating in the study, the voluntary nature of the study, and the strict confidentiality of any results (see Appendix L). This form also provided a section for name and address for participants who were interested in finding out the results of the study. Participants were then provided with the questionnaire package and an instruction sheet, reminding them of the purpose of the study and of what was required of them (see Appendix M). The most common way that questionnaires were returned was through the mail, although some data was collected directly from the Diabetes Education Centers. All participants were provided with a debriefing form (see Appendix N) upon completion of the questionnaire, either though the mail or through the Diabetes Education Centers.

Data Analyses

All data were entered into a microcomputer, and SPSS version 7.5 was used to analyze the data. First, data were checked for violations of assumptions (normality, linearity, multicollinearity, etc.), for multivariate outliers, and for differences on each of the main independent (coping strategies, perceived control, perceived stress) and dependent (state and trait depression and anxiety, blood glucose control) variables based on general and diabetes-specific demographic information. Second, descriptive statistics, such as means, standard deviations, and reliabilities were obtained for each of the independent and dependent variables. Third, Pearson's Product Moment Correlations

were run to determine if relationships existed among the variables being studied. This part of the analyses was particularly important in determining whether there were direct relationships of coping and perceived control with the outcome measures, and in determining the relationship these two variables had to each other (for Hypotheses 1-3).

Once these relationships were established, inferential statistics were used to further analyze the data. In particular, multiple regression was used to determine whether coping strategies and perceived control would each separately and directly (main effects) predict the outcome measures. Multiple regression was also used to determine whether perceived control acted as a moderator of the relationships between coping strategies and outcome variables (interaction effects; for Hypothesis 4; Tabachnick & Fidell, 1996). For this analysis, an interaction variable was created between perceived control and each of the other main predictor (coping) variables. This was done by multiplying the standardized (z) scores of the independent variables (i.e., perceived control with each of the coping variables) to produce a product vector (the interaction variable), which became the predictor variable used in the regression analysis. This is often referred to in statistical design and analysis as creating a "dummy" variable (see, for example, Fox, 1997; Glass & Hopkins, 1996). Significant β values indicated that coping and perceived control interact to produce the indicated outcome (depression, anxiety, blood glucose control, or HbA_{1c}).

Finally, each of the coping variables were tested to determine whether they differentially mediated the relationship of perceived control to each of the outcome variables. These analyses were conducted using three steps, as outlined by Baron and

Kenny (1986): (1) each of the coping variables (the potential mediators) were regressed on the other independent variable (perceived control); (2) the dependent variables (depression, anxiety, and blood glucose control) were regressed on the independent variable (perceived control); and (3) the dependent variable was regressed on both the independent (perceived control) and mediator (coping) variables. In this final analysis, "perfect mediation holds if the independent variable has no effect when the mediator is controlled" (Baron & Kenny, 1986, p. 1177). More detail is provided in the Results section.

Chapter 3

RESULTS

Preliminary Analyses

1. Data check: Test for accuracy and assumptions for all variables. Prior to proceeding with any analyses, data were checked for accuracy of input, normality, linearity, and outliers, as described by Tabachnick and Fidell (1996). First, frequencies (i.e., means, maximum and minimum scores) revealed that all data were within normal limits for each variable. In the case of missing data, items were replaced with the mean if a minimum of 80% of items were completed in the questionnaire. This still left missing responses for some of the predictor and outcome variables (missing variables were not replaced in any demographic questions) in two cases. In terms of normality of the variables, the distribution of the Center for Epidemiological Studies-Depression (CES-D) scale was found to be positively skewed, but a square root transformation corrected for this. Thus, the square root transformation of the CES-D variable was used in all analyses for this study. Although other variables (e.g., EMAS-State, Ruminative coping) were found to be slightly skewed, transformations did not correct for normality or for linearity with other variables, and hence, no transformations were retained for any of the other variables.

Linearity was investigated through bivariate scatterplots and through residual plots once regression analyses were run. Most variables were found to have linear relationships, although some seemed to have no direct relationship at all, as indicated by very scattered distributions (e.g., CES-D by CHIP-Palliative). The lack of relationships

are, however, also indicated through the correlation analysis, the results of which are described as part of the main analyses. Eta analysis confirmed that none of the variables had curvilinear relationships to one another.

In terms of homoscedasticity, most variables were found to be heteroscedasctic, and again, transformation of variables was not effective in changing this assumption violation. In terms of multicollinearity, another assumption in multiple regression analyses, only those variables that were subsets of the same scale and, hence, had high correlations (i.e., Rumination-total scale and Rumination-thoughts subscale had $\underline{r} = .97$) violated this assumption. This was simply corrected for by only including the scales that were not highly correlated (i.e., $\underline{r} > .90$) in the main regression analyses.

Multivariate outliers were screened for when conducting linear regression analyses for each variable (in the models outlined below). Outliers causing a significant effect in analysis were found for models involving the following two dependent variables: HbA_{1c}, or actual blood glucose control (case 36), and CES-D (case 34). These cases were removed only for models that involved these variables as outcome variables. Although multivariate outliers were found for some other variables (i.e., State Depression), removing these cases did not affect the results, and so all other cases were retained for analyses.

2. Tests for differences based on sample characteristics. To determine if there were differences within the sample based on main biographical (i.e., age, gender, and recruitment type) and diabetes-specific variables (i.e., time since diagnosis, presence of complications, treatment type, and presence of another illness), a Multivariate Analysis of

Variance (MANOVA) with post hoc multiple comparisons (using Scheffe' test), analyzed with per contrast Bonferroni correction (10 tests, 0.05/10 = .005), was used. This analysis revealed differences among the participants based on "time since diagnosis" for three variables: recruitment type, treatment type, and presence of complications. Beginning with the recruitment type variable, participants from the Chapter Meeting group were diagnosed longer ago (M = 153.14 months, or 12.8 years, SD = 138.78 months) than people from the Diabetes Education Centers (M = 40.32 months, SD = 50.54), the Diabetes Workshop/Symposium Group (M = 77.06 months, SD = 48.35), and the Ad respondents (M = 44.21 months, SD = 45.93). No significant differences were observed for any of the other groups. In terms of treatment regimen, participants in the total sample (i.e., not just the group from the Chapter Meeting) who were diagnosed with type 2 diabetes ten years (112.72 months) ago or more were more likely to use a treatment regimen that involved insulin rather than one that only involved diet and exercise or oral medications. Also, in terms of complications, people who were diagnosed more than ten years ago were more likely to have complications directly associated with diabetes. These former two findings are consistent with the general progression of type 2 diabetes. It should be noted that 33% (n = 38) of participants indicated that they also suffered from another physical health condition as well as type 2 diabetes (e.g., hypothyroidism, coronary heart disease, hypertension, cancer, etc.). However, there were no differences between people who did and did not have another illness based on any of the biographical or diabetes-specific variables included in this analysis. Overall, no gender or age differences were observed for any of the variables.

3. Tests for effects of demographic variables on predictor and outcome variables.

Because some differences were observed between the various samples based on some demographic variables, analyses were run to determine if any of the main biographical (i.e., age, gender, recruitment type) and diabetes-specific demographic variables (i.e., time since diagnosis, presence of complications, treatment type, and presence of another illness) were having a significant effect on the predictor and outcome variables in this study. To ensure that there were no effects based on these variables, an ANCOVA was run with time since diagnosis and age (continuous variables) as covariates; gender, recruitment type, treatment type, complications, and other illness as independent variables; and all predictor and outcome variables as dependent variables. A family-wise Bonferroni correction (0.05/20 = .003) was used to test significance because of the large number of tests in this analysis. No significant differences were found using this analysis, indicating that the main biographical and diabetes-specific demographic variables did not significantly effect the predictor and outcome variables in this study.

Descriptive Statistics for All Variables

Means, standard deviations, and internal consistency reliabilities are reported for each scale used in this study in Table 1 (see Appendices O and P for descriptive statistics reported separately for men and women). The alpha reliabilities for the main variables for the total sample were generally acceptable, although three scales were found to have low[5] to low-moderate α levels: Trait Depression (T-Dep) with $\alpha = .57$; State Depression

[5] Descriptions used for reliability coefficients are adapted from Murphy and Davidshofer's (1991) basic guidelines: .50-.60 = low; .61-.69 = low-moderate; .70-.79 = moderate; .80-.90 high; .91-.95 = extremely high.

Table 1

Descriptive Statistics for Total Sample (N = 115) of People With Type 2 Diabetes

Variable	Abbr.	N/items	Mean	S. D.	α
COPING					
CHIP-Distraction coping	CHIP-D	8	25.86	5.99	.75
CHIP-Palliative coping	CHIP-P	8	21.06	4.66	.66
CHIP-Instrumental coping	CHIP-I	8	32.91	5.07	.82
CHIP-Emotional Preoccupation coping	CHIP-EP	8	19.61	7.70	.87
Rumination	RUM	16	30.72	12.24	.92
Ruminative Thoughts	RUM-T	10	21.02	9.84	.94
Ruminative Behaviors	RUM-B	6	9.70	3.69	.72
CONTROL & STRESS					
Perceived Control (Event Perception)	PCON	6	23.00	4.56	.70
Actual Control (HbA_{1c})	HbA_{1c}	1	7.89%	2.10	N/A
Perceived Stress of Diabetes	PSTR	1	2.81	1.14	N/A
STATE-ANXIETY					
EMAS-State Anxiety	EMAS-S	20	28.10	11.22	.94
EMAS-State Autonomic-Emotional	EMAS-S-AE	10	13.28	4.97	.86
EMAS-State Cognitive-Worry	EMAS-S-CW	10	14.83	6.97	.93
TRAIT-ANXIETY					
EMAS-Trait Anxiety Social Evaluation	EMAS-T-SE	15	40.55	11.50	.90
EMAS-Trait Anxiety Physical Danger	EMAS-T-PD	15	55.07	11.31	.90
EMAS-Trait Anxiety Ambiguous	EMAS-T-AM	15	42.68	10.18	.89
EMAS-Trait Anxiety Daily Routines	EMAS-T-DR	15	26.27	8.40	.87
DEPRESSION					
State Depression	S-DEP	10	19.74	3.97	.66
Trait Depression	T-DEP	10	20.04	3.77	.57
General Depression (CES-D)	DEP	20	11.47	10.45	.92

Note. Abbr. = Variable name abbreviation; N/items = Number of items; S. D. = standard deviation; α = Cronbach's alpha; CHIP = Coping with Health Injuries and Problems; EMAS = Endler Multidimensional Anxiety Scales; N/A = not applicable.

S-Dep) with $\alpha = .66$, and Palliative Coping (CHIP-P) with $\alpha = .66$. Alpha levels for the remainder of the scales ranged from a moderate level of .70 (for Perceived Control or PCON) to an extremely high level of .94 (for Rumination, or RUM, and EMAS-State Anxiety, or EMAS-S). The Center for Epidemiological Studies – Depression scale (Sawyer-Radloff, 1977) was in this group of scales showing extremely high alpha levels (.92 for CES-D), indicating that the problems with internal consistency of state and trait depression scales by Spielberger (1995) were limited only to these depression scales. Means for the scales were generally within normal limits when comparing to normative data with adult samples. However, looking at the means for the Coping with Health Injuries and problems subscales, it is apparent that this sample was more inclined to use instrumental and, to a lesser extent, distraction coping strategies when dealing with their type 2 diabetes. They were also more likely to experience physical danger trait anxiety than any other facets of trait anxiety, with the mean for daily routines trait anxiety being particularly low (see Table 1). Mean blood glucose level over the past 2-6 months (HbA_{1c}) was 7.89% for the sample, showing that the average HbA_{1c} score was within the "good blood glucose control" range in this group of participants. Also, the average perception of stress associated with type 2 diabetes was 2.81 (where 1 = not stressful and 5 = extremely stressful; see Appendix E), indicating that this sample perceived type 2 diabetes to be "moderately" stressful. Normative data were not available for the Rumination Scale and the Event Perception Measure (PCON).

Testing Hypotheses 1-3: Correlation Analyses

Table 2 shows the correlations for the total sample among all the main predictor and outcome variables. Subscales of the EMAS-State (Autonomic-Emotional and Cognitive-Worry) and Rumination (Ruminative-thoughts and Ruminative-behaviors) scales, and the "perceived stress" (PSTR) variable, were not included in this table because these variables were not part of the main analyses conducted for this study. However, all variables are included in the correlation matrix in Appendix Q (Table 14). Correlations for men and women separately on all variables can be found in Appendix R (Table 15). As noted above, there were no gender differences in preliminary analyses for all of the main variables, and thus, correlations for men and women were very similar (see Appendix R). The alpha level in Table 2 was set at .003 following a family-wise Bonferroni correction for 15 tests.

Hypothesis 1: Coping strategies and outcome variables. It was predicted that instrumental coping (CHIP-I) would be negatively correlated with depression (for each of the three types of depression measured: State-depression, or S-Dep, and Trait-depression, or T-Dep, each measured through Spielberger's (1995) State-Trait Depression Inventory; and general depression, or DEP, measured by the Center for Epidemiological Studies Depression scale or CES-D; Sawyer-Radloff, 1977), anxiety (both State, EMAS-S, and Trait, EMAS-T), and "actual blood glucose control", or Hemoglobin A_{1c} (HbA_{1c}). It was also hypothesized that emotion-focused coping (Emotional Preoccupation, CHIP-EP, and Rumination coping, RUM) and avoidance coping (Distraction, CHIP-D, and Palliative,

Table 2

Intercorrelations among Coping, Perceived and Actual Control, Anxiety and Depression for Total Type 2 Diabetes Sample (N = 115)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. CHIP-D	--	.43**	.30**	.10	.14	.10	.08	.01	-.14	-.06	-.18	-.05	-.22	-.22	-.08
2. CHIP-P		--	.33**	.40**	.33**	-.08	.05	.25	-.04	.02	-.02	.21	.12	.12	.27
3. CHIP-I			--	.07	-.03	.11	-.10	-.03	-.07	-.02	-.15	-.06	-.14	-.20	-.21
4. CHIP-EP				--	.70**	-.38**	.11	.57**	.34**	.30**	.30**	.33**	.58**	.52**	.61**
5. RUM					--	-.33**	-.01	.67**	.35**	.20	.31**	.36**	.68**	.60**	.70**
6. PCON						--	-.26	-.31**	-.12	.10	.03	-.22	-.35**	-.36**	-.35**
7. HbA_{1c}							--	.20	-.09	-.21	-.11	.04	.07	.05	.01
8. EMAS-S								--	.30**	.08	.29*	.59**	.74**	.65**	.69**
9. EMAS-T-SE									--	.51**	.55**	.13	.35**	.37**	.37**
10. EMAS-T-PD										--	.49**	-.11	.18	.16	.19
11. EMAS-T-AM											--	.23	.36**	.37**	.34**
12. EMAS-T-DR												--	.45**	.49**	.49**
13. S-DEP													--	.75**	.76**
14. T-DEP														--	.76**
15. DEP															--

CHIP = Coping with Health Injuries and Problems
CHIP-D = CHIP-Distraction coping
CHIP-P = CHIP-Palliative coping
CHIP-I = CHIP-Instrumental coping
CHIP-EP = CHIP-Emotional Preoccupation coping
RUM = Rumination
PCON = Perceived Control (Event Perception Measure)
HbA_{1c} = Actual Control
EMAS-S = EMAS-State Anxiety
EMAS-T-SE = EMAS-Trait Anxiety Social Evaluation
EMAS-T-PD = EMAS-Trait Anxiety Physical Danger
EMAS-T-AM = EMAS-Trait Anxiety Ambiguous
EMAS-T-DR = EMAS-Trait Anxiety Daily Routines
S-DEP = State Depression
T-DEP = Trait Depression
DEP = General Depression (CES-D)

**p<.001. *p<.003. Family-wise Bonferroni adjustment for 15 tests (0.05/15 = .003) was used to test for significance

CHIP-P) would be positively correlated with these variables. Table 2 shows that only the emotion-oriented coping variables had significant relationships to any of the outcome variables. More specifically, CHIP-EP had moderate[6] positive correlations with each of the EMAS-T variables, and had high positive correlations with EMAS-S and each of the depression measures. RUM showed the same patterns, except that it was not significantly related to one aspect of EMAS-T, namely, Physical Danger (EMAS-T-PD; $r = .20$, $p > .003$). None of the coping variables were significantly related to the "actual control", or HbA_{1c} outcome variable.

Hypothesis 2: Perceived control and outcome variables. It was hypothesized that perceived control (PCON) over diabetes would be negatively correlated with depression (State-depression, S-Dep; Trait-depression, T-Dep; and general depression, DEP), anxiety (State, EMAS-S, and Trait, EMAS-T), and actual blood glucose control (Hemoglobin A_{1c}, HbA_{1c}). As predicted, PCON had moderate negative correlations with EMAS-S ($r = -.31$, $p < .003$, 9.6% of the variance accounted for) and with each of the depression outcome measures (DEP: $r = -.35$, $p < .001$; S-Dep: $r = -.36$, $p < .001$; T-Dep: $r = -.35$, $p<.001$; 12.0% of the variance was accounted for across each of the depression measures). PCON was not significantly correlated with any of the EMAS-T scales, although the relationship with EMAS-T-Daily Routines (DR) approached significance ($r = -.22$, $p = .004$). The same was true for the relationship with the actual blood glucose control, or HbA_{1c} outcome variable ($r = -.26$, $p = .004$).

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[6] Correlations will be described following Cohen's (1988) guidelines: >.50 = large, high or strong; .30-.49 = medium or moderate; .10-.29 = small, weak, or low.

Hypothesis 3: Relationships between main predictor variables. It was predicted that the following variables would be positively correlated: perceived control (PCON) and instrumental coping (CHIP-I); the two emotion-oriented coping strategies (Emotional Preoccupation, CHIP-EP, and Rumination, RUM) with each other; and the avoidance oriented coping strategies (Distraction, CHIP-D, and Palliative, CHIP-P) with each other. It was further predicted that the following variables would be negatively related: perceived control and emotion-focused coping; and perceived control and avoidance coping. Instrumental coping was predicted to be either unrelated or negatively related to the other coping strategies.

As was expected, the two emotion-oriented coping scales (CHIP-EP and RUM) had a strong positive correlation with each other ($r = .70$, $p < .001$, 48.9% of the variance accounted for), and the two avoidance-oriented coping scales (CHIP-D and CHIP-P) had a moderate positive correlation with each other ($r = .43$, $p<.001$, 18.9% of the variance accounted for). However, PCON was not found to have a significant positive relationship with CHIP-I.

As predicted, PCON had a moderate negative relationship with each of the emotion-oriented coping scales (CHIP-EP: $r = -.38$, $p < .001$, with 14.4% of the variance accounted for; RUM: $r = -.33$, $p <.001$, with 10.9% of the variance accounted for). However, no significant relationships were observed between PCON and each of the avoidance-oriented coping scales. Also, CHIP-I was not related to either of the emotion-oriented coping scales or to PCON.

Two unpredicted positive relationships among predictor variables were observed. First, CHIP-I had a moderate positive relationship with each of the avoidance-oriented coping scales (CHIP-D: r=.30, p < .001, with 9.3% of the variance accounted for; and CHIP-P: r = .33, p < .001, with 11.1% of the variance accounted for). This indicated that people who scored high on instrumental coping also scored high on avoidance coping, which was not an expected outcome. Second, moderate correlations were observed between each of the emotion-oriented coping scales and CHIP-P (CHIP-EP: r=.40, p < .001, with 15.9% of the variance accounted for; and RUM: r = .33, p < .001, with 10.8% of the variance accounted for). This indicated that people who scored high on avoidance-oriented palliative coping also tended to score high on emotion-oriented coping. The general trend that is indicated in the relationships between each of the coping variables is that people with type 2 diabetes tended to use a combination of coping strategies in dealing with the condition, rather than one specific coping strategy.

Summary of results from correlation analyses. In summary, correlation analyses revealed that the emotion-oriented coping strategies (Emotional Preoccupation, CHIP-EP, and Rumination, RUM) were the only coping strategies that were positively related to anxiety and depression (state, trait, and general), and that perceived control was the only predictor variable negatively related to depression (state, trait, and general) and state anxiety. None of the predictor variables were significantly related to actual blood glucose control (HbA_{1c}), although the relationship with perceived control approached significance. In terms of relationships among the predictor variables, perceived control was negatively related to each of the emotion-oriented coping scales (CHIP-EP and

RUM), but was not related to any of the other coping variables. As was expected, the two emotion-oriented coping scales were related to each other, and the same was true for the avoidance-oriented coping scales (Distraction, CHIP-D, and Palliative, CHIP-P). Finally, two unexpected results were that Instrumental coping was positively related to each of the avoidance coping measures, and that Palliative coping was positively related to each of the emotion-oriented coping measures.

The correlation analyses showed that of all the coping variables, emotion-oriented coping strategies were positively related to the depression and anxiety outcome variables for this group of people with type 2 diabetes. No coping variables were negatively related to outcomes, indicating that none of the coping variables measured here were related to better adjustment. However, perceived control was found to have negative relationships with each of the depression outcome measures and with state anxiety, and its negative relationship to actual blood glucose control, or $HbA_{1c.}$, approached significance. This indicated that perceived control may act directly to alleviate some of the forms of distress measured by the outcome variables. Multiple regression analyses were conducted to further test whether perceived control and coping act in isolation or together in their relationships to outcome measures,.

Multiple Regression Analyses

Hypothesis 4: Perceived control as a moderator. Data were analyzed for this section by entering each of the predictor variables (coping variables: Distraction, CHIP-D; Palliative, CHIP-P; Instrumental, CHIP-I; Emotional-Preoccupation, CHIP-EP; Rumination, RUM; and perceived control, PCON), along with the interaction terms for

each coping variable with perceived control (DISxPCON, PALxPCON, INSxPCON, EMPxPCON, RUMxPCON) into a linear regression model for each of the main dependent variables (Depression: DEP, S-Dep, T-Dep; State Anxiety: EMAS-S; Trait Anxiety: EMAS-T-Social Evaluation (SE), EMAS-T-Physical Danger (PD), EMAS-T-Ambiguous (AM), EMAS-T-Daily Routines (DR); and actual blood glucose control (Hemoglobin A_{1c}, or HbA_{1c}): nine models in total; see below). Standard multiple regression analyses were carried out, which meant that all independent variables (coping, perceived control, and their interactions) were entered at the same time (as in Martin, Flett, Hewitt, Krames & Szanto, 1996; & as confirmed by J. Fox, personal communication, March 26, 1999). A "backwards deletion" method was then used to test for significant interactions and main effects (as in Johnson, 1998, and Rutherford, 1995; also referred to in Tabachnick & Fidell, 1996). Interaction effects were first investigated, and the least significant interaction terms were deleted in order until only significant interactions remained or until there were no significant interactions. If significant interactions were present, the variables corresponding to this interaction were left in the model, whether or not they had significant main effects. The main effects were then similarly investigated, such that only significant main effects, or non-significant main effects which were part of the interaction effect, were retained. Only final models are reported in the sections below (see "Data Analyses" section in Procedure for more information regarding this technique).

Hypothesis 4: General predictions for regression models. In terms of main effects, it was predicted that each of the avoidance-oriented (CHIP-D and CHIP-P) and emotion-

oriented (CHIP-EP, RUM) coping strategies would be positively related to each of the outcome variables (DEP, S-Dep, T-Dep, EMAS-S, EMAS-T-SE, EMAS-T-PD, EMAS-T-AM, EMAS-T-DR, HbA_{1c}). On the other hand, PCON and CHIP-I were predicted to be negatively related to each outcome measure. In terms of interaction effects, it was predicted that combining PCON with the avoidance and emotion-oriented subscales would lead to better outcomes (i.e., high perceived control interacting with high CHIP-EP would show lower anxiety that low perceived control interacting with high CHIP-EP) for all outcome variables.

Regression Analyses for Depression

Model 1: Predicting General Depression (DEP) as measured by CES-D. This first model investigated general depression (DEP), as measured by Sawyer-Radloff's (1977) Center for Epidemiological Studies Depression Scale (CES-D), as the criterion variable. As stated above, all predictor variables (the five coping strategies and perceived control) were entered into the model, along with each of the coping by perceived control interaction terms. No interaction effects were observed, so each of these terms were removed from the model. Also, no significant main effects were observed for PCON, so this variable was also removed. The results of the final model, which accounted for 60.3% of the variance in DEP, are presented in Table 3. Significant main effects were observed for CHIP-D [$t(5, 107) = -2.64$, $p < .01$], CHIP-P [$t(5, 107) = 2.58$, $p < .01$], CHIP-I [$t(5, 107) = -3.62$, $p < .0001$], CHIP-EP [$t(5, 107) = 2.19$, $p < .05$], and RUM [$t(5, 107) = 5.94$, $p < .0001$]. All main effects were in the predicted direction, except for CHIP-D, which was negatively related to DEP.

Table 3

Results of Model 1: Center for Epidemiological Studies Depression scale (CES-D)

Analysis of Variance

Source	df	MS	F	p
Between	5	25.95	32.44	.0001
Within	107	.80		
Total	112			

R^2 = .60; Adjusted R^2 = .58.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	2.77	.63		4.40	.0001
CHIP-D	-.04	.02	-.18	-2.64	.01
CHIP-P	.06	.02	.19	2.58	.01
CHIP-I	-.07	.02	-.24	-3.62	.0001
CHIP-EP	.35	.02	.19	2.19	.03
RUM	.06	.01	.51	5.94	.0001

CHIP = Coping with Health Injuries and Problems; CHIP-D = Distraction coping; CHIP-P = Palliative coping; CHIP-I = Instrumental coping; CHIP-EP = Emotional preoccupation coping; RUM = Ruminative coping.

Model 2: State Depression (S-Dep). As in Model 1, this model, with State Depression (S-Dep, Spielberger, 1995) as the criterion variable, and coping, perceived control, and the interaction terms as the predictor variables, did not show any significant interaction effects, so all interaction terms were removed. PCON, CHIP-P, and CHIP-I were also removed from the model as they did not produce significant main effects. The final model accounted for 58.3% of the variance in S-Dep (see Table 4). Main effects were present for CHIP-D [$t(3, 111) = -5.13$, $p < .0001$], CHIP-EP [$t(3, 111) = 2.32$, $p < .05$], and RUM [$t(3, 110) = 6.77$, $p < .0001$]. As was found in Model 1, all results were in the predicted direction except for CHIP-D, which was negatively related to S-Dep.

Model 3: Trait Depression (T-Dep). Similar results as Model 2 with S-Dep were revealed for Model 3, which had Trait Depression (T-Dep) as the criterion variable and coping, perceived control, and the coping by perceived control interaction terms as predictor variables. That is, CHIP-D [$t(3, 108) = -4.44$, $p < .001$], CHIP-EP [$t(3, 108) = 1.98$, $p < .05$], and RUM [$t(3, 108) = 5.22$, $p < .0001$] were all found to be significant predictors of T-Dep. This model, presented in Table 5, accounted for 47.7% of the variance in T-Dep.

Summary of depression models: In summary, perceived control was not found to be a moderator of any of the coping variables, and did not produce any main effects for each of the main depression variables (DEP, S-Dep, and T-Dep). Across each of the depression variables, Rumination and Emotional preoccupation coping were found to be positively related to depression, and Distraction coping was negatively related to

Table 4

Results of Model 2: State Depression (S-Dep)

Analysis of Variance

Source	df	MS	F	p
Between	3	346.82	51.28	.0001
Within	110	6.76		
Total	113			

R^2 = .58; Adjusted R^2 = .57.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	17.35	1.21		13.89	.0001
CHIP-D	-.21	.04	-.32	-5.13	.0001
CHIP-EP	.10	.04	.20	2.32	.02
RUM	.19	.03	.59	6.77	.0001

CHIP = Coping with Health Injuries and Problems; CHIP-D = Distraction coping; CHIP-EP = Emotional Preoccupation coping; RUM = Ruminative coping.

Table 5

Results of Model 3: Trait Depression (T-Dep)

Analysis of Variance

Source	df	MS	F	p
Between	3	250.92	32.77	.0001
Within	108	7.66		
Total	111			

R^2 = .48; Adjusted R^2 = .46.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	18.43	1.30		14.19	.0001
CHIP-D	-.20	.04	-.31	-4.44	.0001
CHIP-EP	.09	.05	.20	1.98	.05
RUM	.16	.03	.51	5.22	.0001

CHIP = Coping with Health Injuries and Problems; CHIP-D = Distraction coping; CHIP-EP = Emotional Preoccupation coping; RUM = Ruminative coping.

depression. Other variables that were positive predictors were Emotional Preoccupation coping (for S-Dep and T-Dep) and Palliative coping (for DEP only), and Instrumental coping was a negative predictor in the case of DEP.

Regression Analyses for Anxiety

Model 4: State Anxiety (Endler Multidimensional Anxiety Scales-State, EMAS-S). For this model the total score from the Endler Multidimensional Anxiety Scales–State subscale (EMAS-S) was entered as the criterion, and the coping, perceived control, and coping by perceived control interaction terms were entered as the predictors. As with depression, there were no significant interaction effects. In terms of main effects, only two significant relationships were observed: one for CHIP-EP [$t(2, 111) = 2.08$, $p < .05$], and the other for RUM [$t(2, 111) = 5.21$, $p < .0001$]. Each of these variables were positively related to EMAS-S. This model, which accounted for 47.2% of the variance in EMAS-S, is presented in Table 6.

This same model was run to investigate the relationships the predictor variables had to each of the subscales of EMAS-S. Thus, the criterion variable was changed so that the Subscales of EMAS-S (EMAS-State Autonomic Emotional, or EMAS-S-AE, and EMAS-State Cognitive-Worry, or EMAS-S-CW) were each investigated. First, for EMAS-S-AE, only significant effects were observed for RUM [$t(1, 113) = 8.08$, $p<.0001$], but this model accounted for quite a large proportion of the variance (36.6%). For EMAS-S-CW, on the other hand, significant main effects were observed each of CHIP-D (negative relationship), CHIP-EP, and RUM (both positive relationships), the total model [$F(3, 110) = 32.78$, $p < .0001$] accounting for 47.2% of the variance in EMAS-S-CW.

Table 6

Results of Model 4: Endler Multidimensional Anxiety Scales-State (EMAS-S)

Analysis of Variance

Source	df	MS	F	p
Between	2	3374.93	49.71	.0001
Within	111	67.90		
Total	113			

R^2 = .47; Adjusted R^2 = .46.

Parameter Estimates

Variable	B	SE	β	t	P
Constant	7.33	2.27		3.23	.002
CHIP-EP	.29	.14	.20	2.08	.04
RUM-T	.49	.09	.53	5.51	.0001

CHIP = Coping with Health Injuries and Problems; CHIP-EP = Emotional Preoccupation coping; RUM = Ruminative coping.

The results of these additional analyses are presented in Tables 16 and 17 in Appendices S and T.

Model 5: Social Evaluation Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Social Evaluation subscale, EMAS-T-SE). For model 5, social evaluation trait anxiety (EMAS-T-SE) was entered as the criterion, and coping, perceived control, and the coping by perceived control interaction terms, were entered as the predictor variables. Consistent with the other results thus far, no significant interaction effects were observed. The final model, presented in Table 7, indicates that main effects were observed for only two variables: CHIP-P [$t(2, 109) = -2.19$, $p < .05$] and CHIP-EP [$t(2, 109) = 4.37$, $p < .0001$]. This model accounted for 15.0% of the variance in EMAS-T-SE, and showed that palliative coping is negatively related to this social evaluation trait anxiety, whereas emotional preoccupation coping is positively related to social evaluation trait anxiety in this sample of people with type 2 diabetes.

Model 6: Physical Danger Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Physical Danger subscale, EMAS-T-PD). For this model, with physical danger trait anxiety (EMAS-T-PD) entered as the criterion variable, and coping, perceived control, and the interaction terms entered as predictors, many interesting and unexpected interaction and main effects were present. First, the PALxPCON interaction variable was significantly positively related to EMAS-T-PD [$t(6, 104) = 2.77$, $p < .01$], showing that when these two variables interact, they predict higher physical danger trait anxiety. Second, the RUMxPCON interaction variable was significantly negatively related to EMAS-T-PD [$t(6, 104) = -2.77$, $p < .01$], showing that when these two variables interact,

Table 7

Results of Model 5: Social Evaluation Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Social Evaluation subscale, EMAS-T-SE).

Analysis of Variance

Source	df	MS	F	P
Between	2	1089.44	9.65	.0001
Within	109	112.94		
Total	111			

$R^2 = .15$; Adjusted $R^2 = .14$.

Parameter Estimates

Variable	B	SE	β	t	P
Constant	39.56	4.76		8.32	.0001
CHIP-P	-.52	.24	-.21	-2.19	.03
CHIP-EP	.62	.14	.42	4.37	.0001

CHIP = Coping with Health Injuries and Problems; CHIP-P = Palliative coping, CHIP-EP = Emotional Preoccupation coping.

they predict lower physical danger trait anxiety. The nature of the interactions are shown through line graphs generated through SPSS 7.5 (see Figures 2 and 3) with regression lines for perceived control. Perceived control and each of the coping variables (palliative and rumination) were dichotomized into "low" and "high" based on a median split. Figure 2 shows that palliative coping is associated with higher levels of physical danger trait anxiety for those participants with high perceived control. On the other hand, palliative coping is associated with lowered physical danger anxiety for participants with low perceived control. Figure 3 shows that rumination is associated with higher but more stable levels of physical danger trait anxiety in subjects with high perceived control. In subjects with low perceived control, increased rumination coping is associated with increases in physical danger trait anxiety.

In terms of main effects, PCON was actually found to be a positive predictor of EMAS-T-PD [$t(6, 104) = 2.61$, $p = .01$], as was CHIP-EP [$t(6, 104) = 3.72$, $p < .0001$]. The entire model accounted for 25% of the variance in EMAS-T-PD. These results show that perceived control may actually be related to higher levels of physical danger anxiety (see Table 8).

Model 7: Ambiguous Situation Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Ambiguous subscale, EMAS-T-AM) This model, with ambiguous situation trait anxiety (EMAS-T-AM) entered as the criterion variable, and coping, perceived control, and the interaction terms entered as predictors, produced very similar results to Model 6. The PALxPCON interaction variable was significantly positively related to

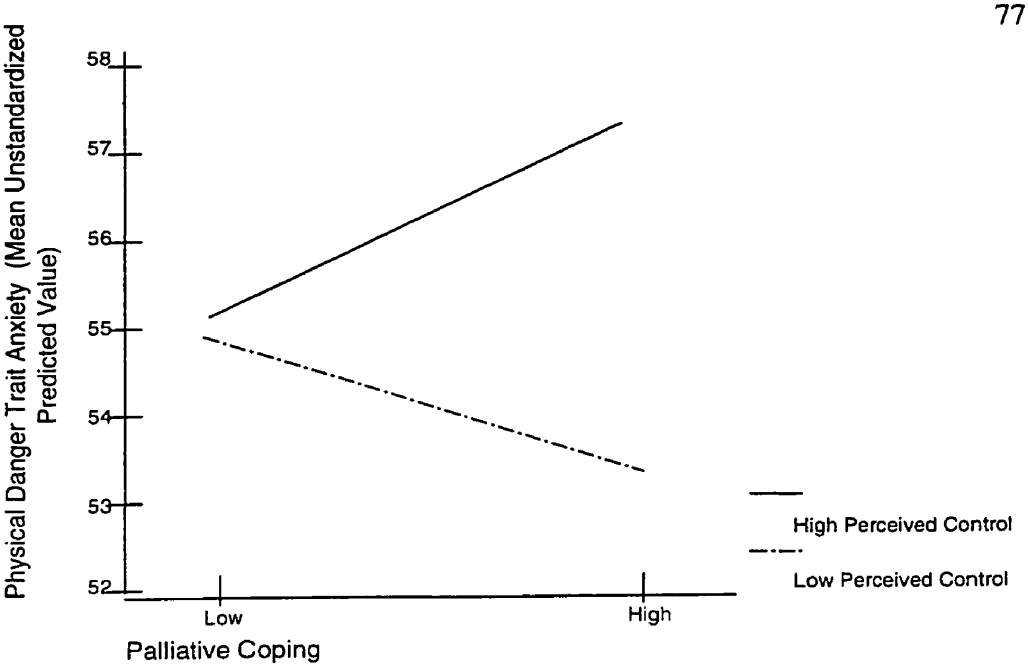

Figure 2. Interaction of perceived control and palliative coping on physical danger trait anxiety. Both perceived control and palliative coping were made categorical based on a median split.

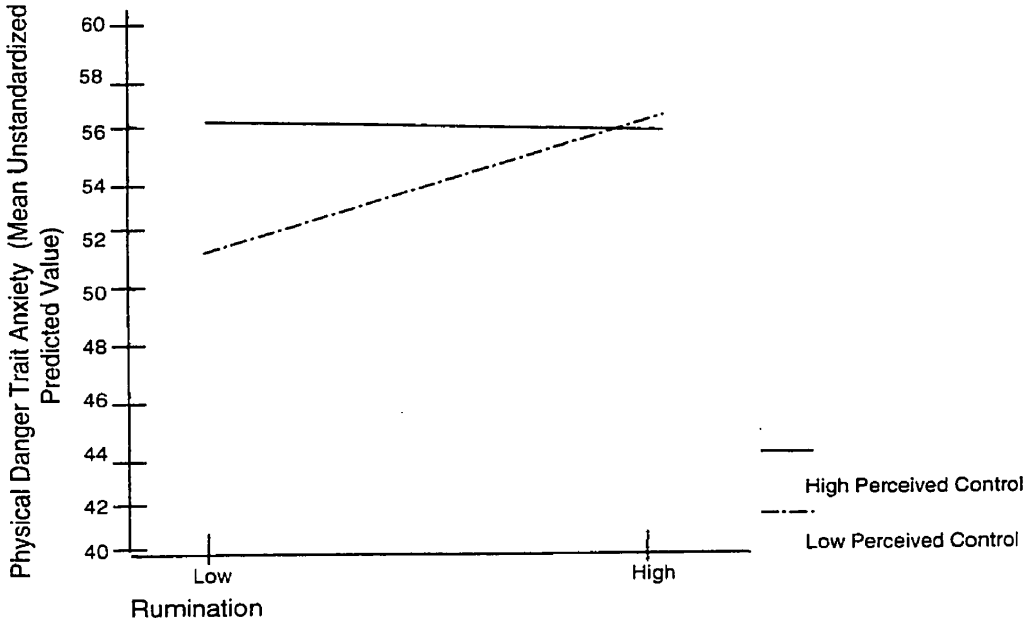

Figure 3. Interaction of perceived control and rumination on physical danger trait anxiety. Both perceived control and rumination were made categorical based on a median split.

Table 8

Results of Model 6: Physical Danger Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Physical Danger subscale, EMAS-T-PD).

Analysis of Variance

Source	df	MS	F	p
Between	6	580.50	5.64	.0001
Within	104	103.00		
Total	110			

R^2 = .25; Adjusted R^2 = .20.

Parameter Estimates

Variable	B	SE	β	T	p
Constant	34.36	7.39		4.151	.0001
CHIP-P	-.21	.24	-.09	-.89	.37
CHIP-EP	.70	.19	.49	3.72	.0001
RUM	-.10	.12	-.11	-.88	.38
PCON	.61	.23	.25	2.61	.01
PALxPCON	2.49	.90	.27	2.77	.007
RUMxPCON	-2.57	.93	-.28	-2.77	.007

CHIP = Coping with Health Injuries and Problems; CHIP-P and PAL = Palliative coping; CHIP-EP = Emotional Preoccupation coping; RUM = Ruminative coping; PCON = perceived control.

EMAS-T-AM [$t(7, 102) = 3.15$, $p < .01$], showing that when high perceived control interacts with high palliative coping, this leads to higher ambiguous trait anxiety. Figure 4 shows that this is a similar relationship to that found for physical danger trait anxiety. That is, palliative coping was associated with higher ambiguous trait anxiety in people with high perceived control, but lower ambiguous trait anxiety in people with low perceived control. The RUMxPCON interaction variable was significantly negatively related to EMAS-T-AM [$t(7, 102) = -3.08$, $p < .01$]. Figure 5 shows that rumination was associated with higher but more stable levels of ambiguous trait anxiety in subjects with high perceived control. In subjects with low perceived control, increased rumination coping was associated with increases in ambiguous trait anxiety, such that people with low perceived control who scored high on rumination coping showed higher levels of ambiguous trait anxiety than those who scored high on rumination and perceived control (see Figure 5).

In terms of main effects, as in the case of EMAS-T-PD, PCON was actually found to be a positive predictor of EMAS-T-AM [$t(7, 102) = 2.37$, $p < .05$], as was CHIP-EP [$t(6, 104) = 2.42$, $p < .05$]. Also, CHIP-D was found to be negatively related to EMAS-T-AM [$t(6, 104) = -2.00$, $p < .05$], showing that distraction coping may be related to lower levels of ambiguous situation trait anxiety in people with type 2 diabetes (see Table 9). Model 7 accounted for 30.9% of the variance in EMAS-T-AM.

Model 8: Daily Routines Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Daily Routines subscale, EMAS-T-DR). In this model, Daily Routines Trait Anxiety (EMAS-T-DR) was entered as the criterion variable, and coping, perceived

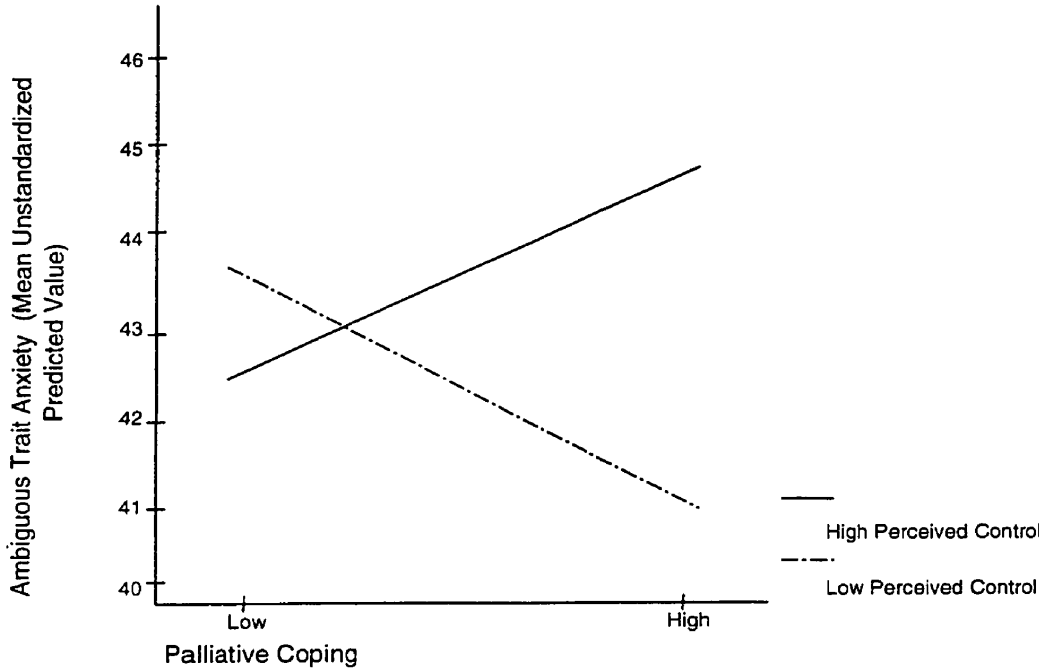

Figure 4. Interaction of perceived control and palliative coping on ambiguous trait anxiety. Both perceived control and palliative coping were made categorical based on a median split.

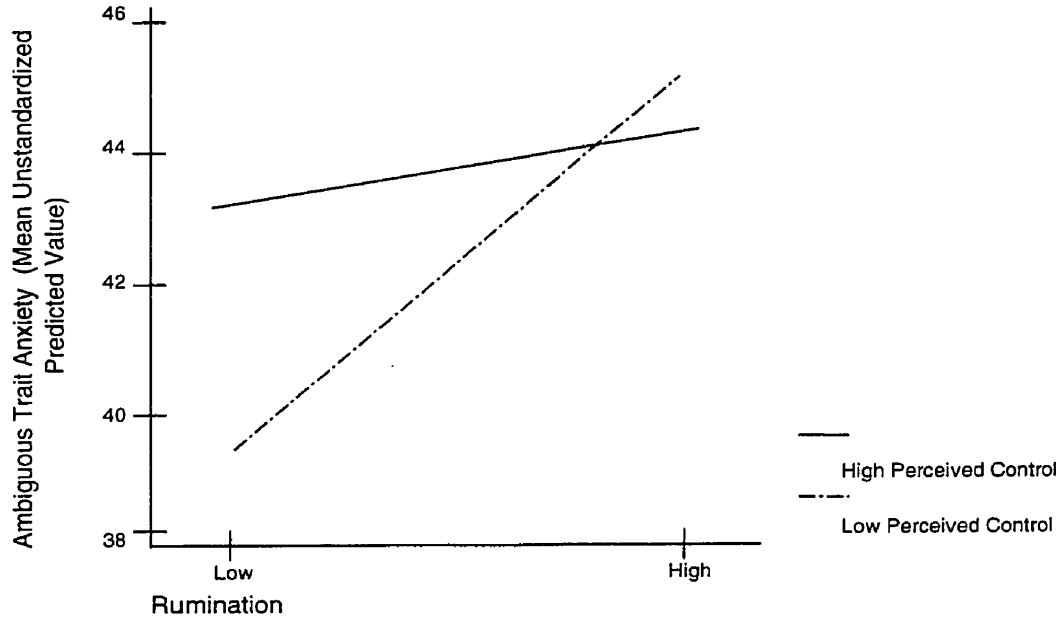

Figure 5. Interaction of perceived control and rumination on ambiguous trait anxiety. Both perceived control and palliative coping were made categorical based on a median split.

Table 9

Results of Model 7: Ambiguous Situation Trait Anxiety (Endler Multidimensional Anxiety Scale-Trait, Ambiguous subscale, EMAS-T-AM).

Analysis of Variance

Source	df	MS	F	P
Between	7	497.10	6.51	.0001
Within	102	76.40		
Total	109			

R^2 = .31; Adjusted R^2 = .26.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	31.18	6.73		4.63	.0001
CHIP-D	-.32	.16	-.19	-2.00	.05
CHIP-P	-.13	.22	-.06	-.59	.56
CHIP-EP	.40	.17	.31	2.42	.02
RUM	.09	.11	.11	.87	.39
PCON	.49	.21	.22	2.37	.02
PALxPCON	2.47	.78	.30	3.15	.002
RUMxPCON	-2.46	.80	-.30	-3.08	.003

CHIP = Coping with Health Injuries and Problems; CHIP-D = Distraction coping; CHIP-P and PAL = Palliative coping; CHIP-EP = Emotional Preoccupation coping; RUM = Ruminative coping; PCON = perceived control.

control and the interaction variables as the predictors. After successively removing each of the non-significant interaction and main effects from this model, only one variable was found to predict EMAS-T-DR: Ruminative coping [$t(1, 111) = 4.06$, $p < .0001$]. This model accounted for 12.9% of the variance in EMAS-T-DR. This indicates the people in this sample who were high on ruminative coping were more likely to have higher levels of Daily Routines Trait Anxiety (see Table 10).

Summary of anxiety models. In summary, Emotional Preoccupation coping was found to be positively related to state anxiety and to all facets of trait anxiety, except for EMAS-T-DR. Ruminative coping also had positive main effects for two of the anxiety variables: State anxiety and EMAS-T-DR. Distraction coping, on the other hand, was negatively related to EMAS-T-AM, and to a subscale of state anxiety (Cognitive-Worry).

Palliative coping was negatively related to EMAS-T-SE. Perceived control was found to be a moderator of both Palliative coping and Ruminative coping for EMAS-T-AM and for EMAS-T-PD, with the PALxPCON interaction variable having an unexpected positive relationship with each variable, and the RUMxPCON interaction variable having a negative relationship with each variable. What was also unexpected was the positive relationship PCON had to each of EMAS-T-PD and EMAS-T-AM. In summary, it seems that each of coping and perceived control had different relationships to each type of anxiety, rather than there being an overall and systematic relationship between each of the variables.

Table 10

Results of Model 8: Daily Routines Trait Anxiety ((Endler Multidimensional Anxiety Scale-Trait, Daily Routines subscale, EMAS-T-DR)

Analysis of Variance

Source	df	MS	F	p
Between	1	1023.86	16.50	.0001
Within	111	62.04		
Total	112			

R^2 = .13; Adjusted R^2 = .12.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	18.75	1.99		9.40	.0001
RUM	.25	.06	.36	4.06	.0001

RUM = Ruminative coping.

Actual Blood Glucose Control

Model 9: Hemoglobin A_{1c} (HbA_{1c}) In the final model in the analyses of the main effects of each predictor variable (coping and perceived control), and the moderating effects of perceived control on the coping variables, actual blood glucose control, or Hemoglobin A_{1c} (HbA_{1c}), was used as the criterion variable. The results of the multiple regression analyses showed that only perceived control predicted HbA_{1c}, with the model [$F(1,112) = 8.57$, $p < .001$] accounting for 7.1% of the variance in this outcome variable (see Table 11). Although this is a low percentage, the result is revealing in that PCON was the only variable among many to significantly predict this outcome measure. It also showed that perceived control may act on its own, rather than through coping variables, in its relationship to actual blood glucose control.

Hypothesis 5: Testing for Mediation of Perceived Control by Coping

The analyses above showed that perceived control has moderate negative correlations with state anxiety, state depression, trait depression and general depression. Also, regression analyses showed that perceived control is a positive predictor of physical danger and ambiguous trait anxiety, and negatively related to actual blood glucose control, or Hemoglobin A1c. These relationships were not revealed in the correlation analysis due partly to the relatively stringent Bonferroni correction that was necessary to test for the significance of the large number of tests in this figure (see Table 2 and previous section on Correlation Analysis).

Table 11

Results of Model 9: Actual Blood Glucose Control (Hemoglobin A_{1c}, HbA_{1c})

Analysis of Variance

Source	df	MS	F	p
Between	1	35.53	8.57	.004
Within	112	4.15		
Total	113			

R^2 = .071; Adjusted R^2 = .063.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	10.72	.98		10.93	.0001
PCON	-.12	.04	-.27	-2.93	.004

PCON = perceived control.

For the mediator analysis, regression analyses were conducted to determine whether any of the direct relationships between perceived control and the adjustment variables (general depression, state depression, trait depression, state anxiety, and trait anxiety) were mediated by the coping variables (distraction, palliative, instrumental, emotional preoccupation, and rumination) included in this study. The following describes how the specific coping variables were chosen to be tested as mediators through Step 1 of the test for mediation (see Baron & Kenny, 1986). Note that the regression analyses have been run for each variable in lieu of simply referring back to the correlation table. This was done to illustrate the predictor relationships to some of the variables (e.g., HbA1c) that did not show up in the correlation table as significant due primarily to the Bonferroni correction.

Step 1. The first step for testing mediation was the same for each outcome variable. This step involved testing each of the potential mediators (coping strategies: Distraction, CHIP-D; Palliative, CHIP-P; Instrumental, CHIP-I; Emotional preoccupation, CHIP-EP; and Rumination, RUM) against the independent variable (perceived control, PCON) to determine whether a significant relationship existed between perceived control and each coping variable (which was also indicated in the correlation analyses previously discussed). This simple linear regression analysis, conducted separately for each coping variable, yielded two potential mediators to be tested for each outcome variable: CHIP-Emotional Preoccupation (EP), and Rumination

coping. The following describes the tests for mediation conducted for each of the outcome variables.

Depression Variables

Perceived control (PCON) was found in previous analyses to have moderate negative relationships to each of the depression outcome variables: General Depression (DEP), measured through the Center for Epidemiological Studies Depression Scale (CES-D; Sawyer-Radloff, 1977); State-Depression (S-Dep), and Trait-Depression (T-Dep), each measured through Spielberger's (1995) State-Trait Depression measure. The following describes tests that were conducted to determine whether Emotional Preoccupation and Ruminative coping mediated these relationships.

General depression (DEP). For step 2 of this model, the dependent variable (general depression or DEP, as measured by the CES-D) was regressed on perceived control, and perceived control was found to predict general depression ($\beta = -.35$). In step 3, each of the coping variables were entered into separate models with perceived control. The relationship between perceived control and DEP was no longer significant when these each variable was entered into their respective models ($\beta = -.13$ for both the CHIP-EP and RUM models).Each of the potential mediators produced significant main effects, indicating that they did mediate the relationship between perceived control and DEP. Results of this analysis are presented in Figures 6 and 7.

State depression (S-Dep). Similar analyses were conducted for state depression (S-Dep). In the second step for this variable, perceived control was found to have a direct

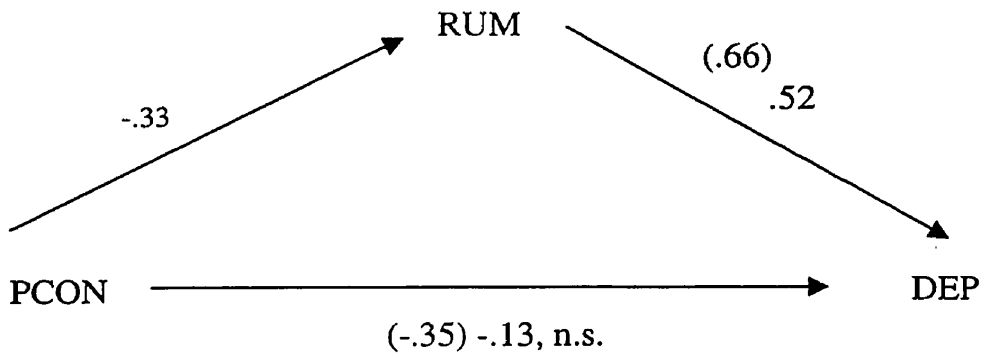

Figure 6. Diagram showing the direct and indirect effects of perceived control on general depression. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when the variables were entered simultaneously into the final regression model. RUM = ruminative coping; PCON = perceived control; DEP = general depression as measured by the Center for Epidemiological Studies Depression Scale (CES-D; Sawyer-Radloff, 1977).

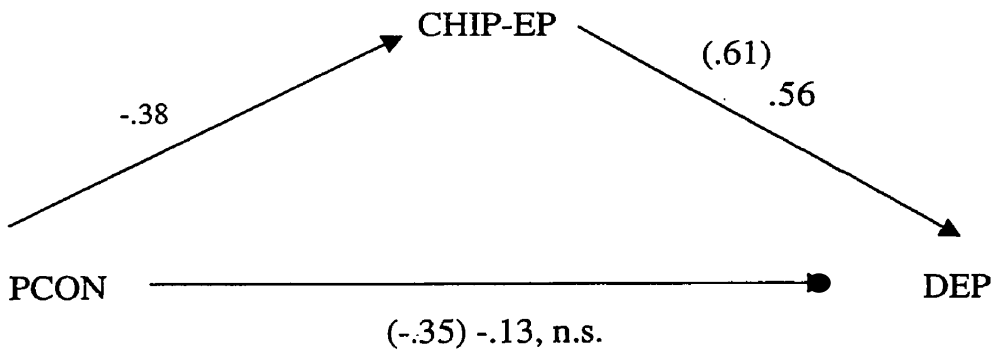

Figure 7. Diagram showing the direct and indirect effects of perceived control on general depression. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when the variables were entered simultaneously into the final regression model. CHIP-EP = emotional preoccupation coping; PCON = perceived control; DEP = general depression as measured by the Center for Epidemiological Studies Depression Scale (CES-D; Sawyer-Radloff, 1977).

negative relationship with S-Dep (β = -.35). In step 3, only RUM was found to significantly predict state depression (β = .53). when all variables (PCON, CHIP-EP, RUM) were entered into the model (see Figure 8). Thus, Ruminative coping was the single mediator of the relationship between perceived control and state depression.

Trait depression (T-Dep). The results of mediation analyses for T-Dep are presented in Figure 8. The results are highly similar to those for S-Dep. That is, RUM was the only variable found to mediate the relationship of perceived control to T-Dep. The relationship between RUM and T-Dep was, however, slightly lower (β = .45; see Figure 9) than the relationship between RUM and S-Dep (β = .53; see above).

Anxiety Variables

Previous analyses showed perceived control to be negatively related to state anxiety. Correlation analyses did not reveal any significant negative relationships between perceived control and each of the trait anxiety variables, although the relationship with EMAS-T-Daily Routines (DR) approached significance (r = -.22, p=.004). Also, regression analyses for Hypothesis 4 showed perceived control to be a positive predictor of EMAS-T-Physical Danger (PD) and EMAS-T-Ambiguous (AM). Thus, each of these anxiety variables were tested at step 2 for relationships to perceived control, and then significant results were tested for mediation (for Emotional Preoccupation coping and Ruminative coping). The results are presented below.

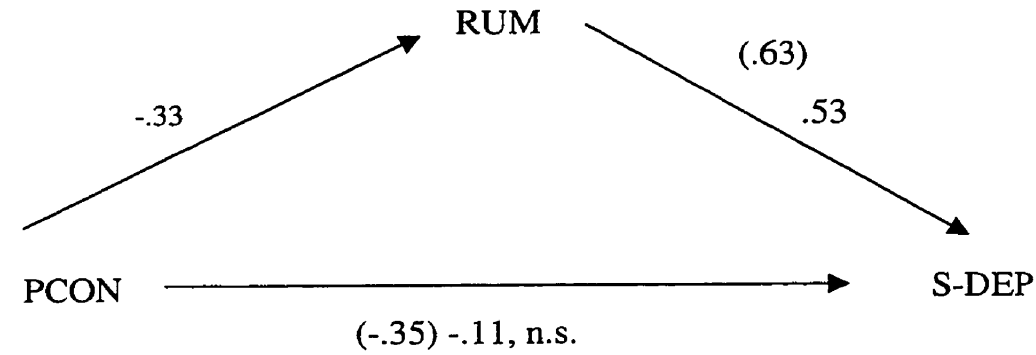

Figure 8. Diagram showing the direct and indirect effects of perceived control on state depression. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when all the variables were entered simultaneously into the final regression model. RUM = ruminative coping; PCON = perceived control; S-Dep = State depression as measured by Spielberger's State-Trait Depression Inventory (1995).

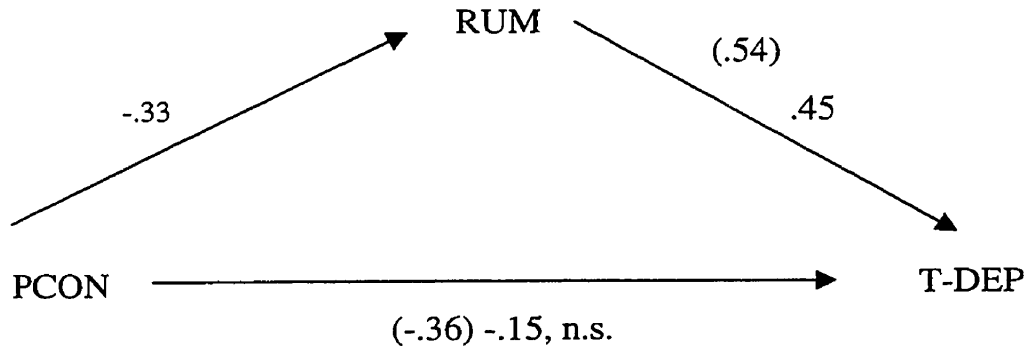

Figure 9. Diagram showing the direct and indirect effects of perceived control on trait depression. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when all the variables were entered simultaneously into the final regression model. RUM = ruminative coping; PCON = perceived control; T-Dep = Trait depression as measured by Spielberger's State-Trait Depression Inventory (1995).

State Anxiety (EMAS-S). In step 2, perceived control was found to be a significant predictor of state anxiety (β = -.31). When RUM was entered into the model with CHIP-EP at step 3, only RUM was found to have a significant relationship to EMAS-S (β = .42). The results of this analysis are presented in Figure 10.

Perceived control was also found to directly predict each of EMAS-S-Cognitive Worry (CW; β = -.30) and EMAS-S-Autonomic-Emotional (AE; β = -.28). RUM (β = .50) mediated the relationship between perceived control and EMAS-S-AE, whereas, each of CHIP-EP (β = .28) and RUM (β = .49) were found to mediate the relationship between perceived control and EMAS-S-CW. These results are presented in Appendix U (Figures 13 and 14).

Trait anxiety. Each of the Trait anxiety subscales were entered into the model in step 2. Perceived control was only found to significantly predict EMAS-T-Daily Routines (DR) at this level, and the effect was rather low (β = -.22). Mediation was observed, but only for the RUM coping variable (β = .24). This result is presented in Figure 11.

Actual Control: Hemoglobin A_{1c} (HbA_{1c})

The final test of mediation was conducted for actual blood glucose control, or Hemoglobin A_{1c} (HbA_{1c}). Although none of the coping variables were correlated with this outcome variable at the $p < .003$ level (see Table 2, correlations), the relationship with perceived control approached significance (r = -.26, p = .004). Thus, mediation was still tested to ensure that RUM and CHIP-EP were not factors in the relationship between perceived control and actual blood glucose control. The relationship between perceived

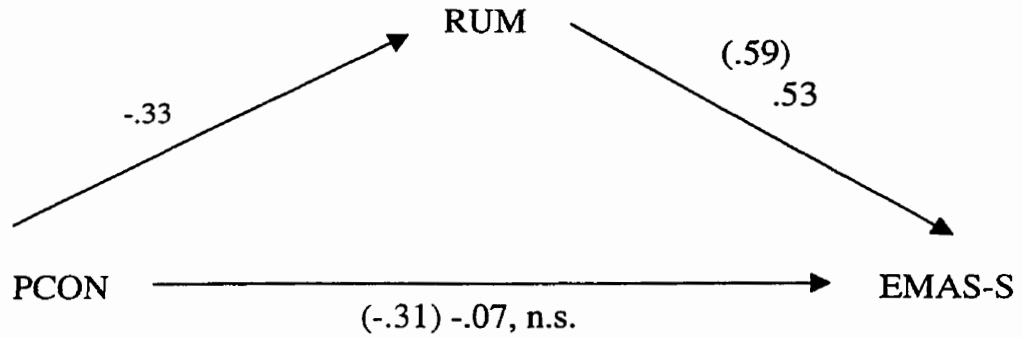

Figure 10. Diagram showing the direct and indirect effects of perceived control on state anxiety. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when all the variables were entered simultaneously into the final regression model. RUM = ruminative coping; PCON = perceived control; EMAS-S= Endler Multidimensional Anxiety Scales-State anxiety.

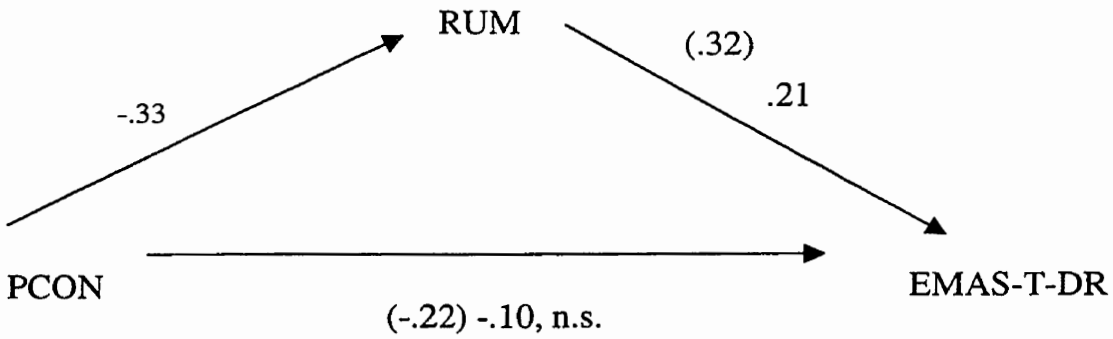

Figure 11. Diagram showing the direct and indirect effects of perceived control on daily routines trait anxiety. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when all the variables were entered simultaneously into the final regression model. RUM = ruminative coping; PCON = perceived control; EMAS-T-DR= Endler Multidimensional Anxiety Scales-Trait anxiety, Daily Routines subscale.

control and HbA_{1c} was found to be significant at step 2 (β = -.26). However, neither of the potential mediators reached significance at step 3. This provided further support for the previous findings that perceived control acts directly on actual blood glucose control, rather than through any coping variables.

Summary of tests of Mediation. Ruminative coping was found to mediate the relationship between perceived control and each of the following outcome measures: general depression, state depression, trait depression, state anxiety, and daily routines trait anxiety. Emotional preoccupation was also found to be a mediator of perceived control, but only for general depression. Finally, none of the coping strategies were found to mediate the relationship between perceived control and actual blood glucose control (HbA_{1c}), indicating that perceived control acts directly in its relationship to actual blood glucose control.

Summary of Results

Correlation analyses showed that the emotion-oriented coping variables (emotional preoccupation and rumination) were positively related to anxiety and depression (state, trait, and general), and that perceived control was negatively related to depression (state, trait, and general) and state anxiety. No significant relationships were found for any of the predictor variables with actual blood glucose control (as measured by Hemoglobin A_{1c}), but the relationship with perceived control approached significance. Relationships between the coping variables were in the predicted direction for all variables, except that instrumental coping was positively related to distraction and

palliative coping, and palliative coping was positively related to emotional preoccupation and rumination coping.

In the multiple regression analyses, rumination, emotional preoccupation, and palliative coping were found to be positive predictors of depression, although the results varied based on which outcome measure of depression (state, trait, or general) was being tested. Distraction and instrumental coping were both negatively related to depression, but again, these results depended on the outcome measure used for depression. Similar results were revealed for the anxiety variables. Emotional preoccupation coping and rumination were positively related to state anxiety, whereas distraction coping was negatively related to state anxiety (for the cognitive-worry subscale only). For the trait anxiety variables, ambiguous trait anxiety and physical danger trait anxiety each showed significant positive interaction effects for palliative coping by perceived control, and negative interaction effects for rumination by perceived control. Perceived control had an unexpected positive relationship to each of these two trait anxiety variables. Main effects were also observed for palliative coping on social evaluation trait anxiety (negative relationship) and for distraction coping on ambiguous situation trait anxiety (negative relationship). Only perceived control was found to be a predictor of actual blood glucose control at this level of analysis.

Finally, tests for potential mediators of the relationship between perceived control and outcome variables, found rumination to be a mediator of the negative relationships between perceived control and each of general depression, state depression, trait depression, state anxiety, and daily routines trait anxiety. Emotional preoccupation

coping was the only other mediator, and this coping variable was found to mediate the negative relationship between perceived control and general depression. The relationship between perceived control and actual blood glucose control was not found to be mediated by any of the coping variables investigated in the present study.

In summary, the most consistent result from these analyses was that rumination-based coping was maladaptive in terms of most of the psychological adjustment variables (state and trait depression and anxiety), and even acted as a positive mediator of the negative relationship between perceived control and many of the outcome measures (all the depression variables, state anxiety, and daily routines trait anxiety). In other words, these results provided an indication of the strong relationship that ruminating about type 2 diabetes can have with poor adjustment (i.e., higher depression and anxiety). However, interestingly, this coping variable did not factor into the physical adjustment to the condition, as measured by Hemoglobin A_{1c}. Rather, cognitive appraisal regarding the perception of control over the condition was the only predictor of this variable, with individuals who perceived type 2 diabetes to be personally controllable showing better actual blood glucose control than those who did not. The implications of these results, along with the limitations of the present study, are discussed further in the next chapter.

Chapter 4

DISCUSSION

The purpose of this study was to investigate the relationships between how people cope with type 2 diabetes (in terms of emotion-focused, avoidance-oriented and instrumental coping), their cognitive perceptions regarding personal control over the condition (perceived control), and their psychological (state and trait depression and anxiety) and physical (actual blood glucose control, as measured through Hemoglobin A_{1c}) adjustment to having type 2 diabetes. This chapter discusses the results of the present study in relation to the hypotheses postulated and to other research on type 1 and type 2 diabetes. Also discussed are limitations of the present research, implications of the findings for Diabetes Educators and for psychological research, and possible directions for future research. First, however, a discussion of the psychometric properties (i.e., alpha reliabilities) of the scales included in this study is provided.

Alpha Reliabilities

Inter-item or alpha reliabilities for the majority of the scales included in this study ranged from moderate (i.e., $\alpha = .70$ for the Event Perception Measure, which measured perceived control) to extremely high (e.g., $\alpha = .94$ for both the Rumination and Distraction Questionnaire, used to measure Ruminative coping or RUM, and the Endler Multidimensional Anxiety Scales – State Subscale, or EMAS-S). However, three scales deviated from this: each of Spielberger's (1995) state ($\alpha = .57$) and trait ($\alpha = .66$) depression scales (S-Dep and T-Dep), and the palliative coping subscale of the Coping with Health Injuries and Problems scale (CHIP-P; $\alpha = .66$). Spieblerger's (1995)

depression scales were originally constructed to measure depression in non-clinical settings (Spielberger & Ritterband, 1996), and although they are relatively new, thorough analyses by Spielberger (1995) found them to be psychometrically sound, with moderate to high alpha levels for each scale. A recent study by Endler, Macrodimitris and Kocovski (1998) confirmed the strong psychometric properties of these depression scales, and found similar high alpha reliabilities to Spielberger (α = .84 for S-Dep and α = .86 for T-Dep). However, through factor analyses, these researchers showed that the items from the two scales loaded almost perfectly on two main factors, labeled dysthymia and euthymia, but that these factors did not overlap with factors from scales constructed for clinically-based samples. For example, this and other studies (e.g., Endler, Rutherford & Denisoff, in press) found the Beck Depression Inventory to load on a cognitive-affective and a physiological factor, rather than on the dysthymic or euthymic factor, and this cognitive-affective/physiological factor structure was also found for the Carroll Rating Scale for Depression (Endler, Macrodimitris & Kocovski, 1998). These findings indicate that the S-Dep and T-Dep scales may be measuring different aspects of depression than the clinically-based scales (like the Centre for Epidemiological Studies Depression scale, or CES-D, included in the present study). In the present study, S-Dep and T-Dep both had strong relationships (r = .76 for both) with the CES-D, which indicates that this may not be a problem for the current study. However, the low reliabilities of S-Dep and T-Dep, and the possibility that the scales may actually measure different aspects of depression than the CES-D, should be taken into account when reading about the conclusions regarding each of the depression variables.

The low-moderate alpha level for CHIP-P may be due to the simple fact that some items on this subscale were perceived as irrelevant and not germane to coping with type 2 diabetes. For example, items like "Stay in bed", "Try to use as little energy as possible", and "Make sure I am warmly dressed or covered", seem to be more relevant to an acute illness (i.e., cold, flu) than to a chronic condition, like type 2 diabetes. Thus, many items on this subscale may not have been appropriate coping mechanisms for people with type 2 diabetes, which could account for its low-moderate alpha level. Despite the low alpha levels for CHIP-P, S-Dep, and T-Dep, significant results were found for each of these variables. These and the other main results of the present study are discussed below.

Coping Strategies

One of the main purposes of this study was to determine what types of coping strategies are used by people with type 2 diabetes, and how these coping strategies (a) relate to each other, and (b) relate to psychological (state and trait depression and anxiety) and physical (blood glucose control, as measured through HbA_{1c}) adjustment variables. Means for each of the coping variables showed that this group of people with type 2 diabetes used instrumental coping to a greater extent than any of the other coping variables, although the mean for distraction coping was also high. The finding for instrumental coping is supported by research reviewed by Maes, Leventhal and DeRidder (1996) that showed a general tendency for people with diabetes mellitus to use more task-oriented coping than emotion-focused coping. This result may be related to the "goodness of fit hypothesis" (Conway & Terry, 1992), which postulates that people are more likely to use problem-focused coping strategies when dealing with a controllable stressor, like

type 2 diabetes (see "Theoretical and Practical Implications" section, below, for a further discussion of the goodness of fit hypothesis). The high means for distraction coping are curious, especially for a chronic illness, and given the fact that research tends to show negative results regarding various adjustment variables when this type of coping is used (e.g., Kvam & Lyons, 1991). A discussion of the main coping-based analyses may provide further insight into this finding.

Coping strategies used by people with type 2 diabetes. It was hypothesized that emotion-focused coping strategies (i.e., Emotional Preoccupation, or CHIP-EP, and Rumination, or RUM) would be positively related to each other, as would the avoidance-oriented coping strategies (Distraction coping, or CHIP-D, and Palliative coping, or CHIP-P). It was also hypothesized that instrumental coping (CHIP-I) would be either unrelated or negatively related to each of the other coping strategies. Correlation analyses revealed a strong relationship between the two emotion-oriented coping variables (RUM and CHIP-EP, $\alpha = .70$) and a moderate relationship between the avoidance-oriented coping variables (CHIP-D and CHIP-P, $\alpha = .43$). This analysis also showed no relationship between CHIP-I and each of the emotion-oriented coping variables, which, taken together with the other results, provided support for most of the hypotheses. Interestingly, moderate positive correlations were also observed between CHIP-I and each of the distraction coping variables, and between CHIP-P and each of the emotion-oriented coping variables. These unexpected results show that people with type 2 diabetes tend to use a combination of coping strategies when dealing with the condition, rather than one specific style of coping, and may account for the high means for both

instrumental and distraction coping in this group. Endler, Parker and Summerfeldt (1998) found that individuals with a chronic illness tend to use primarily both instrumental and emotion-oriented coping to deal with their illness. The findings from this study, which focused only on type 2 diabetes, show that distraction coping may be used in conjunction with both instrumental and emotion-oriented coping strategies in people with type 2 diabetes, but that instrumental and emotion-oriented coping generally do not relate to one another in this chronic illness group. This result is indicative of coping as a process that may change depending on what aspect of the condition is being dealt with, rather than coping as a style, or trait-like feature (Endler & Parker, 1999a), in people with type 2 diabetes.

Coping strategies and adjustment in people with type 2 diabetes: Correlations. In terms of the relationship between coping variables and psychological and physical adjustment, it was hypothesized that emotion-oriented and avoidance coping strategies would be maladaptive (i.e., related to higher depression and anxiety, and poor blood glucose control), whereas instrumental coping would be adaptive, in terms of all of the outcome variables. Correlation analyses revealed that only the emotion-oriented coping variables (CHIP-EP and RUM) were positively related to psychological adjustment. In particular, people scoring high on CHIP-EP also scored high on each of the depression variables, and on each of the state and trait anxiety variables. RUM was also positively related to each of the depression variables, and to all of the facets of trait anxiety, except for physical danger. Thus, similar results were revealed for the two emotion-oriented coping variables at this level of analysis, and thus, the hypothesis for emotion-oriented

coping was generally supported. This result is consistent with a study by Bombardier et al. (1990) who found, in a sample of people with various chronic illnesses, that emotion-oriented coping was positively related to poor psychosocial adjustment and depression, whereas problem-focused coping was unrelated to these outcome variables.

Coping strategies and adjustment in people with type 2 diabetes: Regression analyses. Regression analyses were perhaps more revealing than correlation analysis of relationships between predictor and outcome variables, through results showing main effects of the coping variables on the outcome variables. Staying with the emotion-focused coping variables (CHIP-EP and RUM) to begin this discussion, similar results were again found for the two variables in terms of depression, except that RUM was predictive of each facet of depression (general, state, and trait) whereas CHIP-EP was only predictive of state and trait depression. These general results, showing a positive relationship between emotion-oriented coping and depression, are consistent with research and theory which show the negative effects that emotion-oriented coping can have on an individual in the long run (e.g., Lazarus, 1993; Endler & Parker, 1999a). Also, the results for RUM are consistent with the findings of research by Nolen-Hoeksema and Morrow (1991; 1993), and Nolen-Hoeksema, Morrow and Frederickson, (1993) which show that people who ruminate in response to a being in a depressed state will likely have more enduring depressive episodes. Applying this model to the present study, people who showed excessive thought-focused attention (as measured by the Rumination subscale of the Rumination and Distraction Questionnaire, Nolen-Hoeksema, Morrow &

Frederickson, 1993) on their type 2 diabetes were more likely to be depressed than those who did not use ruminative coping strategies in dealing with the condition.

In terms of the anxiety outcome variables, CHIP-EP was positively related to state anxiety and to each of the four facets of trait anxiety, which were predicted outcomes. RUM, on the other hand, was predictive of state anxiety, but only for the daily routines trait anxiety. The different results for the anxiety outcome variables for these two emotion-oriented coping variables highlights the conceptual difference between these coping strategies. Although highly correlated with one another, CHIP-EP is more of a general, emotion-oriented coping measure, whereas RUM focuses specifically on the thought-focused attention characteristic of emotion-oriented coping (Endler & Parker, 1999b; Endler, Parker & Summerfeldt, 1998). The results presented here show that this "thought-focused attention," an aspect of rumination, can be particularly relevant to state anxiety and daily routines trait anxiety, whereas general emotionality in coping is related to a heightened level of each of the four facets of anxiety.

The significant result for RUM as a predictor of daily routines trait anxiety deserves closer attention. For a person with type 2 diabetes, daily routines may include following strict dietary and exercise regimens, constantly monitoring blood glucose levels, and remembering to take oral tablets or to give oneself insulin injections. Excessive brooding over these treatment factors and over having type 2 diabetes could lead to heightened anxiety surrounding one's ability to keep up with the regimen on a daily basis and to maintain a balanced lifestyle. Thus, this relationship is rather intuitive for people with type 2 diabetes. The fact that RUM did not predict any of the other trait

anxiety measures shows, however, the key significance of this specific aspect of emotion-oriented coping to trait anxiety surrounding daily routines in people with type 2 diabetes. The relationship between rumination and state anxiety and daily routines trait anxiety also shows the applicability of Nolen-Hoeksema's (1996) theory and research to adjustment variables other than depression, and to a focus on illness-based stressors rather than just on the actual depression being experienced.

Focusing now on distraction coping, this avoidance-oriented coping variable was related to lower DEP (CES-D), lower S-Dep, and lower T-Dep, showing the importance of this coping variable to healthy adjustment (in terms of lower depression) in people with type 2 diabetes. This result may be unique for people with type 2 diabetes. Research with people with type 1 diabetes shows that they are either worse off when using avoidance-oriented coping (e.g., Kvam & Lyons 1991; avoidance related to lower scores on well-being) or that there is no relationship between avoidance coping and outcomes (e.g., Smari & Valtysdottir, 1997). The reason that other studies found avoidance coping to be a maladaptive coping strategy for people with type 1 diabetes, whereas the findings here show the potential adaptive function of distraction coping in people with type 2 diabetes, may be related to differences in the two conditions. These differences may include the temporal or age differences between the two types of diabetes, or may be related to the treatment regimens associated with each. People with type 1 diabetes must follow a minimum treatment regimen involving several insulin injections each day. On the other hand, the treatment regimen for people with type 2 diabetes often involves just modifying diet and exercise habits, which are changes in one's lifestyle that are a lot

easier to avoid making, since the impact is not as severe. That is, using avoidance coping to deal with type 1 diabetes could have more immediate consequences. For example, if blood glucose is not properly monitored, a person with type 1 diabetes may administer oneself too much insulin, resulting in hypoglycemic shock. However, if blood glucose is not closely monitored in a person with type 2 diabetes using diet and exercise to control blood sugars, the consequences will be more gradual, leading to gradual deterioration of micro-vascular functions and future complications, and to the potential change in treatment regimen (i.e., to the use of oral hypoglycemic agents or insulin) to maintain blood glucose levels. This gives a further indication that what may be important in determining whether avoidance coping is adaptive in people with type 2 diabetes is the treatment regimen used to control blood glucose levels. One study (Kvam & Lyons, 1991) that investigated both people with type 1 and type 2 diabetes, found escape coping to be related to lower well-being for both the illness groups, but no information was provided regarding the type of treatment regimen used by the two groups. These possible confounds (treatment type and type of diabetes), as well as the contradictory findings across various studies, shows that more research is needed to investigate the relationship of avoidance coping with adjustment in people with type 1 and type 2 diabetes.

The other avoidance-oriented coping strategy investigated in this project produced very different results than the distraction coping variable. Palliative coping (CHIP-P), was found in Endler, Parker & Summerfeldt (1998) to be strongly correlated with avoidance-oriented coping, as measured by the Coping Inventory for Stressful Situations (CISS, Endler & Parker, 1999a), and thus, it was considered an avoidance-oriented

coping strategy in this study. CHIP-P was a direct, positive predictor of general depression (DEP), but a negative predictor of ambiguous trait anxiety. This finding is consistent with other research on avoidance coping that has shown a positive relationship between this coping strategy and outcomes (e.g., Kvam & Lyons, 1991; McRae, 1984). However, the results of this study also show that two different types of avoidance-based coping can lead to different results, particularly regarding depression. This is revealing in that it indicates that perhaps the present difficulty for researchers in discerning the effects of avoidance coping on outcomes may be related to the fact that different studies are measuring different facets of the same construct. In this study, the differences between CHIP-P and CHIP-D were revealed through the initial correlation analysis: CHIP-P correlated not only with CHIP-D and CHIP-I (as did CHIP-D), but also with CHIP-EP and RUM, indicating that CHIP-P is perhaps a more emotion-focused, and hence, more maladaptive type of avoidance coping than distraction coping. This shows that future research should take care to fully explicate which specific aspect of avoidance coping is being measured.

Results of multiple regression analyses also showed that instrumental coping (CHIP-I) predicted lower general depression (DEP), as measured by the Center for Epidemiological Studies Depression scale (CES-D; Sawyer-Radloff, 1977), in people with type 2 diabetes. This was the only significant result for CHIP-I. Research has found similar results for instrumental coping and depression in people with type 1 diabetes (e.g., Smari and Valtysdottir, 1997; Spiess et al., 1994), and other research has found that instrumental coping is related to better adjustment, as measured by variables like

psychological distress (McRae, 1984), and well-being (Kvam & Lyons, 1991). Spiess et al. (1994) also found that instrumental coping was related to better blood glucose control and lower anxiety in people with type 1 diabetes. Although these results were hypothesized in the present study, instrumental coping was not related to any of the anxiety variables nor to HbA_{1c} in this sample of people with type 2 diabetes. These results for CHIP-I indicate that, for people with type 2 diabetes, instrumental coping may be a more adaptive coping strategy for depression than for the other outcome variables investigated here.

There were no significant relationships between any of the coping variables and Hemoglobin A_{1c} (HbA_{1c}) indicating that none of the coping strategies investigated here had any significant impact on physical adjustment to type 2 diabetes, as measured by actual blood glucose control. This finding is counter to other studies, like the one conducted by Smari and Valtysdottir (1997) with people with type 1 diabetes. These researchers found task-oriented coping to be related to better blood glucose control, whereas emotion-oriented coping was related to poor blood glucose control. Similarly, in a two year longitudinal study, Spiess et al. (1994) found that control-oriented coping strategies were related to better blood glucose control in people with type 1 diabetes. Unfortunately, it is difficult to come to any conclusions about whether this lack in relationship between these coping strategies and actual blood glucose control is unique to type 2 diabetes, because there is such a small amount of other research connecting actual blood glucose control and coping in people with type 2 diabetes. Thus, although the results of this study suggest that there are no relationships between any of the coping

variables investigated and blood glucose control, this result should be confirmed through future research on type 2 diabetes.

Perceived Control

Cognitive appraisal regarding perceptions of control (perceived control, PCON) over type 2 diabetes was the other main predictor variable investigated in the present study. Based on previous research findings (e.g., Taylor et al., 1984; Tennen et al, 1984) it was hypothesized that high perceived control over type 2 diabetes would be related to high instrumental coping (CHIP-I), whereas low perceived control would be related to the use of emotion-oriented (emotional preoccupation, CHIP-EP, and Rumination, RUM) or avoidance (distraction, CHIP-D, and palliative, CHIP-P) coping. In terms of the outcome variables, it was predicted that high perceived control would be related to, and predictive of, better psychological and physical adjustment (less depression and anxiety, and better blood glucose control).

Relationships between perceived control and coping. Results of correlation analyses revealed that perceived control was negatively related to both of the emotion-oriented coping variables (CHIP-EP and RUM), but was not related to any of the other coping strategies. This provided partial support for the hypotheses for the present study, and for the larger, theoretical "goodness of fit hypothesis" (Conway & Terry, 1992; Vitaliano et al., 1990) by showing the "mismatch" between perceived control and emotion-oriented coping. That is, if an individual in this study had a high sense of personal control over type 2 diabetes, this individual would be less likely to use emotion-oriented coping in dealing with type 2 diabetes. However, for the present study to fully

support the goodness of fit hypothesis, it should have also revealed a positive relationship between perceived control and instrumental coping, a result that was not found.

Relationships between perceived control and outcome variables: Correlation and regression analyses. Correlation analyses showed that perceived control had moderate negative relationships (e.g., α = -.38 for DEP, or general depression, as measured by CES-D) with each of the depression variables (general, state, and trait) and with state anxiety. Thus, these results supported the hypotheses for this study, except that perceived control was not found to be significantly related to any of the trait anxiety variables. The relationships that were revealed between perceived control and adjustment in this study are consistent with results found in research with breast cancer patients. Taylor et al. (1984) showed that patients who perceived themselves as having personal control over the illness were less depressed, anxious, fearful, and angry, than those who did not have this sense of personal control over their cancer. Other research with people with type 1 diabetes has also generally found a positive effect of perceived control on adjustment variables (e.g., Smari & Valtysdottir, 1997; Tennen et al., 1984). The results of the present study, thus, serve to expand the existing literature by showing that high perceived control is directly related to better psychological adjustment in people with type 2 diabetes.

Results of the regression analyses investigating perceived control as a predictor of psychological adjustment were not consistent with the research and previous results described thus far. Perceived control (PCON) was not predictive of any of the depression variables through this analysis, and was actually a positive predictor of physical danger

trait anxiety (EMAS-T-PD) and ambiguous trait anxiety (EMAS-T-AM). These results were not hypothesized, but were interesting, particularly given the "good outcomes" associated with PCON in the correlation analyses. The results for PCON with EMAS-T-PD and EMAS-T-AM may be related to what Thompson, Cheek and Graham (1988) refer to as "the other side of perceived control." These researchers discuss the fact that perceived control is not always adaptive in dealing with health outcomes, and outline four main situations when perceived control may be maladaptive. These are: (a) when perceptions of control are not accurate, so that efforts towards control would fail; (b) when one's perceptions of control are in fact accurate, but success is not guaranteed, such that efforts towards control may again lead to failure; (c) when perceived control leads to exercising control over a certain health outcome, but other goals are sacrificed as a result; and finally, (d) when actualizing perceived control has certain costs associated with it, like financial loss, hassles, or increased stress. Their second issue – that a person may see oneself as having personal control over the situation, but acting on this may not lead to successful outcomes – may be relevant to why perceived control was positively related to EMAS-T-PD in people with type 2 diabetes. People dealing with this chronic condition may be constantly aware of the fact that no matter how well they control their diabetes, they are still at a very high risk for developing complications like retinopathy, which can lead to blindness (Maes, Leventhal & DeRidder, 1996). Thus, having a high perception of control may be coupled with the knowledge of the real physical dangers associated with having diabetes, thus producing this positive relationship between perceived control and physical danger trait anxiety in people with type 2 diabetes. Although the reasons for the

positive relationship of PCON to EMAS-T-AM are not as clear, this result may also be related to the main maladaptive situations related to perceived control, as outlined by Thompson et al. (1988; see above).

Although the regression analyses revealed some of the potentially negative effects of perceived control on psychological adjustment, these analyses also highlighted the positive aspects of perceived control in relation to physiological adjustment. Of all the predictor variables included in this study, PCON was the only variable found to be predictive of Hemoglobin A_{1c} (HbA_{1c}), or actual blood glucose control, and the result was in the hypothesized direction. That is, regression analyses revealed that those people with type 2 diabetes who perceived the condition to be personally controllable had better actual blood glucose control (lower HbA_{1c} results) than people who did not perceive the condition to be personally controllable. Similar results were found by Smari and Valtysdottir (1997) in their investigation of coping and perceived control in a sample of people with type1 diabetes. These results indicate that perceived control may be an important factor in glycemic control for both people with type 1 and type 2 diabetes.

Coping, Perceived Control, and Adjustment in Type 2 Diabetes

At this stage, each of the main predictor variables have been discussed in terms of their main effects on each of the outcome variables in this study. This leaves one question still to be answered: Did coping and perceived control act together to produce any outcomes? This section focuses on the regression analyses showing moderator and mediator relationships of some of the predictor variables in relation to the outcome variables studied.

Regression analyses: Perceived control as moderator. The regression models for some of the outcome variables showed significant interactions between perceived control (PCON) and certain coping strategies. In particular, this study showed that perceived control moderated the effects of Palliative coping (CHIP-P) and Rumination coping (RUM) for both physical danger trait anxiety (EMAS-T-PD) and ambiguous trait anxiety (EMAS-T-AM). As was expected, the interaction of PCON x RUM was negatively related to both of these trait anxiety variables, indicating that when perceived control and ruminative coping are both high, there are better outcomes (in terms of these aspects of trait anxiety) than when low perceived control interacts with high rumination. The results for CHIP-P, on the other hand, were not in the predicted direction. That is, the PCON x CHIP-P interaction term was actually related to higher EMAS-T-PD and higher EMAS-T-AM. That is, high palliative coping used by participants with a high sense of control over diabetes lead to higher levels of both EMAS-T-PD and EMAS-T-AM. On the other side of the interaction, low perceived control and high palliative coping seemed to lead to lower levels of these two facets of anxiety. Perceived control was not involved in the relation of coping variables to any of the other outcome variables (i.e., the depression variables, state anxiety variables, and physiological adjustment).

These findings are difficult to interpret given the fact that no other research was found investigating the different facets of trait anxiety in people with type 2 diabetes, and in particular, nothing was found that investigated the connection between PCON and palliative coping and PCON and ruminative coping for the trait anxiety facets. However, it is possible that these results are also related to the issues discussed in the previous

sections. For example, the negative aspects or "other side" of perceived control (Thompson et al., 1988) was further illustrated in these interaction models by the fact that PCON moderated the relationship of CHIP-P such that the interaction term was related to higher EMAS-T-PD and EMAS-T-AM. The more salubrious moderating aspects of perceived control also came through, however, in the negative relationship the PCON x RUM variable had with these two facets of trait anxiety. These results, along with the results of the main effects regression analyses discussed above, point specifically to the salience of perceived control, CHIP-P, and RUM to the physical danger and ambiguous facets of trait anxiety in people with type 2 diabetes. Thus, more research into these interesting results is needed to be able to further explicate the connection between coping, perceived control, and the various facets of trait anxiety.

Regression analyses: Coping as a mediator. The results of the mediation models showed that perceived control was related to the type of coping strategy used, and more specifically, low perceived control was predictive of the use of emotion-oriented coping strategies (emotional preoccupation, CHIP-EP, and rumination, RUM). Results of mediation tests conducted in this study showed that both RUM and CHIP-EP mediated the negative relationship between perceived control and depression, and RUM also mediated the relationship between PCON and state anxiety and daily routines trait anxiety. The effect was such that when RUM and CHIP-EP were mediators, the direct negative relationship between PCON and each of the outcome variables disappeared, and there was a lower, but significant, positive relationship of CHIP-EP and RUM to the outcome variables.

The results of mediation tests in the present study are similar to other research on people with type 1 diabetes (e.g., Smari & Valtysdottir, 1997) which showed a relationship between low perceived control, the use of emotion-focused coping, and poor adjustment; and a relationship between task-oriented coping, high perceived control, and good adjustment, the latter of which was not found in the present study. For the physiological adjustment variable (Hemoglobin A_{1c}, HbA_{1c}), results were more supportive of Felton and Revenson's (1984) findings that coping and control act directly and independently rather than together in producing outcomes. In the present study, perceived control was a direct negative predictor of HbA_{1c}, but none of the coping strategies investigated here predicted this outcome variable. These results are discussed below in relation to the goodness of fit hypothesis. First, however, a comparison will be made between the results of the present study and studies investigating similar variables in people with other chronic illnesses.

Coping with type 2 diabetes: Comparison with other chronic illnesses. It is interesting to note how the results of this study compare with research that focuses on coping, perceived control, and adjustment in other chronic illnesses. Maes, Leventhal and DeRidder (1996) provide an excellent overview of research on coping and, to a lesser extent, illness appraisal, in people with other chronic illnesses, including asthma, rheumatoid arthritis, cancer, and coronary heart disease. Research in general on avoidance-oriented coping strategies used by patients with coronary heart disease (CHD) and cancer shows similar results to the present study on coping with type 2 diabetes. That is, people with cancer and coronary heart disease tend to use more avoidance coping in

dealing with these illnesses, and this coping strategy has been associated with lower levels of depression and anxiety in these patients. On the other hand, Maes, Leventhal and DeRidder (1996) cite research on coping in patients with asthma which, although limited, shows that avoiding the illness can be just as maladaptive as concentrating excessively on this illness (which would be similar to using rumination coping, measured in the present study). However, as was remarked in the discussion section above, these researchers also caution that "coping effectiveness largely depends on the outcome variables used and on the way that avoidance or vigilant coping strategies are defined" (p. 239). Thus, the differences between avoidance coping in asthma patients may be related to how this type of coping was operationalized in these studies. For example, the type of avoidance coping assessed in these studies may be more like the palliative coping variable included in the present study, which was generally found to be related to poor adjustment in people with type 2 diabetes. The importance of how avoidance coping is operationalized was also shown in a study with cancer patients (Courbasson, Endler, & Cunningham,1998) which found that cancer patients used specifically more social diversion avoidance coping (rather than general distraction avoidance coping, as measured by the CISS, Endler & Parker, 1999a) than a healthy comparison group.

In terms of the other coping variables investigated here, the review by Maes, Leventhal and DeRidder (1996) showed that problem-focused or instrumental coping may be more adaptive for each of asthma, cancer, and CHD patients. This is supported by more recent research on cancer (Courbasson, 1998) and CHD (Carr, 1997). However, the review by Maes, Leventhal and DeRidder (1996) indicated that people with rheumatoid

arthritis are generally not found to benefit from the use of problem-focused coping. The present study found that instrumental coping was related to better adjustment, but only in terms of lower depression, indicating that this type of coping strategy may not be of as much importance in general adjustment for people with type 2 diabetes. Such an interpretation would equate the present results to general results found for people with rheumatoid arthritis. However, the fact that the mean for instrumental coping was high in this sample shows, instead, that it is probably an important strategy for people with type 2 diabetes, which would be more similar to findings with people with asthma, cancer, and CHD than with people with rheumatoid arthritis.

The one coping variable that seems to have consistently maladaptive outcomes in studies on a variety of chronic illnesses, including the present study, is emotion-oriented coping (Carr, 1997; Coubrasson, 1998; Maes, Leventhal & DeRidder, 1996). Emotion-oriented coping variables were found to be positively related to depression and anxiety in the present study – a result that is similar for people with asthma, cancer, CHD, and rheumatoid arthritis. These results, and the results of studies on other chronic illnesses in comparison to type 2 diabetes described above, reflect both the unique aspects of coping (i.e., that problem focused coping may not be adaptive in people with rheumatoid arthritis) and the similarities in coping strategies (i.e., in the maladaptiveness of emotion-oriented coping across many different chronic illnesses) that occur in response to having different types of chronic illnesses.

Finally, the connections between coping and perceived control in the present study on people with type 2 diabetes, in comparison to similar studies on people with

other chronic illnesses, also need to be addressed. A study by Vitaliano et al. (1990) investigated the relationship between perceived control and coping in a sample of people with a variety of chronic illnesses. The results showed that emotion-oriented coping was related to lower levels of perceived control, which was the same result found in the present study focusing on people with type 2 diabetes. However, Vitaliano et al. (1990) also found problem-focused coping to be related to higher perceived control, which was not a result found in the present study. The lack of relationship between perceived control and instrumental coping found here was, in fact, more similar to results found by Felton and Revenson (1984): that perceived control and the type of coping strategy used were not related in people with a variety of chronic illnesses (e.g., diabetes and rheumatoid arthritis). The study by Vitaliano et al. (1990) provides support for the theoretical "goodness of fit" hypothesis (Conway & Terry, 1992), whereas the study by Felton and Revenson (1984) does not. Hence, the results of the present study regarding the goodness of fit hypothesis shows support both for and against this theory. A summary of the implications of the results of the present study to the goodness of fit hypothesis, and to other theories described in this chapter, is provided in the next section.

Theoretical and Practical Implications of the Present Study

The results of this study conducted with people with type 2 diabetes were discussed above in connection to research and theory on coping responses and perceived control. A summary of the contributions this study could make to the main theories described as part of the present study (e.g., the goodness of fit hypothesis, research and theory on rumination coping, and the interaction model of stress, anxiety and coping) is

provided in this section, along with some of the potential practical implications that this study may have for people with type 2 diabetes and their Diabetes Educators.

Goodness of fit hypothesis. The "goodness of fit hypothesis" (Conway & Terry, 1992) maintains that the type of coping strategy an individual uses to deal with a stressor will be matched with one's appraisal of the stressor. In particular, this theory holds that a stressor that is perceived to be controllable will be dealt with through problem-focused or instrumental coping strategies. Conversely, this theory also maintains that stressors perceived to be uncontrollable will be dealt with through emotion-oriented coping strategies. The results of this research project show support for the emotion-oriented/low perceived control aspect of the goodness of fit hypothesis, but not for the task-oriented/high perceived control aspect of this theory people with type 2 diabetes for the psychological adjustment variables. More specifically, results showed that high perceived control was negatively related to the two emotion-focused coping variables (RUM and CHIP-EP) included in this study. Results of mediation tests further supported these findings by showing that RUM and CHIP-EP both acted as mediators between perceived control and outcome variables. The specific outcome variable that was mediated by RUM and CHIP-EP was general depression (DEP), and RUM also mediated the relationships between perceived control and state depression, trait depression, state anxiety, and daily routines trait anxiety.

As indicated in the discussion above, the results of this study showed support both for and against the goodness of fit hypothesis, and hence supported aspects of both Vitaliano et al.'s (1990) and Felton and Revenson's (1984) opposing research findings in

a sample of people with type 2 diabetes. Also, in the present study, emotion-oriented coping strategies were found to mediate the relationship between perceived control and some, but not all, of the outcome variables investigated in this sample of people with type 2 diabetes. This could indicate that, for people with type 2 diabetes, support for or against the goodness of fit hypothesis may be related to the type of outcome variable measured in a particular study, and this may also be related to why the studies by Vitaliano et al. (1990) and Felton and Revenson (1984) produced such different results (i.e., these studies used different outcome variables in their research). In summary then, this study both supported and opposed the goodness of fit hypothesis in people with type 2 diabetes, indicating that perhaps only certain aspects of this theory are relevant to this illness group.

Theory and research on rumination and distraction. Nolen-Hoeksema's (1996) theory and research (e.g., Nolen-Hoeksema & Morrow, 1991; 1993; Nolen-Hoeksema, Morrow, & Frederickson, 1993) on using rumination or distraction responses when having a depressive episode, emphasizes the negative effects of rumination and the positive effects of distraction responses. The results of the present study are consistent with Nolen-Hoeksema's research and theory, because this study shows that high scores on rumination were related to higher depressive symptoms, whereas high scores on distraction coping were related to lower symptoms of depression.

The results of this study also show how Nolen-Hoeksema's ideas and research findings can be applied to illness-based stressors, and to anxiety-based outcome variables. In terms of illness-based stressors, this study showed that ruminating in

response to having type 2 diabetes has similar negative results to ruminating in response to a depressive episode. In terms of the latter implication, this study found RUM to be positively related to state anxiety and to daily routines trait anxiety, whereas distraction coping was negatively related to the cognitive-worry component of state anxiety. This shows the opposite effects that rumination and distraction responses may have on adjustment variables in general, rather than just on depression. In summary, this study both confirmed and expanded the existing theory and research on rumination and distraction responses through an investigation of these constructs in a sample of people with type 2 diabetes.

Multidimensional interaction model of stress, anxiety, and coping. In general, many of the results of this study provide support for Endler's (1997) multidimensional interaction model, and this study even expands the model to include multidimensional aspects of depression. The multidimensionality of depression and anxiety were both investigated in this study by looking at state and trait aspects of each. Although there may be some problems with the specific scales used to measure State and Trait depression in this study (see "Alpha Reliabilities" section, above), the fact that different results were observed for each of the state and trait depression, as well as for state anxiety and trait anxiety, confirms the multidimensionality of these adjustment variables in people with type 2 diabetes.

Figure 7 shows the model, originally presented in Figure 1, as it relates specifically to the results of this study. The main changes made are the dashed arrows added to show the direct relationships that perceived control had with coping responses

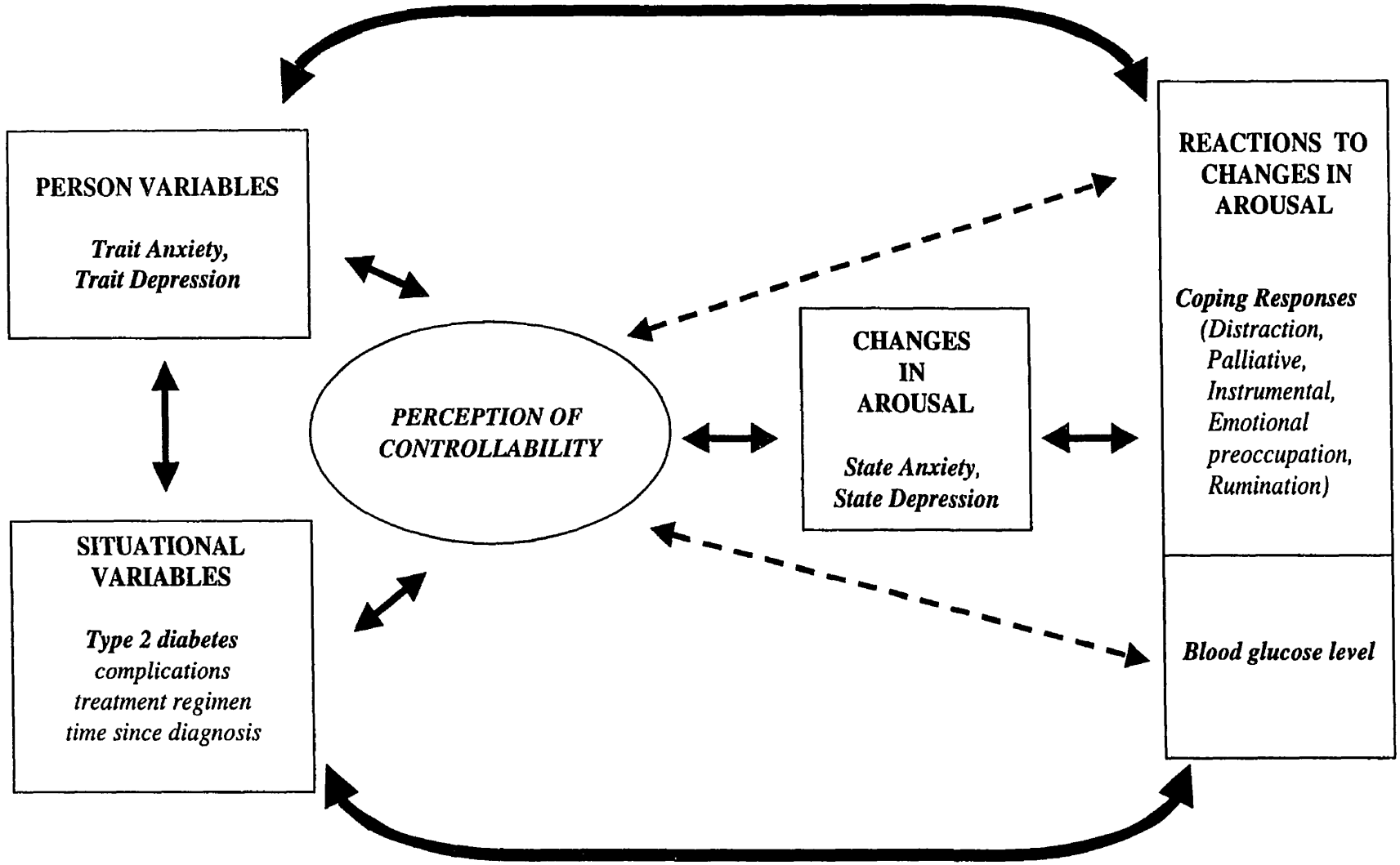

Figure 12. The Multidimensional Interaction Model of Stress, Anxiety, and Coping, as applied to the results of the present study. Dashed arrows were added to show the direct relationship of perceived control to coping and blood glucose levels. Adapted from "Stress, anxiety and coping: The multidimensional interaction model," by N. S. Endler, 1997, Canadian Psychology, 38, p. 149. Copyright 1997 by the Canadian Psychological Association. Adapted with permission.

(emotional preoccupation and rumination) and with blood glucose control. Also, the specific "coping responses" that were found to be important to this study are included in brackets in the "reactions to changes in arousal" box. Certain "situational variables" that were found to be salient features of type 2 diabetes (i.e., complications, type of treatment regimen, and time since diagnosis), and may be implicated in reactions to changes in arousal, person variables, and perceptions of controllability, were included in the model. The results of this study showed support for nearly every relationship shown in this model, indicating that the Multidimensional Interaction Model of Stress, Anxiety, and Coping (Endler, 1997) is applicable to people with type 2 diabetes.

Practical implications. Wilkinson (1991) found depression to be the most common psychiatric disorder in people with type 2 diabetes, and especially in those people who have complications related to diabetes. The present study found that emotion-oriented coping strategies, particularly ruminative coping, may exacerbate not only depressive symptoms but also anxiety in people with type 2 diabetes. Distraction and instrumental coping strategies were, on the other hand, related to less depression (and ambiguous trait anxiety in the case of distraction coping) in this illness group. Also, people scoring high on perceived control over type 2 diabetes scored low on depression and anxiety variables, and had better blood glucose control. Thus, in general, this study revealed that certain coping strategies are more maladaptive (i.e., emotional preoccupation, rumination, and palliative) in people with type 2 diabetes than are other coping strategies (i.e., distraction and instrumental), and that having a high sense of

personal control over the condition is generally related to better psychological (except for physical danger and ambiguous trait anxiety) and physiological (i.e., blood glucose control) adjustment. This shows emphasis should be placed on perceptions of control, active coping responses, and acceptance of the condition as being part of one's life, in helping people with type 2 diabetes to adjust to having this condition.

These results can applied to practical settings, such as Diabetes Education Centers, for the benefit of both people with type 2 diabetes and for Diabetes Educators, who, until now, have not had much guidance as to what the most adaptive psychological coping strategies may be for people with type 2 diabetes. The results of the present study show that Diabetes Educators may want to encourage a general acceptance of the condition in their patients with diabetes, since ruminating or thinking excessively about the illness was found here to be a very maladaptive coping strategy. Also, helping patients to see the condition as personally controllable could lead to better blood glucose control for their patients, which is a very important goal in light of recent research (i.e., UKPDS, 1998) showing that consistent blood glucose control is related to fewer micro-vascular complications in people with type 2 diabetes. However, future research should try to replicate the results of the current study in a more homogeneous sample of people with type 2 diabetes (see Limitations, below) before implementing any of the results of the present study.

Limitations of the Present Study

The sample. The first limiting aspect of this study is the heterogeneity of the sample used. Participants were recruited from a number of different places, and

differences were observed between sample sites, primarily regarding time since diagnosis. Although time since diagnosis was controlled for to an extent by including only those people diagnosed 6 months ago or more, the range in illness duration was from 6 months-40 years, indicating that it may have been more advantageous to have had a specified period of time within which individuals had to be diagnosed. Since sample characteristics showed differences in treatment regimen and complications in people diagnosed for 10 years or more, "within ten years" may have been a better time criteria for inclusion in the study. This may have had the dual effect of including people who had similar treatment types and number of complications. Although no significant results were observed on any of the main independent and dependent variables based on within-sample variability, the idea that differences may exist depending on stage of illness should still be considered (Taylor, 1999). The finding in this study that people with type 2 diabetes tend to use a variety of coping strategies may be confounded by the fact that this study included participants at different stages and ages of the condition, who, as a result, may be coping differently from each other. Future research would be better to use a more homogeneous group of people with type 2 diabetes than used in this study.

Another problem with the sample is that many of the participants reported having another co-occurring illnesses, such as coronary heart disease, hypertension, or hypothyroidism, as well as type 2 diabetes. Although participants were clearly instructed to respond to questions specifically regarding their feelings towards having type 2 diabetes, it is possible that some participants may also have been responding to their experience with other illnesses. This may particularly be the case for people who had a

more debilitating illness (i.e., rheumatoid arthritis, cancer) in conjunction with type 2 diabetes, such that the other illness was more of a constant and prevalent concern to the individual. Again, using a specified time period, such as 10 years, for inclusion into the study may serve to control for the presence of other illnesses in future research. However, the possibility that an individual with type 2 diabetes would have another illness is very high, given the age of onset of the condition and the fact that many people are diagnosed with diabetes once complications are already present. This shows that it may be practically impossible to completely control for "other illnesses" in this group of people, but also indicates that care should be taken to clearly indicate to participants that the focus of the study is on their type 2 diabetes, which was actually done in the present study.

Statistical/methodological weaknesses. Some of the main limitations of the current study relate to statistical or methodological variables. First, the low alphas found for the state depression and trait depression scales suggest that results for the multidimensionality of depression may not be as strong as they could have been if more psychometrically sound state-trait depression measures were used. However, strong results were obtained for general depression through the highly reliable Center for Epidemiological Studies – Depression scale (Sawyer-Radloff, 1977). There was also a relatively low reliability obtained for the palliative coping subscale of the Coping with Health Injuries and Problems Questionnaire (Endler & Parker, 1999b). However, the fact that there were still significant results for each of these variables indicates that effects were not strong enough to be a detriment to the results.

Other main issues involve the design of the study. The cross-sectional nature of the study was clearly limiting since it meant being unable to look at the process of coping over time in people with type 2 diabetes. Also, the self-report nature of the study was limiting in that it was difficult to discern the reliability of responses and the extent to which participants were simply making "socially desirable" and erroneous responses. This limitation is particularly salient for the reporting of Hemoglobin A_{1c} results. Participants were simply asked to write the results of their most recent test taken within 4 months, into a space provided on the questionnaire package. Participants were also asked to write in the date the test was taken, along with the date the questionnaire was being filled in, to try to ensure that the test was, in fact, taken within the last four months. It is very possible, however, that the participants' responses may have been erroneous in this section.

Future Research Directions

The findings and limitations of this study have raised many possibilities for further research. One possibility would be to further investigate avoidance-oriented coping strategies. In this study, different results were found based on two different avoidance-oriented coping scales: Palliative coping and Distraction coping. Future research may try to tease out the positive aspects of avoidance coping in people with type 2 diabetes. In terms of distraction coping in particular, people with type 2 diabetes who were high on distraction coping generally showed better adjustment (less depression and anxiety). Future research could investigate whether this coping strategy might be related to an overall acceptance of having the condition, such that all the factors associated with

diabetes become part of one's life, rather than something that is focused on. It may be that active distraction or avoidance coping (i.e., actually trying to avoid sticking to treatment regimen) is the negative aspect of distraction, whereas more "passive" distraction, which may be associated with diabetes being "just part of one's life," could be adaptive and may be used to enrich one's life.

Another interesting research venture would be to investigate the process of coping over time in people with type 2 diabetes. Kvam and Lyons (1991) conducted a 2 year longitudinal study of this nature in people with type 1 diabetes, and a similar study for people with type 2 diabetes may provide more information on the particular coping strategies that might be used at different stages in the progression of the condition. Another way to conduct such a study would be to compare coping strategies and perceptions of control in people at different stages of diabetes (i.e., diagnosed 1 year ago, 5 years ago, 10 years ago, etc). A third potential research project is to conduct a thorough investigation of the different facets of trait anxiety in people with type 1 and type 2 diabetes, in comparison to a "control" group of people from an acute illness group, or just in comparison to normative data. The results of the present study, showing a high average score on physical danger trait anxiety in people with type 2 diabetes, should be investigated further in future research.

Future research could also investigate other variables that might be important to coping and adjustment, or other potential mediators of perceived control. For example, Johnson (1998) studied optimism and coping in AIDS patients and found optimism to be very important in level of distress associated with the illness. Thus, optimism may also be

an important variable for adjustment in people with type 2 diabetes, and this would be an interesting variable to investigate in future research. Issues regarding self-management, such as motivation towards changing one's exercise and eating habits, may also be interesting variables to explore, particularly as potential mediators of the relationship between perceived control and actual blood glucose control. Other resources, such as social support, could also be investigated as being important to how a person copes with and adapts to having type 2 diabetes, particularly given the support one may need in the lifestyle changes demanded by having diabetes. Finally, there is much research to be done in terms of the cross-cultural issues surrounding type 2 diabetes, particularly given the fact that there is such a high incidence of First Nations people in Canada living with type 2 diabetes ("Virtual Epidemic", 1997). Psychological coping mechanisms and illness appraisals may be different in this cultural group, as may behavioral patterns regarding treatment regimen adherence – just a few of the many variables that could be studied as a future cross-cultural research project on type 2 diabetes. It is evident that, in general, much research into the psychological variables associated with type 2 diabetes has yet to be pursued.

Chapter 5

SUMMARY & CONCLUSIONS

The present study investigated how coping strategies and perceived control affected psychological (state and trait depression and anxiety) and physical (blood glucose control) adjustment in a sample of 115 people (50 men, 65 women) with type 2 diabetes. All participants were diagnosed with type 2 diabetes 6 months ago or more, and those who had the condition for 10 or more years were more likely to use a treatment regimen that included insulin (rather than oral hypoglycemic agents, diet, and/or exercise), and to have complications related to their diabetes (e.g., retinopathy, nerve insensitivity, etc.). There were no differences on the main independent (coping, perceived control) and dependent (state and trait depression and anxiety and actual blood glucose control) variables based on these factors.

Participants were approached to participate in the study through five main venues: (a) during seminars at Diabetes Education Centers, (b) as part of a meeting held by the Jewish Chapter of the Toronto branch of the Canadian Diabetes Association (CDA), (c) through an Ad placed in the Diabetes Dialogue, (d) as part of a large mail-out of questionnaire to members of the York Region CDA, or (c) through personal solicitation by the researcher. All participants filled out informed consent/participation forms when they agreed to participate, and were presented with debriefing forms when their questionnaires were returned. Each participant filled in questionnaire packages, ordered such that the questionnaires regarding general functioning (General Information Questionnaire, Trait-Depression, or T-Dep, Endler Multidimensional Anxiety Scales, or

EMAS, -Trait, and Center for Epidemiological Studies Depression scale, or CES-D) were answered first, followed by the diabetes-specific questionnaires (Diabetes Information Questionnaire, including HbA_{1c} report, Event Perception Measure, Rumination and Distraction Questionnaire, Coping with Health Injuries and Problems scale, or CHIP, State-Depression, or S-Dep and EMAS-State). The questionnaire package took 30-45 minutes to complete, and a portion of the sample (69 participants) were given $10.00 for their participation.

Coping strategies, including distraction, palliative, instrumental and emotional preoccupation, were assessed by the Coping with Health Injuries and Problems scale (CHIP; Endler & Parker, 1999). Ruminative coping was measured through the Rumination and Distraction Questionnaire (RDQ; Nolen-Hoeksema, Morrow & Frederickson, 1993). Perceived control was assessed through the Event Perception Measure (Conway & Terry, 1992). In terms of the outcome variables, state and trait depression were measured through Spielberger's (1995) State-Trait Depression Inventory, and general depression was measured through the Center for Epidemiological Studies Depression scale (CES-D; Sawyer-Radloff, 1977). State and Trait Anxiety were measure through the Endler Multidimensional Anxiety Scales (EMAS; Endler, Edwards & Vitelli, 1991). Finally, actual blood glucose control was measured through self-reported Hemoglobin A_{1c} (HbA_{1c}) tests.

It was hypothesized that instrumental coping would be negatively related to outcome variables (associated with low depression and anxiety, and better blood glucose control) and positively related to perceived control, whereas each of emotional

preoccupation, rumination, distraction, and palliative coping strategies would be positively related to outcome variables (associated with high depression and anxiety, and poor blood glucose control) and negatively related to perceived control. Other predictions were that perceived control would moderate the relationship between coping and outcome variables to produce better outcomes than when coping variables were used in isolation. Finally, it was predicted that the coping strategies would differentially mediate the relationships between perceived control and outcome variables.

Correlation analyses revealed partial support for the various hypotheses. Significant negative relationships were found between the psychological outcome variables (state and trait anxiety and depression) and each of emotional preoccupation and rumination coping. These two coping variables were also negatively related to perceived control. Perceived control was negatively related to all of the psychological outcome variables, except for trait anxiety. No significant relationships were found between instrumental, palliative, and distraction coping and any of the outcome variables and perceived control. There were also no significant relationships between any of the predictor variables and HbA_{1c}, although the negative relationship between perceived control and HbA_{1c} approached significance.

Regression analyses revealed that instrumental and distraction coping were each predictors of lower levels of depression (negative predictors), whereas rumination, emotional preoccupation, and palliative coping were each predictors of higher depression (positive predictors), although results varied based on the different depression measures. Results for the anxiety variables were more complex. Distraction coping was a negative

predictor of both ambiguous trait anxiety and state anxiety, and palliative coping was a negative predictor of social evaluation trait anxiety. Emotional preoccupation coping was a positive predictor of all of the anxiety variables except for daily routines trait anxiety, whereas ruminative coping was a positive predictor of state anxiety and only daily routines trait anxiety. Perceived control moderated the relationship of ruminative coping with both ambiguous and physical danger trait anxieties, such that the outcome was a negative relationship (less anxiety), a predicted result. What was not predicted was the moderating effects of perceived control on palliative coping for both ambiguous and physical danger trait anxieties: the interaction between these two predictor variables actually predicted higher anxiety. These unexpected results were discussed in light of research by Thompson et al. (1988), which indicates that perceived control may actually be maladaptive in some situations. The only variable that predicted HbA_{1c} was perceived control, and the result was in the expected (negative) direction.

Results of tests for mediators using regression analysis showed that rumination and emotional preoccupation mediated the relationship between perceived control and general depression. Rumination coping was also found to be a mediator of the relationship between perceived control and state depression, trait depression, state anxiety, and daily routines trait anxiety. None of the coping variables were found to mediate the negative relationship between perceived control and HbA_{1c}, which confirmed the other findings that perceived control is a direct predictor of HbA_{1c} in people with type 2 diabetes. No other coping variables were mediators.

Results of this study found partial support for the goodness of fit hypothesis (Conway & Terry, 1992; for emotion-oriented coping and perceived control, but not for instrumental coping and perceived control). The results from the rumination and distraction variables confirmed Nolen-Hoeksema's (1996) theories and research in a sample of people with type 2 diabetes. The results for rumination and distraction and anxiety also showed that her theory may be able to be expanded to other outcomes (i.e., anxiety). Finally, it was determined that the results of this study for people with type 2 diabetes fit well into Endler's (1997) "Multidimensional Interaction Model of Stress, Anxiety, and Coping."

The implications of this study for theory (e.g., Conway & Terry, 1992; Endler, 1997; Nolen-Hoeksema, 1996) and research (e.g., Felton & Revenson, 1984; Vitaliano et al., 1990) are that coping strategies and cognitive appraisals do, in fact, play a role in adjustment in people with type 2 diabetes. Thus, the research and theories on coping and cognitive appraisal in people with type 1 diabetes (e.g., Cox & Gonder-Frederick, 1992; Smari & Valtysdottir, 1997) has been expanded to people with type 2 diabetes. Implications for practical settings are that Diabetes Educators and physicians should focus on teaching people with type 2 diabetes more instrumental coping strategies, and on instilling a sense of personal control over the condition, in people with type 2 diabetes. In particular, the importance of accepting the condition, such that patients do not brood or excessively focus on it, should be accentuated. In other words, patients should be encouraged to not just think about their diabetes, but instead, to take action to control it.

Limitations of the present study included the fact that the sample was heterogeneous, and that many of the participants had other illnesses as well as type 2 diabetes. In terms of methodological weaknesses, the limitations of the cross-sectional design of the study were discussed. Also, the self-report nature of the study meant that the reliability of some of the responses, particularly HbA_{1c} test results, may have been compromised.

This study shows that much more research focusing on people with type 2 diabetes is needed. In particular, the findings that there were opposite effects for the two type of avoidance-oriented coping (distraction was more adaptive, whereas palliative was less adaptive) indicated that perhaps different aspects avoidance-oriented coping produce different results for people with type 2 diabetes, and should be investigated further. The same is true for the various facets of trait anxiety, which have not been investigated in other research with people with type 2 diabetes. Other research projects might include conducting a longitudinal study to investigate coping as a process from diagnosis to onset of and dealing with complications in people with type 2 diabetes. Investigations into the different cultural aspects of coping with type 2 diabetes is especially warranted, given the high incidence of type 2 diabetes in other cultural groups and the lack of research investigating the psychological factors associated with adjusting to diabetes in these populations.

In conclusion, this study showed that emotion-oriented coping strategies (e.g., emotional preoccupation and rumination coping) may be maladaptive for people with type 2 diabetes, in that they were related to higher depression and anxiety in a sample of

people with this condition. On the other hand, instrumental coping may be a more adaptive coping strategy, at least for depression, and distraction coping (which may be related to a certain level of acceptance of having type 2 diabetes) may be more adaptive in terms of lower levels of depression and possibly also trait anxiety (lower levels of ambiguous trait anxiety found here). Although perceived control was found to be related to higher levels of certain aspects of trait anxiety (physical danger and daily routines), overall, this variable predicted better adjustment, in terms of less depression, less state anxiety, and better blood glucose control. In fact, the importance of perceived control was highlighted by the fact that none of the coping variables predicted actual blood glucose levels, such that perceived control was the only variable in this study related to better blood glucose control. Thus, this study seemed to show that even though diabetes is an objectively controllable condition, one's perceptions of control over type 2 diabetes could be an important factor in whether or not actual control is maintained. Thus, the goal for a person with type 2 diabetes may be to recognize what one participant in the study clearly communicated on a note in her questionnaire package: that "I can't change the fact that I have diabetes, however, I can control it."

References

Aldwin, C. M. (1994). Stress, coping and development: An integrative perspective. New York: The Guilford Press.

Beardsley, G., & Goldstein, M. G. (1993). Psychological factors affecting physical condition: Endocrine disease literature review. Psychosomatics, 34, 12-19.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). BDI-II Manual. San Antonio, Texas: The Psychological Corporation, Harcourt & Brace Company.

Blankstein, K. R. (1984). Psychophysiology and perceived locus of control: Critical review, theoretical speculation, and research directions. In H. M. Lefcourt (Ed.), Research with the locus of control construct (Vol. 3; pp. 73-208). Orlando: Academic Press.

Bombardier, C. H., D'Amico, C. D., & Jordan, J. S. (1990). The relationship of appraisal and coping to chronic illness adjustment. Behavior Research and Therapy, 28, 297-304.

Boswell, E. B., Anfinson, T. J., & Nemeroff, C. B. (1997). Depression associated with endocrine disorders. In M. M. Robertson & C. E. Katona (Eds.), Depression and physical illness (pp. 255-292). New York: John Wiley & Sons.

Canadian Diabetes Association (CDA, 1997). Diabetes: What every Canadian needs to know [Brochure]. Toronto: Author.

Carlson, N. R. (1994). Physiology of behavior (5th ed.). Boston: Allyn & Bacon.

Carr, T. L. (1997). Cardiac surgery patients' coping reactions and perceived health status. Unpublished doctoral dissertation, University of Saskatchewan, Saskatoon, Canada.

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. Journal of Personality and Social Psychology, 56, 267-283.

Cohen, J. (1988). Statistical power analyses for the behavioral sciences (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, S., Kessler, R. C., & Underwood-Gordon, L. (1995). Strategies for measuring stress in studies of psychiatric and physical disorders. In S. Cohen, R. C. Kessler. & L. Underwood-Gordon (Eds.), Measuring stress: A guide for health and social scientists (pp. 3-26). New York: Oxford University Press.

Compas, B. E., Banez, G. A., Malcarne, V., & Worsham, N. (1991). Perceived control and coping with stress: A developmental perspective. Journal of Social Issues, 47, 23-34.

Conway, V. J., & Terry, D. J. (1992). Appraised controllability as a moderator of the effectiveness of different coping strategies: A test of the goodness of fit hypothesis. Australian Journal of Psychology, 44, 1-7.

Courbasson, C. M. A. (1998). Reflective activity: Its relationship to coping, self-efficacy, and mental health. Unpublished doctoral dissertation, York University, Toronto, Canada.

Courbasson, C. M. A., Endler, N. S., & Cunningham, A. J. (1998). Coping with stress: How do people with cancer do it? In R. Schwarzer (Ed.), Advances in health psychology research (CD-ROM; pp. 1-15). Berlin: Freie Universitat Berlin.

Cox, D. J., & Gonder-Frederick, L. (1992). Major developments in behavioral diabetes research. Journal of Consulting and Clinical Psychology, 60, 628-638.

Denisoff, E., & Endler, N. S. (1998). Life experiences, coping and weight preoccupation. Submitted for publication.

Devins, G. M., Orme, C. M., & Costello, G. (1988). Measuring depressive symptoms in illness populations: Psychometric properties of the Center for Epidemiologic Studies Depression (CES-D) scale. Psychology and Health, 2, 139-156.

Diabetes Care and Education Committee (DCEC, 1997). The management of diabetes mellitus (4th ed.). Toronto: University of Toronto Banting and Best Diabetes Centre.

Diabetes Control and Complications Trial Research Group (DCCT, 1993). The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. New England Journal of Medicine, 20, 614-620.

Edwards, J. M. (1984). Situational determinants of behavior. In N. S. Endler & J. M. Hunt (Eds.), Personality and the behavioral disorders (2nd ed., Vol. 1, pp. 147-181). New York: John Wiley & Sons.

Endler, N. S. (1997). Stress, anxiety and coping: The multidimensional interaction model. Canadian Psychology, 38, 136-153.

Endler, N. S., Edwards, J. M., & Vitelli, R. (1991). Endler Multidimensional Anxiety Scales (EMAS): Manual. USA: Western Psychological Services.

Endler, N. S., Edwards, J. M., Vitelli, R., & Parker, J. D. A. (1989). Assessment of state and trait anxiety: Endler Multidimensional Anxiety Scales. Anxiety Research, 2, 1-14.

Endler, N. S., Macrodimitris, S. D., & Kocovski, N. (1998). Depression: The complexity of self-report inventories. Manuscript submitted for publication.

Endler, N. S., & Parker, J. D. A (1999a). Coping Inventory for Stressful Situations (CISS): Manual (2nd ed.). Toronto: Multi-Health Systems, Inc.

Endler, N. S., & Parker, J. (1999b). Coping with Health Injuries and Problems (CHIP): Manual. Toronto: Multi-Health Systems.

Endler, N. S., & Parker, J. D. A. (1990). Multidimensional assessment of coping: A critical evaluation. Journal of Personality and Social Psychology, 58, 844-854.

Endler, N. S., & Parker, J. D. A. (1994). Assessment of multidimensional coping: Task, emotion, and avoidance strategies. Psychological Assessment, 6, 50-60.

Endler, N. S., Parker, J. D. A., Bagby, R. M., & Cox, B. J. (1991). Multidimensionality of state and trait anxiety: Factor structure of the Endler Multidimensional Anxiety Scales. Journal of Personality and Social Psychology, 60, 919-926.

Endler, N. S., Parker, J. D. A., & Summerfeldt, L. J. (1993). Coping with health problems: Conceptual and methodological issues. Canadian Journal of Behavioural Science, 25, 384-399.

Endler, N. S., Parker, J. D. A., & Summerfeldt, L. J. (1998). Coping with health problems: Developing a reliable and valid multidimensional measure. Psychological Assessment, 10, 195-205.

Endler, N. S., Rutherford, A., & Denisoff, E. (in press). Beck Depression Inventory: Exploring its multidimensionality. Journal of Clinical Psychology.

Endler, N. S., Speer, R. L., Johnson, J. M., & Flett, G. L. (1998a). Controllability, coping, efficacy, and distress. Manuscript submitted for publication.

Endler, N. S., Speer, R. L., Johnson, J. M., & Flett, G. L. (1998b). General versus specific self-efficacy and perceived versus objective control in relation to anxiety and cognitive performance. Manuscript submitted for publication.

Felton, B. J., & Revenson, T. A. (1984). Coping with chronic illness: A study of illness controllability and the influence of coping strategies on psychological adjustment. Journal of Consulting and Clinical Psychology, 52, 343-353.

Fisher, E. B., Delamater, A. M., Bertelson, A. D., & Kirkley, B. G. (1982). Psychological factors in diabetes and its treatment. Journal of Consulting and Clinical Psychology, 6, 993-1003.

Folkman, S. (1984). Personal control and stress and coping processes: A theoretical analysis. Journal of Personality and Social Psychology, 46, 839-852.

Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. Journal of Health and Social Behavior, 21, 219-239.

Fore, W. W. (1995). Noninsulin-dependent diabetes mellitus: The prevention of complications. Medical Clinics of North America, 79, 287-298.

Forsythe, C. J., & Compas, B. E. (1987). Interaction of cognitive appraisals of stressful events and coping: Testing the goodness of fit hypothesis. Cognitive Therapy and Research, 11, 473-485.

Fox, J. (1997). Applied regression analysis, linear models, and related methods. Thousand Oaks, California: Sage.

Glass, G. V., & Hopkins, K. D. (1996). Statistical methods in education and psychology. Boston: Allyn & Bacon.

Goetsch, V. L., Abel, J. L., & Pope, M. K. (1994). The effects of stress, mood, and coping on blood glucose in NIDDM: A prospective pilot evaluation. Behavior Research and Therapy, 32, 503-510.

Gonen, B., Rubenstein, A. H., Rochman, H., Tanega, S. P., & Horwitz, D. L. (1977). Haemoglobin A1: An indicator of the metabolic control of diabetes patients. The Lancet, 2, 734-736.

Goodnick, P. J., Henry, J. H., & Buki, V. M. (1995). Treatment of depression in patients with diabetes mellitus. Journal of Clinical Psychiatry, 56, 128-136.

Helgeson, V. S., & Franzen, P. L. (1998). The role of perceived control in adjustment to diabetes. Anxiety, Stress, and Coping, 11, 113-136.

Johnson, J. (1998). Optimism, coping and distress in men testing positive for human immunodeficiency virus. Unpublished Master's Thesis, York University, Toronto, Canada.

Kaplan, R. M., & Atkins, C. J. (1983). The behavioral management of Type II diabetes mellitus. In R. M. Kaplan & M. H. Criqui (Eds.), Behavioral epidemiology and disease prevention (pp. 353-383). New York: Plenum Press and NATO.

Kaplan, R. M., Sallis, J. F., & Patterson, T. L. (1993). Health and human behavior. New York: McGraw-Hill, Inc.

Kavanagh, D. J., Gooley, S., & Wilson, P. H. (1993). Prediction of adherence and control in diabetes. Journal of Behavioral Medicine, 16, 509-522.

Kvam, S. H., & Lyons, J. S. (1991). Assessment of coping strategies, social support, and general health states in individuals with diabetes mellitus. Psychological Reports, 68, 623-632.

Latack, J. C. (1986). Coping with job stress: Measures and future directions for scale development. Journal of Applied Psychology, 71, 377-385.

Lazarus, R. S. (1993). From psychological stress to the emotions: A history of changing outlooks. Annual Review of Psychology, 44, 1-21.

Lazarus, R. S., & Folkman, S. (1984). Stress, appraisal, and coping. New York: Springer Publishing Company.

Lustman, P. J. (1988). Anxiety disorders in adults with diabetes mellitus. Psychiatric Clinics of North America, 11, 419-432.

Lustman, P. J., Amado, H., & Wetzel, R. D. (1983). Depression in diabetics: A critical appraisal. Comprehensive Psychiatry, 24, 65-74.

Lustman, P. J., Griffith, L. S., & Clouse, R. E. (1996). Recognizing and managing depression in patients with diabetes. In B. J. Anderson & R. R. Rubin (Eds.), Practical

psychology for diabetes clinicians: How to deal with the key behavioral issues faced by patients and health care teams (pp. 143-152). Virginia: American Diabetes Association.

Lustman, P. J., Griffith, L. S., Gavard, J. A., & Clouse, R. E. (1992). Depression in adults with diabetes. Diabetes Care, 15, 1631-1639.

MacLean, H., & Oram, B. (1987). Living with diabetes: Personal stories and strategies for coping. Toronto: University of Toronto Press.

Macrodimitris, S. D., Durup, M. J. R., Donaldson, L. K., & Waldman, S. (August, 1996). Coping with demands at work and at home: Finding the optimal stressor-resource match. Poster presented at the XXVI International Congress of Psychology, Montreal, Quebec, Canada.

Macrodimitris, S. D., Durup, M. J. R., & Hamlin, S. (June, 1997). Social support at work and at home: The key to resiliency? Paper presented as part of a symposium entitled Work and Family at the annual meeting of the Canadian Psychological Association, Toronto, Ontario, Canada.

Maes, S., Leventhal, H., & DeRidder, D. T. D. (1996). Coping with chronic diseases. In M. Zeidner & N. S. Endler (Eds.), Handbook of coping: Theory, research, applications (pp. 221-251). New York: John Wiley & Sons, Inc.

Martin, L. L., & Tesser, A. (1989). Toward a motivational and structural theory of ruminative thought. In J. S. Uleman & J. A. Bargh (Eds.), Unintended thought (pp. 306-326). New York: The Guilford Press.

Martin, T. R., Flett, G. L., Hewitt, P. L., Krames, L., & Szanto, G. (1996). Personality correlates of depression and health symptoms: A test of a self-regulation model. Journal of Research in Personality, 31, 264-277.

May, B. (1991). Diabetes. In M. Pitts & K. Phillips (Eds.), The psychology of health: An introduction (pp. 214-230). London: Routledge.

McCrae, R. R. (1984). Situational determinants of coping responses: Loss, threat, and challenge. Journal of Personality and Social Psychology, 46, 919-928.

Mineka, S., & Henderson, R. W. (1985). Controllability and predictability in acquired motivation. Annual Review of Psychology, 36, 495-529.

Moos, R. H., & Schaefer, J. A. (1993). Coping resources and processes: Current concepts and measures. In L. Goldberger & S. Breznitz (Eds.), Handbook of stress: Theoretical and clinical aspects (2nd ed., p. 234-257). New York: Free Press.

Murphy, K. R., & Davidshofer, C. O. (1991). Psychological testing: Principles and applications. Englewood Cliffs, NJ: Prentice Hall.

National Institutes of Health (1998). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: Executive summary. Bethesda, Maryland: Author.

Newberry, B. H., Jaikins-Madden, J. E., & Gerstenberger, T. J. (1991). A holistic conceptualization of stress and disease. New York: AMS Press.

Nolen-Hoeksema, S. (1996). Chewing the cud and other ruminations. In R. S. Wyer (Ed.), Ruminative Thoughts: Advances in Social Cognition Volume IX (pp. 135-144). Mahwah, NJ: Lawrence Erlbaum Associates.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. Journal of Personality and Social Psychology, 61, 115-121.

Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally occurring depressed mood. Cognition and Emotion, 7, 561-570.

Nolen-Hoeksema, S., Morrow, J., & Frederickson, B. L. (1993). Response styles and the duration of episodes of depressed mood. Journal of Abnormal Psychology, 102, 20-28.

Nolen-Hoeksema, S., Parker, L. E., & Larson, J. (1994). Ruminative coping with depressed mood following loss. Journal of Personality and Social Psychology, 67, 92-104.

Norris, J. M. (1996). Epidemiology of non-insulin-dependent diabetes mellitus. In D. Haire-Joshu (Ed.), Management of diabetes mellitus: Perspectives of care across the lifespan (2nd ed.; pp. 75-95). St Louis, Mo.: Mosby-Yearbook.

Okada, S., Hamada, H., Ishii, K., Ichiki, K., Tanokuchi, S., & Ota, Z. (1995). Factors related to stress in patients with non-insulin dependent diabetes mellitus. Journal of International Medical Research, 23, 449-457.

Olson, C. O. (1988). Diagnosis and management of diabetes mellitus (2nd ed.). New York: Raven Press.

Parker, J. D. A., & Endler, N. S. (1992). Coping with coping assessment: A critical review. European Journal of Personality, 6, 321-344.

Pearlin, L. I., & Schooler, C. (1982). The structure of coping. In H. I. McCubbin, A. E. Cauble, & J. M. Patterson (Eds.), Family stress, coping, and social support (pp. 109-135). Springfield, Illinois: Charles C Thomas.

Reid, G. J., Dubow, E. F., Carey, T. C., & Dura, J. R. (1994). Contribution of coping to medical adjustment and treatment responsibility among children and adolescents with diabetes. Developmental and Behavioral Pediatrics, 15, 327-335.

Researchers find 'virtual epidemic' in native community. (1997, November 7). The Globe and Mail (Suppl.), p. C6.

Roglic, G., Pibernik-Okanovic, M., Prasek, M., & Metelko, Z. (1993). Effect of war-induced prolonged stress on cortisol of persons with type II diabetes. Behavioral Medicine, 19, 53-59.

Rubin, R. R. & Peyrot, M. (1992). Psychological problems and interventions in diabetes. Diabetes Care, 15, 1640-1657.

Rubin, R. R. & Peyrot, M. (1996). Emotional responses to diagnosis. In B. J. Anderson & R. R. Rubin (Eds.), Practical psychology for diabetes clinicians: How to deal with the key behavioral issues faced by patients and health care teams (pp. 155-162). Virginia: American Diabetes Association.

Rutherford, A. (1995). Approach-avoidance as a coping construct: Am examination of the predictive validity of three coping measures. Unpublished Master's Thesis, York University, Toronto, Canada.

Sawyer-Radloff, L. (1977). The CES-D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement, 1, 385-401.

Schiaffino, K. M., & Revenson, T. A. (1995). Why me? The persistence of negative appraisals over the course of illness. Journal of Applied Social Psychology, 25, 601-618.

Shilltoe, R. W. (1988). Psychology and diabetes: Psychosocial factors in management and control. London: Chapman & Hall.

Smari, J., & Valtysdottir, H. (1997). Dispositional coping, psychological distress, and disease-control in diabetes. Personality and Individual Differences, 22, 151-156.

Spielberger, C. D. (1995). State-Trait Personality Inventory (STPI): Manual. Mind Garden and Par.

Spiess, K., Sachs, S., Moser, G., Pietschmann, P., Schernthaner, G., & Prager, R. (1994). Psychological moderator variables and metabolic control in recent onset type 1 diabetic patients – A two year longitudinal study. Journal of Psychosomatic Research, 38, 249-258.

Stricker, E. M., & Verbalis, J. G. (1993). Hormones and ingestive behaviors. In J. B. Becker, S. M. Breedlove, & D. Crews (Eds.), Behavioral endocrinology (pp. 451-472). Cambridge, Mass.: The MIT Press.

Summerfeldt, L. J., & Endler, N. S (1996). Coping with emotion and psychopathology. In M. Zeidner & N. S. Endler (Eds.), Handbook of coping: Theory, research, applications (pp. 602-239). New York: John Wiley & Sons, Inc.

Tabachnick, B. G. & Fidell, L. S. (1996). Using multivariate statistics (3rd ed.). New York: Harper Collins.

Taylor, S. E. (1999). Health psychology (4th ed.). New York: McGraw Hill.

Taylor, S. E., Lichtman, R. R., & Wood, J. V. (1984). Attributions, beliefs about control, and adjustment to breast cancer. Journal of Personality and Social Psychology, 46, 489-502.

Tchobroutsky, G., & Elgrably, F. (1983). The control of diabetes. In R. M. Kaplan & M. H. Criqui (Eds.), Behavioral epidemiology and disease prevention (pp.183-200). New York: Plenum Press and NATO.

Tennen, H., Affleck, G., Allen, D. A., McGrade, B. J., & Ratzan, S. (1984). Causal contributions and coping with insulin-dependent diabetes. Basic and Applied Social Psychology, 5, 131-142.

Thompson, S. C. (1981). Will it hurt less if I can control it? A complex answer to a simple question. Psychological Bulletin, 90, 89-101.

Thompson, S. C., Cheek, P. R., & Graham, M. A. (1988). The other side of perceived control: Disadvantages and negative effects. In S. Spacapan & S. Oskamp (Eds.), The social psychology of health (pp. 69-93). Newbury Park: Sage.

United Kingdom Prospective Diabetes Study Group (UKPDS, 1998). Intensive blood glucose control with sulfonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes. Lancet, 352, 837-853.

Vitaliano, P. P., DeWolfe, D. J., Maiuro, R. D., Russo, J., & Katon, W. (1990). Appraised changeability of a stressor as a modifier of the relationship between coping and depression: A Test of the Hypothesis of Fit. Journal of Personality and Social Psychology, 59, 582-592.

Wells, K. B., Golding, J. M., & Burnam, M. A. (1988). Psychiatric disorder in a sample of the general population with and without chronic medical conditions. American Journal of Psychiatry, 145, 976-981.

Wilkinson, G. (1991). Psychological problems and psychiatric disorders in diabetes mellitus. In J. Pickup & G. Williams (Eds.), Textbook of diabetes (Vol. 2; pp. 784-791). London: Blackwell Scientific Publications.

Wilson, T. D., & Schooler, J. W. (1991). Thinking too much: Introspection can reduce the quality of preferences and decisions. Journal of Personality and Social Psychology, 60, 181-192.

Wyer. R. S. (Ed.). (1996). Ruminative Thoughts: Advances in Social Cognition Volume IX. Mahwah, NJ: Lawrence Erlbaum Associates

Author Notes

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APPENDIX A

General Information Questionnaire

The following are some basic information questions about you and your background that will help us to describe the people who participate in this study, and help us to better understand the results of the study. Please note that this information is considered ***strictly confidential*** and is for ***research purposes only***.

1. Gender: Male ___ Female ___ **2.** Age: ___ years **3.** Occupation _____

For each of the following questions, please circle the letter beside the category that *best* describes *you*.

4. Highest level of education obtained:

a) Completed some high school
b) Completed high school
c) Completed college/university
d) Completed Master's degree
e) Completed Doctoral degree
f) Some college/university
g) Some graduate school
h) Other _____

5. Approximate annual family income:

a) less than $19,999
b) $20,000-$39,999
c) $40,000-$59,999
d) $60,000-$79,999
e) $80,000-$99,999
f) greater than $100,000

How many people are supported by this family income (including yourself)?____

6. Marital Status:

a) Single
b) Married
c) Common-Law/Cohabiting
d) Widowed
e) Separated
f) Divorced

7. Ethnicity:

a) White/Caucasian
b) Black/Afro-Canadian
c) Hispanic
d) Native Canadian
e) Asian
f) Other (please specify: _____)

8. Religion:

a) Protestant
b) Catholic
c) Jewish
d) Hindu
e) Buddhist
f) Muslim
g) None
h) Other (please specify: _____)

APPENDIX B

Diabetes Information Questionnaire

The following questions are related specifically to your experiences with ***type 2 diabetes***. Please answer each question honestly. You are reminded, once again, that your responses are ***strictly confidential***, and are for ***research purposes only.***

1. How long has it been since you were first diagnosed with diabetes? _ years_ months

2. Which of the following symptoms did you experience *before* being diagnosed with type 2 diabetes? (feel free to circle more than one):

   a) frequent urination
   b) unusual thirst
   c) changes in appetite
   d) unexplained weight loss
   e) extreme tiredness
   f) irritability
   g) blurry vision
   h) tingling in hands or feet
   i) Other (please specify: _____)
   j) no symptoms were experienced

3. What is the treatment regimen you primarily use to control your diabetes?

   a) diet only
   b) regular exercise
   c) oral medication (please specify type/name: _____)
   d) insulin injections (please specify average number per day: _____)
   e) a combination of the above (please specify, using the letters beside each treatment regimen listed above: _____)

4. To what extent is the regimen you follow consistent with that prescribed by your doctor or Diabetes Educator?

1	2	3	4	5
Not at all				Very Much

5. a) Have you experienced any complications *directly related* to your diabetes?

   Yes ____ No _____

   b) If "yes", please specify the complication(s) and the severity (feel free to circle more than one):

   a) Retinopathy
   b) Heart Disease
   c) Kidney Disease
   d) Neuropathy (nerve problems)
   e) Impotence/sexual dysfunction
   f) Other (please specify: _____)

   Severity (please indicate number from 1-5; 1 = not severe; 3 = moderately severe; 5 = extremely severe)**:**

   Complication (a): ____ Complication (b): ____ Complication (c): ___
   Complication (d): ____ Complication (e): ____ Complication (f): ___

6. a) Do you have any other physical or mental illnesses (e.g., Coronary heart disease; cancer; depression; schizophrenia)?

   Yes ____ No _____

   b) If "yes", please specify the illness(es) and when it was diagnosed (in number of years or months ago):

   c)

   Illness:_____ Diagnosed:_____years/months ago

Please report your most recent Hemoglobin A_{1c} test result below. Your are reminded that *your most recent test must be within the last 4 months.*

HbA_{1c}: _____ %

Date Obtained: _____/_____/_____
Today's Date: _____/_____/_____

APPENDIX C

Coping with Health Injuries and Problems Questionnaire (CHIP)

The following are ways of reacting to health problems, such as illnesses, sicknesses, and injuries. Please circle a number from 1 to 5 for each of the following items. **Indicate how much you engaged in these types of activities when dealing with your *type 2 diabetes*. Please be sure to respond to each item.**

1	2	3	4	5
Not at all		Moderately		Very Much

1. Think about the good times I've had.
2. Stay in bed.
3. Find out more information about the illness.
4. Wonder why it happened to me.
5. Be with other people.
6. Lie down when I feel tired.
7. Seek medical treatment as soon as possible.
8. Become angry because it happened to me.
9. Daydream about pleasant things.
10. Get plenty of sleep.
11. Concentrate on the goal of getting better.
12. Get frustrated.
13. Enjoy the attention of friends and family.
14. Try to use as little energy as possible.
15. Learn more about how my body works.
16. Feel anxious about the things I can't do.
17. Make plans for the future.
18. Make sure I am warmly dressed or covered.
19. Do what my doctor tells me.
20. Fantasize about all the things I could do if I was better.
21. Listen to music.
22. Make my surroundings as quiet as possible.
23. Try my best to follow my doctor's advice.
24. Wish that the problem had never happened.
25. Invite people to visit me.
26. Be as quiet and still as I can.
27. Be prompt about taking medications.
28. Feel anxious about being weak and vulnerable.
29. Surround myself with nice things (e.g. flowers).
30. Make sure I am comfortable.
31. Learn more about the most effective treatments available.
32. Worry that my health might get worse.

APPENDIX D

Rumination and Distraction Questionnaire (RDQ)

For the following items, please indicate how much you engage in these thoughts and behaviors when focused on your ***type 2 diabetes***. Please be sure to respond to each item.

1	2	3	4	5
Not at all		Moderately		Very Much

Thoughts:

1. Why do I always react this way?
2. There must be something wrong with me or I wouldn't feel this way.
3. Why can't I handle things better?
4. No one will want to be around me if I don't snap out of this mood.
5. Why can't I be satisfied with the way things are?
6. I think I must really have serious problems, otherwise I wouldn't feel this way so often.
7. I need to understand these feelings.
8. Why can't I get going?
9. Why do I have problems that other people don't seem to have?
10. I won't be able to concentrate if I keep feeling this way.

Behaviors:

11. Go to my room alone to think about my feelings.
12. Sit at home and think about how I feel.
13. Listen to sad music.
14. Isolate myself and think about the reasons I'm feeling this way.
15. Write about my feelings (i.e, journal/diary/letter)
16. Talk to others about how I'm feeling.

APPENDIX E

Event Perception Measure

I. Please answer the following questions with respect to ***your perceptions*** regarding your experience with ***type 2 diabetes***.

	Not At All				Very Much
1. How much do you feel that the outcome of your diabetes is beyond your control?	1	2	3	4	5
2. How much do you feel that your diabetes is Something you can change or do something about?	1	2	3	4	5
3. How much do you feel that you have to accept your diabetes as there is nothing you can do to change it?	1	2	3	4	5
4. How much do you feel that you can take steps to control your diabetes?	1	2	3	4	5
5. How much do you feel that the outcome of your diabetes will be influenced by factors external to yourself (e.g., chance or fate)?	1	2	3	4	5
6. How much do you feel that your abilities will Influence the outcome of your diabetes?	1	2	3	4	5

II. Over the past 2-6 months, what percentage of time do you think you maintained your blood glucose levels within your target/normal range? (Please note that this question asks about *your* perception, not the results of your HbA_{1c}):

__ 0% __ 25% (1/4) __ 50% (1/2) ___ 75% (3/4) __100%

III. To what extent do you find having diabetes, taking into account everything associated with the illness (e.g., treatment etc), to be stressful for you?

1 2 3 4 5

Not Stressful Extremely Stressful

APPENDIX F

Endler Multidimensional Anxiety Scales (EMAS)-State

For each of the following 20 items, please circle a number on the 5-point scale to indicate **how you feel at this particular moment.**

1	2	3	4	5
Not at all		Moderately		Very Much

1. Hands feel moist
2. Distrust myself
3. Breathing is irregular
4. Unable to focus on task
5. Have tense feeling in stomach
6. Heart beats faster
7. Feel helpless
8. Unable to concentrate
9. Perspire
10. Fear defeat
11. Mouth feels dry
12. Self-preoccupied
13. Feel uncertain
14. Feel tense
15. Feel inadequate
16. Hands feel unsteady
17. Feel flushed
18. Feel self-conscious
19. Feel incompetent
20. Feel lump in throat

APPENDIX G

Endler Multidimensional Anxiety Scales (EMAS)-Trait

The following four sections describe a general type of situation that most people have experienced. For each type of situation, some common reactions and feelings are listed. Please use the 5-point scale to indicate the degree to which you experience these reactions and feelings in the situation described in each section.

1	2	3	4	5
Not at all		Moderately		Very Much

1. You are in situations where you are being evaluated by other people.

2. You are in situations where you are about to or may encounter physical danger.

3. You are in new or strange situations.

4. You are involved in your daily routines.

Responses:

1. Seek experiences like this
2. Feel upset
3. Perspire
4. Feel relaxed
5. Have an "uneasy feeling"
6. Look forward to these situations
7. Get fluttering feeling in stomach
8. Feel comfortable
9. Feel tense
10. Enjoy these situations
11. Heart beats faster
12. Feel secure
13. Feel anxious
14. Feel self-confident
15. Feel nervous

APPENDIX H

State-Depression

A number of statements that people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel **right now**, that is, **at this moment**. There are no right or wrong answers. Do not spend too much time on any one statement, but give the answer which seems to describe your **present** feelings best.

1	2	3	4
Not at all	Somewhat	Moderately So	Very Much So

1. I feel strong
2. I feel blue
3. I feel healthy
4. I feel downhearted
5. I feel alive
6. I feel sad
7. I feel safe
8. I feel gloomy
9. I feel miserable
10. I feel hopeful about the future

APPENDIX I

Trait-Depression

Read each statement and then circle the appropriate number to the right of the statement to indicate how you **generally** feel. Do not spend too much time on any one statement, but give the answer which best describes how you **generally** feel.

1	2	3	4
Not at all	Somewhat	Moderately So	Very Much So

11. I feel happy
12. I feel gloomy
13. I feel whole
14. I feel sad
15. I feel peaceful
16. I feel low
17. I feel depressed
18. I feel safe
19. I feel hopeless
20. I enjoy life

APPENDIX J

CES-D

Circle the number for each statement which best describes how often you felt or behaved this way **DURING THE PAST MONTH.**

0	1	2	3
Rarely (less than 1 week)	Some of the Time (1-2 weeks)	Occasionally (2-3 weeks)	Most of the Time (3-4 weeks)

1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people disliked me.	0	1	2	3
20. I could not get 'going.'	0	1	2	3

APPENDIX K

Sign Advertising Research

COPING WITH TYPE 2 DIABETES

ATTENTION PEOPLE WITH TYPE 2 DIABETES!

If you:

- **Were diagnosed with diabetes *AT LEAST 6 months ago***
- **Are willing to provide the results of your most recent (*no more than 4 months ago*) HbA_{1c} test. . .**

. . .Then you are eligible to participate in research!

All we will require from you is:

- **Simply fill out a questionnaire package on you and your diabetes (takes no more than 45 minutes to complete)**
- **Report the results of your most recent (*taken no more than 4 months ago*) HbA_{1c} test**

All results are kept strictly confidential. If you are interested and would like more information, please see the receptionist.

This research project is being conducted as part of a Master's Thesis by Sophia Macrodimitris, and is supervised by Dr. Norman S. Endler, Distinguished Research Professor at York University.

APPENDIX L

Participation/Informed Consent Form

Coping with Type 2 Diabetes

Thank you for your interest in participating in the ***Coping with Type 2 Diabetes*** research project. As indicated in the title of this study, we are interested in finding out how people cope with their type 2 diabetes, and whether the coping strategies used may be related to how well people adjust to having this condition. This is a very important concept, particularly for diabetes educators who need to know how best to advise people on how to deal with their type 2 diabetes. The only way to determine this is by asking you, the person with type 2 diabetes, how you deal with your diabetes.

For this study, you will be required to:

1. Fill out a questionnaire package, that should take not more than 45 minutes to complete, and return it to the investigator within 2 weeks.
2. Report your most recent HbA_{1c} results (taken no more than 4 months ago). This may involve having your HbA_{1c} tested in the next 2 weeks.

This research project is part of a Master's Thesis conducted by Sophia Macrodimitris, Master's student in the Graduate Programme in Psychology at York University. This research project is supervised by a faculty member, Dr. Norman S. Endler, Distinguished Research Professor, and meets the ethics criteria set out by the Department of Psychology and the University.

If you decide to participate in this research project, there are a few things you should know:

1. Your participation is completely voluntary, and you may withdraw from the study at any time without penalty.
2. The responses you provide in this study will remain strictly confidential, as there will be no way to connect your name to your questionnaire, and no individual results will be reported.
3. You are free to call the researcher at any time during your participation in the study and ask questions regarding the questionnaire package or the study (phone number provided on instruction sheet).
4. You will be given the opportunity to obtain a summary of the results of this study if so desired (see below).

If you have read the above information, and would like to participate in this study, please sign below:

I have read and understand the above requirements of me for the research project, ***Coping with Type 2 Diabetes****, and will participate in this study.*

Signature: _____ Date: _____

If you are interested in obtaining the results of the study, please print your name and address in the space provided below (Please note: This information will be used only to send you the results of the study):

Name: _____
Address: _____
_____
_____.

Thank you for agreeing to participate in this research project.

APPENDIX M

Coping with Type 2 Diabetes: Instruction Sheet

The purpose of this study is to find out how people cope with having type 2 diabetes. This study is part of a Master's Thesis conducted by Sophia Macrodimitris, conducted under the supervision of Dr. Norman S. Endler, Distinguished Research Professor at York University.

You have been provided with a questionnaire package that asks you questions about yourself and your diabetes. The package is broken into two sections: Section 1 contains questionnaires that ask you general questions about you (age, gender, occupation, etc.), as well as how you react to different situations in your daily life. Section 2 contains questionnaires pertaining specifically to your experience with type 2 diabetes, and the way you cope with having type 2 diabetes. The entire questionnaire package should take you *no longer than 45 minutes* to complete.

When filling out the questionnaire package:

1. Please answer the two sections in order.

2. Try to be *completely honest* when you respond to each of the questions. It is crucial to this research project that we get an understanding about how people actually respond in general situations and in dealing with type 2 diabetes, rather than how people think they should respond. You are reminded that questionnaires will remain completely anonymous at all stages in the research project, and that only general group trends will be reported in the results of the study, making all responses strictly confidential.

Remember also to ***return the completed questionnaire package (including report of most recent HbA_{1c} test) within 1 month of receiving the questionnaire***. Your prompt response will be appreciated.

Thank you for agreeing to take the time to participate in the ***Coping with Type 2 Diabetes*** research project. If you have any questions or concerns regarding the questionnaire package at any point during your participation in the study, please feel free to contact the principal researcher by phone, email, or mail (see below).

Sophia Macrodimitris Phone: (416) 736-2100, ext. 40606
Graduate Programme in Psychology, York University Email: smacro@yorku.ca
297 Behavioural Sciences Building
4700 Keele Street
Toronto, Ontario
M3J 1P3

APPENDIX N

Coping with Type 2 Diabetes: Debriefing Form

Thank you for taking the time to take part in the ***Coping with Type 2 Diabetes*** study. As was told to you when you agreed to take part in the study, the main purpose of this study is to find out how people cope with having type 2 diabetes. In the results, I will look at which coping strategies are related to how people adapt to the condition. General adaptation is being measured in this study through questionnaires that show how depressed or anxious people with type 2 diabetes feel in their daily lives. Adaptation to type 2 diabetes is being measured through reported HbA_{1c} test results.

In addition to finding out how people cope with type 2 diabetes, I am interested in finding out how people with type 2 diabetes see their condition. I am interested in whether you see the condition as something you can control or as something that is beyond your control. In the results, I will look at whether the way people see the condition may affect the way they cope with type 2 diabetes, and whether this is related to how they adjust to having diabetes.

Thank you once again for taking part in this study. Your involvement in this research project has been extremely important, and will help us to understand what the best coping methods are for dealing with type 2 diabetes.

Sophia Macrodimitris
Master's Student
Graduate Programme in Psychology
York University

APPENDIX O

Table 12

Descriptive Statistics for the Sample of Men (n = 50) with Type 2 Diabetes

Variable	Abbr.	N/items	Mean	S. D.	α
COPING					
CHIP-Distraction coping	CHIP-D	8	25.42	6.78	.83
CHIP-Palliative coping	CHIP-P	8	19.90	4.61	.67
CHIP-Instrumental coping	CHIP-I	8	32.22	4.10	.70
CHIP-Emotional Preoccupation coping	CHIP-EP	8	18.28	7.42	.87
Rumination	RUM	16	29.98	12.68	.93
Ruminative Thoughts	RUM-T	10	20.78	10.33	.95
Ruminative Behaviors	RUM-B	6	9.20	3.60	.75
CONTROL & STRESS					
Perceived Control (Event Perception)	PCON	6	23.46	4.44	.72
Actual Control (HbA_{1c})	HbA_{1c}	1	7.82%	2.25	N/A
Perceived Stress of Diabetes	PSTR	1	2.66	1.10	N/A
STATE-ANXIETY					
EMAS-State Anxiety	EMAS-S	20	27.92	10.18	.93
EMAS-State Autonomic-Emotional	EMAS-S-AE	10	12.96	4.00	.81
EMAS-State Cognitive-Worry	EMAS-S-CW	10	14.96	6.94	.93
TRAIT-ANXIETY					
EMAS-Trait Anxiety Social Evaluation	EMAS-T-SE	15	38.88	9.98	.87
EMAS-Trait Anxiety Physical Danger	EMAS-T-PD	15	53.37	11.74	.92
EMAS-Trait Anxiety Ambiguous	EMAS-T-AM	15	41.46	9.13	.88
EMAS-Trait Anxiety Daily Routines	EMAS-T-DR	15	26.37	8.43	.89
DEPRESSION					
State Depression	S-DEP	10	20.04	3.98	.66
Trait Depression	T-DEP	10	20.00	3.63	.57
General Depression (CES-D)	DEP	20	10.92	10.67	.93

Note. Abbr. = Variable name abbreviation; N/Items = Number of items; S. D. = standard deviation; α = Cronbach's alpha; N/A = not applicable.

APPENDIX P

Table 13

Descriptive Statistics for the sample of Women (n = 65) with Type 2 Diabetes

Variable	Abbr.	N/items	Mean	S. D.	α
COPING					
CHIP-Distraction coping	CHIP-D	8	26.20	5.33	.65
CHIP-Palliative coping	CHIP-P	8	21.97	4.52	.62
CHIP-Instrumental coping	CHIP-I	8	33.45	5.69	.86
CHIP-Emotional Preoccupation coping	CHIP-EP	8	20.66	7.81	.88
Rumination	RUM	16	31.29	11.97	.91
Ruminative Thoughts	RUM-T	10	21.20	9.53	.93
Ruminative Behaviors	RUM-B	6	10.09	3.73	.69
CONTROL & STRESS					
Perceived Control (Event Perception)	PCON	6	22.65	4.65	.69
Actual Control (HbA_{1c})	HbA_{1c}	1	7.94%	2.00	N/A
Perceived Stress of Diabetes	PSTR	1	2.94	1.16	N/A
STATE-ANXIETY					
EMAS-State Anxiety	EMAS-S	20	28.25	12.04	.95
EMAS-State Autonomic-Emotional	EMAS-S-AE	10	13.52	5.63	.88
EMAS-State Cognitive-Worry	EMAS-S-CW	10	14.72	7.04	.93
TRAIT-ANXIETY					
EMAS-Trait Anxiety Social Evaluation	EMAS-T-SE	15	41.83	12.46	.92
EMAS-Trait Anxiety Physical Danger	EMAS-T-PD	15	56.40	10.88	.88
EMAS-Trait Anxiety Ambiguous	EMAS-T-AM	15	43.60	10.90	.89
EMAS-Trait Anxiety Daily Routines	EMAS-T-DR	15	26.20	8.45	.86
DEPRESSION					
State Depression	S-DEP	10	19.51	3.98	.66
Trait Depression	T-DEP	10	20.06	3.90	.58
General Depression (CES-D)	DEP	20	11.89	10.95	.92

Note. Abbr. = Variable name abbreviation; N/Items = Number of items; S. D. = standard deviation; α = Cronbach's alpha; N/A = not applicable.

APPENDIX Q

Table 14

Intercorrelations among Coping, Perceived and Actual Control, Anxiety and Depression for All Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. CHIP-D	--	.43**	.30**	.10	.14	.12	.13	.10	.08	-.08
2. CHIP-P		--	.33**	.40**	.33**	.28*	.35**	-.08	.05	.20
3. CHIP-I			--	.07	-.03	-.09	.14	.11	-.10	-.04
4. CHIP-EP				--	.70**	.71**	.44**	-.38**	.11	.67**
5. RUM					--	.97**	.74**	-.33**	-.01	.61**
6. RUM-T						--	.54**	-.38**	.02.	.61**
7. RUM-B							--	-.09	-.07	.37**
8. PCON								--	-.26	-.27
9. HbA_{1c}									--	.02
10. PSTR										--

CHIP = Coping with Health Injuries and Problems
CHIP-D = CHIP-Distraction coping
CHIP-P = CHIP-Palliative coping
CHIP- I = CHIP-Instrumental coping
CHIP- EP = CHIP-Emotional Preoccupation coping
RUM = Rumination
RUM-T = Ruminative Thoughts
RUM-B = Ruminative Behaviors
PCON = Perceived Control (Event Perception Measure)
HbA_{1c} = Actual Control
PSTR = Stress associated with Diabetes
**p<.001. *p<.003. Family-wise Bonferroni adjustment for 20 tests (0.05/20 = .003) was used to test for significance.

Table 14 (ct'd)

Variable	11	12	13	14	15	16	17	18	19	20
1. CHIP-D	.01	.09	-.05	-.14	-.06	-.18	-.05	-.22	-.22	-.08
2. CHIP-P	.25	.30**	.19	-.04	.02	-.02	.21	.12	.12	.27
3. CHIP-I	-.03	-.01	-.04	-.07	-.02	-.15	-.06	-.14	-.20	-.21
4. CHIP-EP	.57**	.49**	.57**	.34**	.30**	.30**	.33**	.58**	.52**	.61**
5. RUM	.67**	.60**	.65**	.35**	.20	.31**	.36**	.68**	.60**	.70**
6. RUM-T	.62**	.56**	.60**	.36**	.21	.32**	.36**	.67**	.60**	.68**
7. RUM-B	.58**	.50**	.57**	.21	.11	.19	.25	.48**	.41**	.49**
8. PCON	-.31**	-.28*	-.30**	-.12	.10	.03	-.22	-.35**	-.36**	-.35**
9. HbA_{1c}	.20*	.25	.14	-.09	-.21	-.11	.04	.07	.05	.01
10. PSTR	.50**	.45**	.49**	.37**	.39**	.34**	.32**	.53**	.46**	.53**
11. EMAS-S	--	.92**	.96**	.30**	.08	.29*	.59**	.74**	.65**	.69**
12. EMAS-S-AE		--	.76**	.30**	.05	.27	.62**	.58**	.52**	.57**
13. EMAS-S-CW			--	.27**	.09	.28*	.50**	.78**	.68**	.71**
14. EMAS-T-SE				--	.51**	.55**	.13	.35**	.37**	.37**
15. EMAS-T-PD					--	.49**	-.11	.18	.16	.19
16. EMAS-T-AM						--	.23	.36**	.37**	.34**
17. EMAS-T-DR							--	.45**	.49**	.49**
18. S-DEP								--	.75**	.76**
19. T-DEP									--	.76**
20. DEP										--

CHIP-D = Coping with Health Injuries and Problems-Distraction coping
CHIP-P = CHIP-Palliative coping
CHIP-I = CHIP-Instrumental coping
CHIP-EP = CHIP-Emotional Preoccupation coping
RUM = Rumination
RUM-T = Ruminative Thoughts
RUM-B = Ruminative Behaviors
PCON = Perceived Control (Event Perception Measure)
HbA_{1c} = Actual Control
PSTR = Stress associated with Diabetes
EMAS-S = EMAS-State Anxiety
EMAS-S-AE = EMAS-State Autonomic-Emotional
EMAS-S-CW = EMAS-State Cognitive-Worry
EMAS-T-SE = EMAS-Trait Anxiety Social Evaluation
EMAS-T-PD = EMAS-Trait Anxiety Physical Danger
EMAS-T-AM = EMAS-Trait Anxiety Ambiguous
EMAS-T-DR = EMAS-Trait Anxiety Daily Routines
S-DEP = State Depression
T-DEP = Trait Depression
DEP = General Depression (CES-D)

** p<.001. *p<.003. Family-wise Bonferroni adjustment or 20 tests (0.05/20 = .003) was. used to test for significance

APPENDIX R

Table 15

Intercorrelations among Coping, Perceived and Actual Control, Anxiety and Depression for All Variables for Men (n = 50, above the diagonal) and Women (n = 65, below the diagonal)

Variable	1	2	3	4	5	6	7	8	9	10
1. CHIP-D	--	.37	.32	-.07	.04	.03	.08	.06	.18	-.27
2. CHIP-P	.50**	--	.38	.33	.27	.19	.40	-.20	.06	.23
3. CHIP-I	.31	.29	--	-.04	-.07	-.14	.16	.21	.01	-.11
4. CHIP-EP	.25	.42*	.10	--	.68**	.68**	.44*	-.53**	.12	.73**
5. RUM	.23	.37	-.02	.72**	--	.97**	.74**	-.53**	-.08	.60**
6. RUM-T	.22	.35	-.07	.73**	.97**	--	.55**	-.56**	-.06	.62**
7. RUM-B	.18	.29	.12	.42*	.74**	.54**	--	-.27	-.14	.35
8. PCON	.17	.05	.08	-.26	-.17	-.23	.04	--	-.19	-.45**
9. HbA_{1c}	-.02	.03	-.18	.09	.06	.09	-.03	-.33	--	-.03
10. PSTR	.09	.13	-.03	.62**	.61**	.62**	.38	-.14	.06	--

CHIP = Coping with Health Injuries and Problems
CHIP-D = CHIP-Distraction coping
CHIP-P = CHIP-Palliative coping
CHIP- I = CHIP-Instrumental coping
CHIP- EP = CHIP-Emotional Preoccupation coping
RUM = Rumination
RUM-T = Ruminative Thoughts
RUM-B = Ruminative Behaviors
PCON = Perceived Control (Event Perception Measure)
HbA_{1c} = Actual Control
PSTR = Stress associated with Diabetes
**p<.001. *p<.003. Family-wise Bonferroni adjustment for 20 tests (0.05/20 = .003) was used to test for significance.

Table 15 (ct'd)

Variable	11	12	13	14	15	16	17	18	19	20
1. CHIP-D	.01	.04	-.01	-.26	-.12	-.23	-.17	-.25	-.18	-.13
2. CHIP-P	.34	.41*	.26	-.05	.08	.01	.17	.07	.08	.26
3. CHIP-I	-.06	.03	-.10	-.06	-.10	-.26	.01	-.20	-.26	-.21
4. CHIP-EP	.62**	.51**	.61**	.42*	.41*	.60**	.39	.63**	.60**	.59**
5. RUM	.68**	.56**	.67**	.38	.25	.57**	.32	.75**	.75**	.73**
6. RUM-T	.68**	.57**	.67**	.39	.25	.62**	.36	.78**	.78**	.73**
7. RUM-B	.45**	.35	.45**	.23	.18	.24	.10	.40*	.44*	.48**
8. PCON	-.43*	-.40	-.40	-.28	-.17	-.38	-.28	-.47**	-.45**	-.50**
9. HbA_{1c}	.16	.18	.14	-.14	-.14	-.20	-.02	-.09	-.07	-.10
10. PSTR	.51**	.49**	.46**	.48**	.50**	.61**	.28	.63**	.60**	.53**
11. EMAS-S	--	.88**	.96**	.25	.22	.48**	.54**	.69**	.67**	.74**
12. EMAS-S-AE	.94**	--	.71**	.30	.20	.41*	.62**	.49**	.49**	.60**
13. EMAS-S-CW	.69**	.80**	--	.20	.20	.47**	.43*	.73**	.70**	.73**
14. EMAS-T-SE	.33	.30	.32	--	.58**	.72**	.18	.52**	.40	.30
15. EMAS-T-PD	-.03	-.06	.01	.46**	--	.56**	.04	.32	.35	.20
16. EMAS-T-AM	.19	.20	.17	.46**	.43*	--	.34	.63**	.60**	.47**
17. EMAS-T-DR	.63**	.64**	.56**	.10	-.24	.16	--	.32	.40	.52**
18. S-DEP	.79**	.66**	.82**	.26	.08	.20	.55**	--	.80**	.76**
19. T-DEP	.64**	.53**	.67**	.35	.01	.24	.55**	.72**	--	.77**
20. DEP	.67**	.56**	.69**	.42*	.16	.24	.47**	.78**	.77**	--

CHIP-D = Coping with Health Injuries and Problems-Distraction coping
CHIP-P = CHIP-Palliative coping
CHIP-I = CHIP-Instrumental coping
CHIP-EP = CHIP-Emotional Preoccupation coping
RUM = Rumination
RUM-T = Ruminative Thoughts
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EMAS-S = EMAS-State Anxiety
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EMAS-T-AM = EMAS-Trait Anxiety Ambiguous
EMAS-T-DR = EMAS-Trait Anxiety Daily Routines
S-DEP = State Depression
T-DEP = Trait Depression
DEP = General Depression (CES-D)

** p<.001. *p<.003. Family-wise Bonferroni adjustment or 20 tests (0.05/20 = .003) was. used to test for significance

APPENDIX S

Table 16

Results of Model 4: Endler Multidimensional Anxiety Scales-State, Autonomic-Emotional subscale (EMAS-S-AE)

Analysis of Variance

Source	df	MS	F	p
Between	1	1032.82	65.26	.0001
Within	113	15.83		
Total	114			

R^2 = .37; Adjusted R^2 = .36.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	5.73	1.00		5.70	.0001
RUM	.25	.03	.61	8.08	.0001

RUM = Ruminative coping.

APPENDIX T

Table 17

Results of Model 4: Endler Multidimensional Anxiety Scales-State, Cognitive Worry subscale (EMAS-S-CW)

Analysis of Variance

Source	df	MS	F	p
Between	3	863.21	32.78	.0001
Within	110	26.33		
Total	113			

R^2 = .47; Adjusted R^2 = .46.

Parameter Estimates

Variable	B	SE	β	t	p
Constant	6.17	2.39		2.58	.01
CHIP-D	-.17	.08	-.14	-2.06	.04
CHIP-EP	.20	.09	.22	2.28	.02
RUM	.30	.06	.52	5.33	.0001

CHIP = Coping with Health Injuries and Problems; CHIP-D = Distraction coping; CHIP-EP = Emotional Preoccupation coping; RUM = Ruminative coping.

APPENDIX U

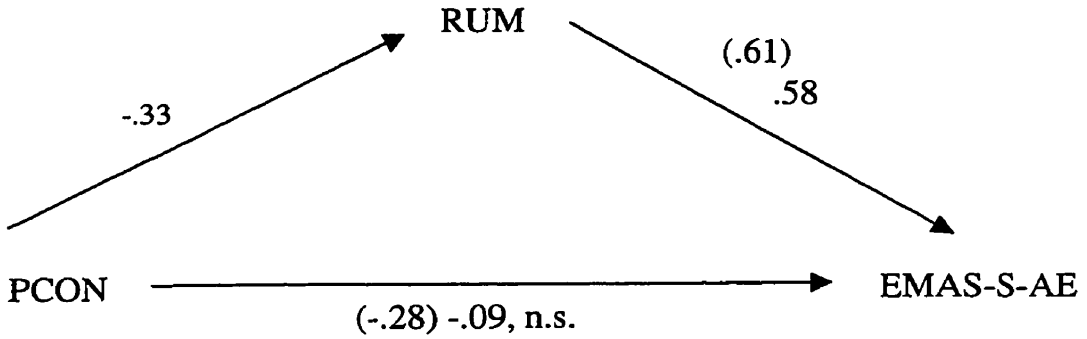

Figure 13. Diagram showing the direct and indirect effects of perceived control on autonomic-emotional state anxiety. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when all the variables were entered simultaneously into the final regression model. RUM = ruminative coping; PCON = perceived control; EMAS-S-AE = Endler Multidimensional Anxiety Scales-State anxiety, Autonomic Emotional Subscale.

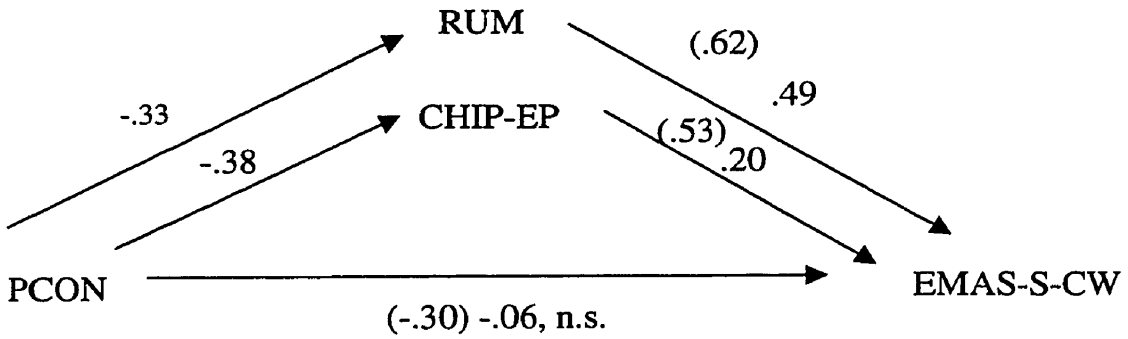

Figure 14. Diagram showing the direct and indirect effects of perceived control on cognitive-worry trait anxiety. Values in brackets are β values before the variables were entered into the final regression model to test for mediation. Unbracketed values show the β values when all the variables were entered simultaneously into the final regression model. RUM = ruminative coping; CHIP-EP = emotional preoccupation coping, PCON = perceived control; EMAS-S-CW = Endler Multidimensional Anxiety Scales-State anxiety, Cognitive Worry subscale.