

IDENTIFYING PSYCHOLOGICAL BARRIERS  
TO DIABETES SELF-CARE:  
SCALE DEVELOPMENT AND VALIDATION

by

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## **Abstract**

This exploratory study aimed at developing and evaluating a disease-specific scale that assessed specific psychological barriers that negatively affect self-care behaviours and metabolic control of individuals with diabetes. The psychological barriers of interest included psychological reactance, learned helplessness, and dysfunctional expectations of behaviour change. The first phase of this research involved generating and selecting items. Items were developed using 4 focus group sessions with individuals with diabetes (7 men, 12 women). Participants were asked to report their emotional/behavioural obstacles that they faced when trying to manage their diabetes. Of these, 74% of participants were diagnosed with diabetes type 2, and 26% with diabetes type 1. The generated items were submitted to a panel of 19 experts in a variety of professional fields for review, rating, and revisions. There were 70 items chosen for further validation. The second phase of the study involved a further selection of the items and an evaluation of the reliability of the resulting measure. There were 169 participants (83 men and 86 women) in the study, which involved a completion of 5 questionnaires, including the preliminary measure under investigation, height and weight measurement and most recent A1C. Nine items with the best psychometric properties were selected for each of the three subscales of the Psychological Barriers Inventory (PBI) on the basis of interpretability, the frequency of endorsement, the exploratory factor analysis and the phenomenological significance of each item. Convergent validity was deemed acceptable. The third phase of the investigation involved evaluating test-retest reliability of the PBI. Test-retest reliability was deemed acceptable for the subscales of Learned Helplessness and Dysfunctional Expectations, and was below acceptable levels for the subscale of Psychological Reactance. The findings indicated positive correlations between the scores on the learned helplessness subscale and A1C. Negative correlations between participants' age and their scores on reactance and learned helplessness were also found. The PBI was developed to be a clinical tool that can be used by health care professionals helping individuals with diabetes make successful changes in their behaviours.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **I. Diabetes**

Diabetes mellitus is a chronic metabolic disorder diagnosed when glucose levels in the bloodstream are persistently higher than the normal range. When food is digested, carbohydrates are broken down into glucose, which is then carried through the body in the bloodstream. Under normal circumstances, rising glucose levels in the bloodstream trigger the release of insulin, which is secreted by the cells of the pancreas. When active, insulin promotes the conversion of glucose into its stored form, glycogen, which can be converted back into glucose when required by the body. When insulin is lacking or when the body is resistant to the action of insulin at the cellular level, glucose levels in the blood continue to rise, resulting in hyperglycemia, the cardinal symptom of the disease (American Diabetes Association, 1998; Watkins, Amiel, Howell, & Turner, 2003).

The two most common forms of diabetes - type 1 and type 2 - affect approximately 16 million Americans (American Diabetes Association, 1998). In Canada, the data from the National Diabetes Surveillance System (NDSS) showed a prevalence of diabetes of 4.8% in individuals who were 20 years old and over in 1998/1999. The data were not available for New Brunswick, Newfoundland and Labrador, Northwest Territories and Nunavut. These numbers likely do not reflect the true prevalence of diabetes, however, as it has been estimated that up to one third of all cases with diabetes in Canada remain undiagnosed and do not receive treatment (Health Canada, 2002). These estimates suggest that there were 1.7 million Canadians with diabetes in 1998/1999

(Health Canada, 2002). In Nova Scotia, 36, 850 individuals aged 20 and over were estimated to have diabetes in 2000. Diabetes was diagnosed in approximately 5% of the adult population in Nova Scotia, with the prevalence rising to 14% in individuals aged 65 and older (Diabetes Care Program of Nova Scotia, 2003). In Canada, the economic burden of diabetes alone was estimated at 1.6 billion in 1998 (Health Canada, 1998).

Type 1 diabetes occurs when the pancreas does not produce any insulin, or produces very small quantities of it. This type of diabetes is primarily a result of pancreatic beta cell destruction, and is often associated with ketoacidosis. Ketones occur when the body cannot use glucose and must break down fat for energy; if accumulated in the body over time, ketones can lead to coma (Ratner, 1996; Watkins et al., 2003). Type 2 diabetes occurs as a result of insulin resistance. Type 2 diabetes can involve both hyperinsulinemia (early in the disease when the pancreas releases excess insulin to counter the effects of insulin resistance) as well as insulin deficiency (which tends to occur later in the disease process). Fasting hyperglycemia results from increased hepatic glucose production, as insulin-stimulated glucose uptake is compromised. (Watkins et al., 2003).

According to the Canadian Diabetes Association 2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada, diabetes is diagnosed when a fasting plasma glucose level is equal to or higher than 7mmol/L; when a random plasma glucose level (taken at any time of the day) is equal to or higher than 11.1 mmol/L and is accompanied by symptoms of diabetes; and, finally, when a 2-hour postprandial plasma glucose is 11.1 mmol/L or higher in a 75-g glucose-tolerance test (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003).

Type 1 diabetes typically has an early onset, while type 2 diabetes most often affects individuals after the age of 40, although it is increasingly common among younger individuals (Rubin & Peyrot, 2001).

Once individuals are diagnosed with diabetes, they can test their blood glucose levels as often as needed, using a blood glucose meter, in order to obtain feedback that can be used to make behavioural decisions that will influence blood glucose levels to become as close as possible to their individualized target range. Another way to test blood glucose levels is a blood test A1C, which measures glycosylated hemoglobin levels and provides an estimate of average of blood glucose levels over approximately 120 days (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003).

The complications of diabetes include two major categories: macrovascular and microvascular. Macrovascular complications of diabetes are comprised of cardiovascular, cerebrovascular (including stroke, cerebral aneurysm, cerebral arteriosclerosis, and cerebral artery disease), and peripheral vascular disease. Macrovascular complications result in serious consequences for individuals with both type 1 and type 2 diabetes, and are one of the greatest overall cause of morbidity and mortality for individuals diagnosed with type 2 diabetes (Watkins et al., 2003). Microvascular complications of diabetes consist of diabetic peripheral neuropathy, diabetic retinopathy, and diabetic nephropathy, and may lead to foot ulceration, limb loss, sexual dysfunction, blindness and end-stage renal disease (Health Canada, 2002). Some of the complaints associated with diabetes include gastrointestinal neuropathy (symptoms of nausea, vomiting, constipation, and diarrhea), dry skin, impotence, and hypothyroidism (Herman & Greene, 1996; Watkins et al., 2003).

The burden of diabetes outcomes primarily lays on the individual who has to make numerous daily decisions required for diabetes management (Sullivan & Joseph, 1998). Blood glucose levels are influenced by food (carbohydrates raise blood glucose levels), activity (lowers blood glucose levels), medication (lowers blood glucose) and other metabolic factors (such as stress or illness, which may either raise or lower blood glucose levels). Sometimes medications that individuals have to take for other illnesses, such as asthma or arthritis, actually raise blood glucose levels, which presents an additional challenge (Watkins et al., 2003). Clinicians expect individuals diagnosed with diabetes to make significant life changes, such as maintaining balanced diet, exercising regularly, taking medications, and checking glucose levels on a regular basis (Gonder-Frederick, Cox, & Ritterband, 2002) as well as maintaining regular follow-up assessments with a variety of medical professionals (family medicine, diabetes management professionals, ophthalmologists and podiatrists). Some individuals suffering from diabetes describe their implementation and maintenance of necessary behaviour changes as a constant battle (Sullivan & Joseph, 1998).

Several factors may make this battle even harder. Relationships with healthcare providers play an important role in diabetes management. Patient-provider interactions may either foster autonomy and motivation in individuals with diabetes, or may lead to discouragement, resentment and hopelessness which may undermine self-management efforts (Anderson, 1990; Glasgow & Anderson, 1999; Golin, Dimatteo, & Gelberg, 1996). In their review, Golin and colleagues (1996) suggest that active patient participation in making decisions regarding his or her diabetes is crucial for successful adherence to self-care, and may affect self-care in three different ways. An ability to

participate in planning one's diabetes management may have a direct effect on an individual's behavioural efforts, may influence her understanding of the diabetes care plan and a possible fit of the proposed regimen with her existing lifestyle, and, finally, may affect her satisfaction with the treatment.

Persons with diabetes who report feeling understood and supported by their service providers are more likely to achieve behaviour change (Williams, Freedman, & Deci, 1998). Williams and colleagues (1998) conducted a study in which 128 individuals with diabetes were followed for a year. The findings revealed that perceived autonomy support from health care providers significantly predicted lower A1C values over the 12 months ( $\beta = -.013, p < .05$ ). Subsequent analyses demonstrated that individuals who perceived that their health care providers supported their autonomy reported increases in autonomous motivation ( $\beta = .015, p < .05$ ); increases in autonomous motivation were in turn related to increases in perceived competence ( $\beta = 0.31, p < .05$ ). Those who reported higher perceived competence demonstrated significant reductions in their blood glucose levels ( $\beta = -.031, p < .01$ ) as measured by A1C over 12 months (Williams et al., 1998).

In a similar vein of research, a model of the hypothesized relationships between the positive perceptions of the patient-provider relationship, self-reported adherence to diet, exercise, and diabetes management attitudes was tested using structural equation modeling (Maddigan, Majumdar, & Johnson, 2005). The data used for this study was collected as part of a larger study that aimed to improve care for individuals with type 2 diabetes in rural regions of Canada (Majumdar, Guirguis, Toth, Lewanczuk, Lee, & Johnson, 2003). In the final model, positive perception of the patient-provider relationship had a direct impact on adherence to exercise ( $\beta = 0.13, p < .05$ ), diet ( $\beta =$

0.23,  $p < .05$ ), and diabetes management attitudes ( $\beta = 0.33$ ,  $p < .05$ ; Maddigan et al., 2005). The investigators acknowledged, however, that the cross-sectional design of the study limited any inferences of causality in this study (Maddigan et al., 2005).

On the other hand, an observational study demonstrated that directive and controlling behaviour of health care professionals negatively affected individuals' metabolic control (Street, Piziak, Carpentier, Herzog, Hejl, Skinner, & McLellan, 1993). In this investigation, 47 individuals diagnosed with diabetes were assessed for a baseline A1C, attended 3.5 days of diabetes education, returned for a follow-up consultation with a nurse, and came back in 9-12 weeks for a follow-up A1C assessment. The frequency with which nurses made controlling, informative, and person-centered responses was recorded to evaluate nurses' communication styles. Person-centered responses were described as empathic and collaborative while informative responses were aimed at providing information. It was shown that individuals with diabetes had poorer metabolic control after interacting with nurses who demonstrated more controlling and directive communication styles ( $r = 0.39$ ,  $p < .01$ ). Individuals' communication styles were also assessed to determine to which degree individuals would seek information, engage in decision-making behaviours and express negative affect. The nurses' use of person-centered utterances were directly related to whether individuals expressed their emotions ( $r = 0.34$ ,  $p < .01$ ) and engaged in active decision-making ( $r = 0.62$ ,  $p < .01$ ; Street et al., 1993).

Sometimes interactions with service providers can be perceived by individuals with diabetes as not only lacking in support, but even posing a danger to their health. For example, Thorne and Patterson (2001) conducted a grounded-theory study of expert self-

care decision making in type 1 diabetes and interviewed 22 individuals with diabetes on several occasions over 12 months. One participant described her experience of dealing with the health care system in a following way: “I believed in the medical system, stupid me, until they nearly killed me when I had my child” (cited in Thorne & Paterson, 2001, p.87).

Some evidence suggests that often health care professionals have not been particularly attuned to misunderstandings that arise in communicating with their patients, tending to overestimate compliance behaviour and blaming noncompliance on a particular individual’s personality (Anderson & Funnell, 2000; Davis, 1966; Trecroci, 1999). When health care professionals focus on improving compliance of individuals with diabetes, patient-provider interactions become characterized by tension and conflict (Anderson & Funnell, 2000). The problem often lies neither with the patient nor with the health care provider, but with the health care system that is largely oriented to treat acute illness, and is often insensitive to concerns of individuals living with chronic disease (Anderson, 1995; Glasgow, Hayward, Hiss, Marrero, Anderson, Taylor, Friedman, & Vinicor, 2001).

Advocates for collaborative diabetes care have been trying to implement a new “empowerment” paradigm, in which health care professionals have a specific role of helping individuals with diabetes to evaluate their own self-management decisions rather than advising them on what they should do (Anderson, 1995; Anderson, Funnell, & Arnold, 1991). In their recent review, Anderson and Funnell (2005) identified a number of challenges faced in fostering the adoption of this paradigm. They point out that even in these days institutions, such as medical schools, continue to train health care providers to

take an acute-illness approach to health care (e.g., Assal, 1999). Anderson and Funnell (2005) suggest that many health care professionals have internalized the acute-care model and use it instinctively, without any conscious awareness, even when they are trained to use strategies consistent with the empowerment approach.

According to another line of research, standardized care may not always benefit individuals attempting to change their behaviours, as their support needs fluctuate over time and situational context (Campbell, DeVellis, Strecher, Ammerman, DeVellis, & Sandler, 1994; Thorne & Paterson, 2001). For example, in one recent investigation that targeted patients with various health conditions rather than focusing specifically on diabetes adult patients from several family practices were randomly assigned to one of two interventions or to a control group. The interventions were individually computer-tailored nutrition messages, standard, non-tailored nutrition information, and a control condition. Individuals were re-assessed 4 months later. The results showed that the individually tailored intervention resulted in significant decreases in total fat and saturated fat scores compared with those of the control group. No significant differences were observed between the non-tailored intervention group and the control group. In addition, 73% of the participants in the tailored intervention group recalled receiving a message as compared to only 33% of the non-tailored intervention group (Campbell et al., 1994). These findings underline the importance of providing individuals with the best fit of a proposed behavioural plan to their current lifestyle and particular issues they struggle with on a daily basis.

Individuals with diabetes may also benefit from interventions tailored to their interpersonal styles. For example, individuals with a “dismissing attachment”

interpersonal style characterized by low levels of trust and excessive self-reliance tend to have poorer glycemic control (Ciechanowsky, Hirsch, & Katon, 2002). In a different investigation, this particular attachment style was related to significantly lower levels of exercise, diet, foot care, poor adherence to oral hypoglycemic medications and higher rates of smoking (Ciechanowski, Russo, Katon, Von Korff, Ludman, Lin, Simon, & Bush, 2004). These associations were partially mediated through the patient-provider relationship, with the proportion mediated ranging from 0.22 for foot care to 0.07 for smoking. Additionally, fearful attachment style, characterized by fear of rejection, was associated with poor adherence to exercise; this relationship was also mediated through the patient-provider relationship, with the proportion mediated 0.14 (Ciechanowsky et al., 2004).

Ciechanowsky and colleagues (2002) speculate that teaching health care providers to recognize different interpersonal styles and adjust their behaviours to reduce levels of interpersonal threat (e.g., developing a more “businesslike” relationship with someone with a dismissive attachment style) might benefit such individuals and help them achieve better metabolic control. Further research is needed to evaluate this possibility.

Another group of investigators demonstrated that individuals who suddenly become more aware of the threat diabetes poses to their health often opt to leave their physician and search for another who would take their illness more seriously (O'Connor, Crabtree, & Yanoshik, 1997). In this study, adults who participated in a 4-day diabetes care program were classified as positive or negative responders to the program on the basis of their values of A1C collected at 6 and 12 months after the program. Both positive and negative responders were invited to participate in focus groups and depth interviews

regarding the change in their life that they experienced since learning that they have diabetes, the social and psychological impact of having diabetes, and their encounters with the health care system. The themes developed on the basis of the focus group and depth interview transcripts included a discussion of “conversion experiences” (reported by approximately 25% of positive responders) and views of health care providers. A number of participants reported having had a powerful “conversion” experience that made them appreciate the seriousness of diabetes and the importance of making changes. These participants reported that they subsequently sought out new diabetes care programs and left their previous physicians for being too “casual” about the control of diabetes. These participants reportedly became highly motivated to change and were looking for specialists that would feel as strongly about diabetes control as the patients now did. The authors suggest that the previous health care providers possibly failed to identify changes in their patients’ motivation, which left the patients dissatisfied with their services (O’Connor et al., 1997). Clinical implications of this research involve becoming more efficient at providing care to those individuals with diabetes who tend to “slip through the cracks” of the system and at alleviating their suffering.

To summarize, individuals with diabetes have to make significant lifestyle adjustments to control their illness. Support provided by health care professionals to an individual who is going through a process of change is of critical importance. Therefore, it is important to increase our understanding of what psychological barriers, if any, negatively affect individuals’ motivation to manage their illness. This knowledge will help health care professionals become more attuned to the needs of their clients, and provide better quality of care.

A number of normal psychological processes associated with diabetes self-management may negatively impact self-management behaviours. Vallis (2001) described these processes as “psychological traps”. Individuals who experience a psychological trap or barrier that impairs self-management behaviours may react poorly to diabetes interventions, and feel that they are misunderstood by health care professionals. The psychological traps include psychological reactance, learned helplessness, dysfunctional expectations, the abstinence violation effect and the pace of diabetes self-management (Vallis, 2001). This clinical report points to specific directions for future research; for example, Vallis suggested that we need to develop diabetes-specific assessment tools to identify those individuals who struggle with psychological barriers and provide them with a better quality of care (Vallis, 2001).

The current exploratory study was an attempt to develop and validate such a tool. Three psychological barriers investigated in the current study included diabetes-specific psychological reactance, diabetes-specific learned helplessness, and dysfunctional expectations. The concept of dysfunctional expectations was further expanded to include an unrealistic expectation regarding the pace at which behaviour changes and an unrealistic expectation regarding non-adherence (“falling off the wagon”), that is, the abstinence violation effect. The abstinence violation effect means that a lapse, that is a single occurrence of an undesirable behaviour, triggers feelings of guilt, negative thoughts, such as “I’ve blown it”, which in turn lead to engaging in further undesirable behaviours, such as additional lapses.

Although for clarity’s sake, diabetes-specific psychological reactance, learned helplessness and dysfunctional expectations are described in three separate sections of

this chapter, the aim of this exploratory study was to determine whether these three barriers were indeed distinct and non-overlapping constructs. No a priori assumptions were made in this regard.

## II. Psychological Reactance

Psychological reactance is an emotional state where an individual perceives a threat to a specific behavioural freedom (Brehm & Brehm, 1981). According to reactance theory, individuals will react against experienced or perceived attempts to constrain their freedom (freedom of will, thought, feelings or behaviour), and may defiantly and directly engage in the prohibited behaviours. (Brehm, 1966; Dowd, 1993). Reactance is a “person-in-situation” occurrence, where both personality characteristics and a contextual component contribute to the development of reactance (Rohrbaugh, Tennen, Press, & White, 1981; Tracey, Ellickson, & Sherry, 1989). Reactance is related to patient “non-compliance” in a number of studies, including smoking cessation (Graybar, Antonuccio, Boutilier, & Varble, 1989), medication taking (Fogarty & Youngs, 2000), and alcohol prevention messages (Bensley & Wu, 1991). High levels of reactance are also significantly related to the decreased use of task-focused coping styles and increased levels of stress (Palmentera, 1996).

According to a recent qualitative study, individuals with diabetes often report a sense of diminished personal agency over their diabetes management, and feel the need to regain control (Broom & Whittaker, 2004). The researchers conducted unstructured interviews with 119 individuals diagnosed with type 2 diabetes, and asked them to describe their experiences of living with diabetes. They also attended a diabetes support

group and conducted a focus group with health care providers. One of the major themes identified in this study was a theme of living with diabetes as living in a culture of control and surveillance (Broom & Whittaker, 2004). For example, some individuals with diabetes reported that they were treated like children or foolish adults by health care professionals and that therefore they tried to reclaim their adult status by rebelling against medical authority, even though recognizing that they were only “cheating themselves” in the process (Broom & Whittaker, 2004). Many individuals expressed their diminished sense of control by using a parodic positioning of themselves as children, such as describing their behaviours as “naughty” or referring to foods that they were “allowed to eat” (Broom & Whittaker, 2004). A small subset of participants admitted to concealing their “transgressions” from health care professionals by recording false readings or timing measurements when they knew that their blood glucose levels would be lower. Some respondents asserted the authority of actual experience of living with diabetes over the abstract, theoretical experience of health care professionals. Although Broom and Whittaker (2004) did not refer to psychological reactance in their study, many of the abovementioned themes describe a situation, where individuals feel that their sense of personal freedom is threatened and engage in rebellious behaviour to regain control.

To the best of my knowledge, there have been no studies to date directly investigating a relation between situational reactance and diabetes self-care. Reactance has been linked to diabetes in the context of Type A behaviour research, however (Rhodewalt & Marcroft, 1988); Type A behaviour is characterized by excessive achievement striving, time urgency and hostility (Glass, 1977). The researchers found an association between Type A behaviour style and poor glucose control (Rhodewalt &

Marcroft, 1988). Rhodewalt and Comer (1982) discussed these findings in the light of laboratory evidence suggesting that individuals with Type A behaviour style tend to be more reactant than individuals with Type B behaviour style. The researchers interpreted the findings as supportive of a reactance-Type A model of medical compliance (Rhodewalt & Marcroft, 1988). However, Rhodewalt and Comer (1982) did not include a measure of reactance to directly assess the association between reactance and diabetes.

While several scales have been developed to measure reactance, including the Therapeutic Reactance Scale (TRS; Dowd, Milne & Wise, 1991), the Hong Psychological Reactance Scale (HPRS; Hong & Faedda, 1996; Hong & Page, 1989), and the Questionnaire for the Measurement of Psychological Reactance (QMPR; Merz, 1983), they have all been criticized for numerous methodological shortcomings (Buboltz, Thomas, & Donnell, 2002; Donnell, Thomas, & Buboltz, 2001; Thomas, Donnell, & Buboltz, 2001). The critics have found these measures to be not able to adequately capture the multi-dimensional nature of the construct (Buboltz et al., 2002; Donnell et al., 2001; Thomas et al., 2001). Finally, the existing scales are devised to assess the general (global) trait of reactance, while event-specific scales tend to have larger power when it comes to predicting specific behaviours (Bandura, 1997; Nicassio, Wallston, Callahan, Herbert, & Pincus, 1985). Some individuals may experience a state of psychological reactance in certain situations and not exhibit a personality trait of reactance.

The current study was designed to explore these possibilities and potentially develop a diabetes-specific reactance scale. The 11-item Hong Psychological Reactance Scale (HPRS; Hong & Faedda, 1996; Hong & Page, 1989) that assesses general reactance was selected to examine the relation between general reactance and diabetes-specific

reactance, provided that diabetes-specific psychological reactance would emerge as a separate construct. The HPRS is one of the more recent scales attempting to measure psychological reactance. Hong & Faedda (1996) refined this measure in 1996 by deleting 3 unclearly defined items. It has acceptable internal consistency (Cronbach's alpha: .77) and acceptable 6-week test-retest reliability (.73; Hong & Faedda, 1996). In addition, it has been validated with both university student and non-university samples. These factors made the HPRS an optimal choice of the reactance scales for the purpose of this study.

### III. Learned Helplessness

Learned helplessness is the state of inaction brought about by repeated failures of behavioural effort to produce an outcome and an acquired expectation that all behaviour outcomes are beyond an individual's control (Peterson, 1982). A reformulated learned helplessness theory posits three dimensions of attributions, distinguishing between internal and external attributions, global and situation-specific helplessness, and stable and unstable attributions (Abramson, Seligman, & Teasdale, 1978). Thus, an individual may view an outcome as attributable to her own personal factors or to the external world variables, as occurring across a range of situations or limited to a single situation, and as attributable to stable or temporary factors. Numerous studies have investigated relationships between learned helplessness and depression (Hollon & Garber, 1980; Klein, Fencil-Morse, & Seligman, 1976), coronary artery disease-prone personality (Glass, 1977), stress (Garber, Miller, & Abramson, 1980), and pain and disability (Nicassio, Schuman, Radojevic, & Weisman, 1999; Stein, Wallston, & Nicassio, 1988).

Regarding diabetes, in one study researchers measured learned helplessness

assessed by the Children's Attributional Style Questionnaire in 50 children with diabetes, and found that it was associated with depression ( $r = .44$ ,  $p < .01$ ), but not with regimen adherence (Kuttner, Delamater, & Santiago, 1990). To the best of my knowledge, however, there have been no published investigations regarding the relationship between metabolic control in diabetes and learned helplessness in adults.

In addition to generic trait-measuring scales of learned helplessness such as the Attributional Style Questionnaire (ASQ; Peterson, Semmel, Von Baeyer, Abramson, Metalsky, & Seligman, 1982), Hopelessness Scale (HS; Beck, Weissman, Lester, & Trexler, 1974) and the Learned Helplessness Scale (LHS; Quinless & McDermott Nelson, 1988), two event-specific scales have been developed that reliably assess learned helplessness in individuals suffering from arthritis (Arthritis Helplessness Index - AHI; Nicassio et al., 1985) and from alcohol dependence (Alcohol Helplessness Scale – AHS; Sitharthan, Hough, Sitharthan, & Kavanagh, 2001).

The goal of the present investigation was to develop the third disease-specific measure in order to assess learned helplessness in individuals diagnosed with diabetes. As an event-specific measure, this scale was expected to have a greater predictive power than trait-measuring scales (Bandura, 1997). It was hoped that this measure would help clinicians identify individuals whose self-management attempts have been undermined by the struggle with the psychological barrier of learned helplessness.

For the present investigation, the ASQ (Peterson et al., 1982) was selected to examine the relation between diabetes-specific learned helplessness and general learned helplessness, provided that diabetes-specific learned helplessness would emerge as a distinct construct in this study. Test-retest reliability and concurrent and criterion validity

of the ASQ have been demonstrated in several investigations (see Peterson & Seligman, 1984; Peterson & Seligman, 1987; Tennen & Herzberger, 1986). To date, this is the most thoroughly evaluated and used measure of learned helplessness.

#### IV. Dysfunctional Expectations

Diabetes self-management is challenging, in part because it involves multiple behaviours, such as calculating food intake, exercising, self-testing blood glucose levels, taking medication and/or insulin according to a specific schedule, and seeing health care professionals on a regular basis (e.g., for regular foot and eye examinations). Individuals diagnosed with diabetes are expected to implement a number of changes in their daily routines in order to manage their diabetes. This can lead to expectations about behaviour that could be problematic. For instance, one of the common responses provided by individuals with diabetes to the question “Now that you’ve gotten your blood glucose under control, how long do you expect it to last?” is “forever” (Vallis, 2001). Yet given that behaviour is highly influenced by a host of internal and external variables and that there are numerous biological factors that can influence blood glucose, such expectations are unlikely to be fulfilled. Hence, if individuals with diabetes rigidly hold the expectation that their blood glucose levels should not fluctuate, it could result in disappointment and increased stress.

Therefore, often individuals with diabetes expect that they will be able to attain and maintain the ideal level of self-management at all times. However, since human behaviour is unstable and tends to fluctuate over time, such expectations can be unrealistic and may set up the individual for failure. That is, in response to failures to

maintain expected levels of self-care the individual could become discouraged or dysphoric. These expectations include expecting that behaviour will be stable over time, that the individual will be able to make multiple changes over a short period of time, viewing self-management behaviours as all or nothing ("you either do it or you don't"), and failing to recognize a tendency for self-care to slip when stressed, sad, fatigued, or in a tempting situation (Vallis, 2001).

While the danger of dichotomous, all-or-nothing thinking regarding behaviour changes has been addressed in the literature (e.g., Vallis, 2001), no published studies have been conducted so far to examine the relations between unrealistic expectations of individuals in a process of change and health-related outcomes in any area of health psychology. Provided that dysfunctional expectations would emerge as a distinct construct in this study, the proposed scale would become the first measure to tap into patients' unrealistic attitudes.

## V. Dissertation Goals and Outline

This work aimed to develop and evaluate a diabetes-specific scale assessing possible psychological barriers to diabetes self-care; specifically, the goal of this dissertation was to explore diabetes-specific psychological reactance, learned helplessness, and dysfunctional expectations. The items were developed using several methods, beginning with focus groups. The psychometric properties of the scale were evaluated, and the relations between the psychological barriers in question and the indices of weight and metabolic control were examined. This scale is referred to as the Psychological Barriers Inventory or PBI for short.

The goal of this exploratory work was to evaluate the following tentative hypotheses:

- a) There would be three distinct, but not unnecessarily orthogonal, subscales of items, that is, Psychological Reactance, Learned Helplessness, and Dysfunctional Expectations, developed on the basis of the information provided by focus group participants.
- b) There would be individual differences in responses to items in the diabetes-specific measure.
- c) The subscales would demonstrate acceptable internal reliability.
- d) The subscales would demonstrate acceptable test-retest reliability.
- e) Convergent validity of the subscale of Learned Helplessness with the Attributional Style Questionnaire would be acceptable.
- f) Convergent validity of the subscale of Psychological Reactance with the Hong Psychological Reactance Scale would be acceptable.
- g) There would be no significant correlations between the subscales of the Psychological Barriers Inventory and the social desirability measure, Balanced Inventory of Desirable Responding.
- h) The relations of the resulting subscales with the indices of weights and metabolic control would be examined.

## **CHAPTER 2**

### **STUDY 1: ITEM GENERATION AND REDUCTION**

#### **I. Item Generation**

##### **A. Overview**

Items for the Psychological Barriers Inventory were initially generated using a focus group method. This method is based on the assumption that the subjective, reportable experiences of members of the target population are valid sources of data on the phenomenon of interest: in this case living with diabetes. In a typical focus group, an individual is invited to express her own views and hears the opinions of other members of the group (Krueger & Casey, 2000). As such, as the group members have the opportunity to react to each other's responses, they might share opinions that would not have been voiced in an individual interview (Stewart & Shamdasani, 1990). Focus groups provide a rich amount of in-depth information in a cost-effective manner.

##### **B. Methods**

###### **1. Participants**

Nineteen adults (aged 18 years and older) diagnosed with diabetes mellitus participated in this study. All participants were receiving treatment at the Diabetes Management Center, QEII Health Sciences Center (Halifax, Nova Scotia, Canada) at the time of recruitment and participation. To be eligible for the study, participants had to be fluent in English, to be diagnosed with type I or type 2 diabetes for more than one year,

and to give their permission for the focus group session to be audio-recorded for transcription purposes. Women diagnosed with gestational diabetes were excluded from the study. Participants were recruited via invitation letters distributed by the staff members at the Diabetes Management Center during regular clinical care (see Appendix A). This protocol received ethical approval by the Research Ethics Board of the Capital District Health Authority.

## 2. Materials and Procedure

Each focus group was 90 minutes long, and was tape-recorded. All participants supplied informed consent and were then asked to complete a brief demographic questionnaire (see Appendix B), assessing age, gender, marital status, a number of individuals living in the same household, as well as type and duration of diabetes type.

A focus group facilitator (the principal investigator, KD) used a semi-structured script to lead the discussion (see Appendix C). At the outset, participants were asked to discuss their experiences in managing their diabetes on a daily basis. Nine probes pertaining to experiences of psychological reactance, learned helplessness, and dysfunctional expectations were asked in flexible order, if needed (i.e., if the issue referenced in the probe had not been spontaneously discussed, the facilitator introduced it). Input from any participant was followed by an inquiry as to whether anyone else in the group had a similar experience. At the end of the focus group, all participants were debriefed and thanked.

The tapes were transcribed by an undergraduate research assistant, and the transcripts were then proof-read by the principal investigator.

### 3. Data Analysis

The information from the demographic questionnaire was summarized using descriptive statistics.

In order to analyze the data generated from the focus groups, the principal investigator defined three categories of interest; that is, psychological reactance, learned helplessness, and dysfunctional expectations. Psychological reactance was defined as the tendency to experience frustration and anger and to act in opposition to advice given when the individual perceives a threat to personal control (Brehm & Brehm, 1981). Learned helplessness was defined as the state of dysphoria and inaction brought about by repeated failures of effort to produce outcome (Peterson, 1982). Finally, dysfunctional expectations were defined as rigid, inflexible expectations concerning behaviour, outcome, affect or interpersonal interactions, such as expecting an unrealistically fast pace of change, expecting behaviour to be maintained constantly once a desired behaviour is achieved, viewing self-management behaviours as all or nothing, or failing to recognize the tendency for self-care to slip when stressed, sad, fatigued, or in a tempting situation (Vallis, 2001).

The principal investigator reviewed each tape, and counted the number of participants who made statements clearly representative of learned helplessness, psychological reactance, or dysfunctional expectations.

Two raters (a research assistant and the principal investigator) independently conducted a content analysis of the transcripts to generate potential items for the Psychological Barriers Inventory (PBI) scale. The following guidelines were used for item generation:

- 1) Each separate transcribed statement made by a participant was considered a potential item.
- 2) Each potential item could not include “either – or” and/or “neither – nor” propositions in order to limit double-barrelled items.
- 3) Potential items pertaining to managing other chronic illnesses besides diabetes (e.g., arthritis) were excluded.
- 4) Personal details were excluded from each potential item.

Second, the raters compared the resulting potential items using the following guidelines:

- 1) If both raters recorded the same potential item using slightly different words, this item was reviewed. The principal investigator made the final decision on which recorded item better described the original statement.
- 2) If only one rater recorded a potential item based on a statement in the transcript, the transcript was consulted to determine if the original statement was there. If both raters agreed that the statement was present in the transcript, the item was included. If the statement could not be confirmed as present in the transcript it was excluded.

The principal investigator pre-defined 11 categories in order to organize the resulting items. Psychological reactance was divided into two categories in order to assess the emotional state associated with psychological reactance (i.e., anger and frustration) and the behavioural tendency to act (i.e., in the opposition to the advice given), respectively. Learned helplessness was divided into two categories using a similar rationale, including 1) the emotional state associated with learned helplessness (i.e.,

dysphoria) and 2) the behavioural tendency to act (i.e., inaction). Each resulting category as well as the category of dysfunctional expectations were further subdivided into categories where items would be coded as positive (higher scores representing higher levels of the psychological barriers in question) or reversed (higher scores referring to lower levels of the psychological barriers in question). Finally, the category “Other” was designed to incorporate all the items that would not fit into the 10 categories described above.

Thus, the categories included:

- 1) psychological reactance - emotion;
- 2) psychological reactance - emotion reversed (the opposite of psychological reactance);
- 3) psychological reactance - behaviour;
- 4) psychological reactance - behaviour reversed (the opposite of psychological reactance);
- 5) learned helplessness - emotion;
- 6) learned helplessness - emotion reversed (the opposite of learned helplessness);
- 7) learned helplessness - behaviour;
- 8) learned helplessness - behaviour reversed (the opposite of learned helplessness);
- 9) dysfunctional expectations;
- 10) dysfunctional expectations reversed (the opposite of dysfunctional expectations).
- 11) other.

After categorizing the statements, the two raters compared each statement. The inter-rater agreement was calculated on all the statements as a ratio of the agreed upon statements to the overall number of statements.

The principal investigator then conducted a redundancy analysis in order to eliminate statements that were similar to each other in wording or conceptually. All the items that were categorized as Other were also eliminated. The following statements are some examples of the items that were categorized as Other:

a) “I would feel more comfortable if I saw the same health care professional every time.”, and

b) “Sometimes it feels like the media is limiting my choices by focusing on severe complications and not showing the entire picture of what it is like to live with diabetes.”

The remaining items were listed in random order. Two raters, the principal investigator and her supervisor, independently assigned the items to the categories of Psychological Reactance, Learned Helplessness, and Dysfunctional Expectations (see the above definitions). The inter-rater agreement was calculated on all the statements as a ratio of agreed upon statements to an overall number of statements. The items that were ambiguous (i.e., raters assigned them to different categories) were dropped from the final version.

### C. Results

Nineteen participants took part in four focus groups, with four to seven participants per group. Seven men and twelve women participated in the groups. The average age of the participants was 48.05 years (SD = 14.34 years, range = 25 - 84). All participants were Caucasian. Nine participants (47.4%) were married, six (31.6%) were single, 2 (10.5%) were divorced, one (5.3%) was separated, and one (5.3%) was widowed.

Fourteen participants (74%) were diagnosed with type 2 diabetes, and five participants (26%) were diagnosed with type 1. While only 10% of individuals with diabetes are diagnosed with type 1, we intentionally recruited a larger number of individuals with type 1 diabetes, to ensure that any experiences specific to type 1 diabetes were represented. On average, participants had been diagnosed with diabetes for 7.79 years ( $SD = 10.18$  years, range = 5 - 42). Participants diagnosed with type 1 diabetes had been diagnosed for 19.80 years on average ( $SD = 13.51$ , range = 5 - 42). Participants diagnosed with type 2 diabetes had been diagnosed for 3.50 years on average ( $SD = 3.48$ , range = 1 - 12).

Ten participants (53%) made one or more statements representative of psychological reactance, 7 participants (37%) made one or more statements representative of learned helplessness, and 11 participants (58%) made one or more statements representative of dysfunctional expectations.

The two raters (the research assistant and the principal investigator) independently recorded 841 statements as potential items in the 11 categories listed above. The inter-rater agreement was calculated as a ratio of statements put in the same category by both raters to an overall number of statements. The inter-rater agreement for this categorization was unacceptably low (69.5%).

It was hypothesized that an overly large number of very narrow categories contributed to the low inter-rater agreement. As these narrowly defined categories were unnecessary for the purpose of the study, it was agreed to reduce the number of categories to the number of subscales anticipated for the scale under development. After conducting the redundancy analysis, the number of items was reduced to 148. The

number of items was further reduced to 136 after deleting vague and ambiguous items. The remaining items were recorded in the 3 broader categories listed above (Psychological reactance, Learned helplessness, and Dysfunctional expectations). The second inter-rater agreement (between the principal investigator and her supervisor) was 93%, which was deemed acceptable.

## II. Item reduction

### A. Overview

To reduce the number of items to a reasonable number, experts in a variety of professional fields were invited to help select and revise the most appropriate items for the subscales of the Psychological Barriers Inventory.

### B. Methods

#### 1. Participants

To reduce the set of 136 items, nine experts provided numerical rankings, comments and possible revisions of these items. Of these, five experts were studying or practicing in the field of health psychology, one expert was practicing in the field of eating disorders, one expert was studying in the field of child clinical psychology, and the remaining two experts were staff members (specialties – nursing and nutrition) at the Diabetes Management Center, the QEII Health Sciences Center.

In addition, five more experts provided only written comments to help revise the items. Out of these, one expert was practicing in the field of experimental psychology, one expert was practicing in the field of endocrinology, and the remaining three experts were students studying or practicing in the field of adult clinical psychology.

## 2. Materials and procedure

Experts were instructed to rate each item's representativeness of the psychological state in question (psychological reactance, learned helplessness, dysfunctional expectations) on a Likert-type scale ranging from 1 ("not at all representative") to 7 ("extremely representative"). In addition, experts were invited to revise each item in response to the following prompts adapted from Streiner & Norman (2003):

- 1) Does the instrument sample all the domains relevant to the construct of interest (content validity)?
- 2) Is the item ambiguous, unclear, or not comprehensive?
- 3) Does the item ask two different questions (double-barreled questioning), uses terms that a lay audience may not be familiar with (jargon)
- 4) Is the item above grade 8 reading level?
- 5) Is the item redundant?
- 6) Does it appear to measure what it proposes to measure (face validity)?
- 7) How likely is this item to elicit an honest response (value-laden words)?
- 8) May this item potentially help with specific recommendations to health care professionals (clinically relevant)?

Each item's mean representativeness rating was calculated on the basis of numerical rankings provided by 9 experts.

The items were revised to incorporate the written comments of 14 experts. All items that were rated as problematic or redundant by two or more experts were revised or rejected.

### C. Results

Items' mean representativeness ratings ranged from 3.89 to 5.9. The analysis revealed, however, that numerical rankings of experts did not always correspond with their written comments. This lack of correspondence was observed in the questionnaires completed by 7 out of 9 experts. For example, one of the experts rated the representativeness of the item "If a relative said "you can't eat that cake because of your diabetes", I would be upset that they are limiting my freedom" as 6. In her written comments, this expert indicated that she viewed this item as redundant and preferred another item (i.e. "If someone questioned my diabetes management by saying, "should you be eating this piece of cake?" I would feel angry and sometimes eat a larger piece than I originally intended"). However, this expert rated this second item as 4.

The inter-rater agreement was calculated for each item, as a ratio of rankings with the same number to an overall number of rankings for this item. For example, if seven raters provided a ranking of 5 for a particular item, and the remaining two experts provided rankings of 3 and 7 respectively, the ratio would be calculated as 7 to 9 (i.e., 77%). The mean percent of the inter-rater agreement was 44% for the ranked items (range = 11.1% - 100%). Five items met minimal criterion for acceptable agreement

(70% or higher). The items that had higher mean ratings than other items were not strongly endorsed by the majority of the experts.

Considering the low inter-rater agreement regarding representativeness of the items to the constructs for most of the items and the fact that it is difficult to provide clearly differentiating numerical rankings for such a large number of similarly phrased items, it was decided that the representativeness rankings were unreliable and therefore invalid, and would not be used to revise items. However, the written comments of the fourteen experts were used to revise items. The items that were deemed as problematic and hard to revise by at least 3 experts were deleted. The remaining list consisted of 70 items (see Table 1).

These items included:

- 1) 30 items assessing diabetes-specific psychological reactance, including 16 items assessing reactions to perceived behaviour of health care professionals, 12 items assessing reactions to perceived behaviour of family and friends, and 2 items assessing reactions to perceived behaviour of others;
- 2) 18 items assessing diabetes-specific learned helplessness,
- 3) and, 22 items assessing diabetes-specific dysfunctional expectations.

Table 1

*A preliminary set of items to comprise the Psychological Barriers Inventory (PBI), Study 1*

<b>Subscale</b>	<b>Psychological Reactance</b>
Item # 1	When my family or friends encourage me to follow my diabetes care plan better, I feel motivated to work hard at it.
Item # 2	In managing my diabetes, it feels like health care workers are trying to take away my freedom.
Item # 3	If a health care worker tells me what to do to manage my diabetes, I say “yes”, but then go home and end up doing the opposite.
Item # 4	I am fed up with family or friends telling me what I have to do to manage my diabetes.
Item # 5	In managing my diabetes, it feels like family or friends are trying to take away my freedom.
Item # 6	I get mad if health care workers tell me they need to see my blood sugar record book.
Item # 7	If my family or friends questioned my food choices because of my diabetes, I would think, “why am I eating this? I don’t even want it!”
Item # 8	When health care workers encourage me to follow my diabetes care plan better, I feel motivated to work hard at it.
Item # 9	If I felt that health care workers were taking control over my diabetes care, it would stop me from trying to manage my diabetes.
Item # 10	Hearing the same advice from different people about how I should manage my diabetes irritates me because it feels like a broken record that keeps spinning and spinning.
Item # 11	I get frustrated if a diabetes care worker tells me something like “You should exercise at least three times a week”, because they do not know what it is like to live with diabetes.
Item # 12	I get frustrated if my family or friends tell me something like “you should exercise at least three times a week” because they do not know what it is like to live with diabetes.
Item # 13	I feel that I am keeping my freedom when I eat something that my family and friends tell me I cannot have because of my diabetes.
Item # 14	If a health care worker tells me something like “You should exercise regularly in order to manage your diabetes”, I think, “Oh no, I don’t!”
Item # 15	If a health care worker told me not to eat any sweets, for example, I would not eat any sweets.
Item # 16	In managing my diabetes, I resent that my family or friends seem to be telling me that they know better than I about what is going to work for me.
Item # 17	If my family or friends told me not to eat any sweets, for example, I would not eat any sweets.
Item # 18	I would feel angry if my family members or friends asked me “why don’t you follow your diabetes care plan better?”

Table 1 (Continued)

*A preliminary set of items to comprise the Psychological Barriers Inventory (PBI), Study 1*

<b>Subscale</b>	<b>Psychological Reactance</b>
Item # 19	I get frustrated when health care workers remind me of things I should be doing to manage my diabetes, even though I know they are correct.
Item # 20	If a family member or friend tells me something like "You should exercise regularly in order to manage your diabetes", I think, "Oh no, I don't! "
Item # 21	When my family or friends tell me what I should or should not do because of my diabetes, it feels like I have one too many nagging parents.
Item # 22	I am fed up with health care workers telling me what I have to do to manage my diabetes.
Item # 23	If someone asked me something like "should you be eating that piece of cake?", I would eat the cake just to show them that I can eat what I want.
Item # 24	In managing my diabetes, I resent that health care workers seem to be telling me that they know better than I about what is going to work for me.
Item # 25	When dealing with diabetes health care workers, I always end up thinking: "if I want to have something like high-sugar treats every day, then I will!"
Item # 26	I would feel angry if a health care worker asked me "why don't you follow your diabetes care plan better?"
Item # 27	I feel that I am keeping my freedom when I eat something that my health care workers tell me I cannot have because of my diabetes.
Item # 28	If I felt that family or friends were taking control over my diabetes care, it would stop me from trying to manage my diabetes.
Item # 29	I get angry when health care workers tell me how to follow my diabetes care plan, for example, have breakfast, because I feel it limits my choices, for example, a choice of sleeping in.
Item # 30	I get mad if health care workers tell me they need to see completed food records.
<b>Subscale</b>	<b>Learned Helplessness</b>
Item # 31	I am afraid that I will get diabetes complications, no matter what I do to manage it.
Item # 32	I feel that I have no control over what diabetes is doing to me.
Item # 33	I feel that there is no part of my life that my diabetes does not touch, and I get overwhelmed.
Item # 34	I do not get down very easily when thinking about my diabetes care.
Item # 35	I feel helpless when I try to control my blood sugar levels, since nothing seems to work.
Item # 36	When people suggest that my life will be shortened because of my diabetes, I want to give up because I believe them.

Table 1 (Continued)

*A preliminary set of items to comprise the Psychological Barriers Inventory (PBI), Study 1*

<b>Subscale</b>	<b>Learned Helplessness</b>
Item # 37	In managing my diabetes, I feel that somewhere along the line I've lost the happiness I once had.
Item # 38	In managing my diabetes, often it seems like no matter what I do it does not work.
Item # 39	I eat what I want to eat because when it is my time to die, I will die.
Item # 40	I often feel that I am not able to exercise self-control to follow my diabetes care plan.
Item # 41	When trying to follow my diabetes care plan, my diabetes feels like a train going 100 miles per hour, and I am out there on the tracks trying to stop it.
Item # 42	I often feel that diabetes is overwhelming, and I want to give up managing it.
Item # 43	I often feel that diabetes is ruining my life, so I might as well write off the rest of it.
Item # 44	When trying to control my blood sugar levels, I often feel like giving up because I do not know what I am doing wrong.
Item # 45	I often feel like I just do not care about managing my diabetes anymore.
Item # 46	I feel depressed because I do not know what I am doing wrong in trying to control my blood sugar levels.
Item # 47	It is a matter of pure luck if my blood sugar levels are under control.
Item # 48	When I try hard to control my blood sugar levels, and it does not seem to make any difference, I feel like giving up on my diabetes care plan.
<b>Subscale</b>	<b>Dysfunctional Expectations</b>
Item # 49	When it comes to following my diabetes care plan, I tend to be an all-or-nothing type of person.
Item # 50	I expect that my blood glucose levels will be about the same if I do the same thing every day.
Item # 51	In managing my diabetes, I get frustrated because I cannot find THE answer to what will control my blood sugars.
Item # 52	I get fed up with myself because after following my diabetes care plan for a while, I just fall "off the wagon", that is, stop exercising, self-testing and making sensible food choices.
Item # 53	It does not bother me that I do not always know what affects my blood sugar levels.
Item # 54	In managing my diabetes, when I see a treat, for example, a plate of nachos, I don't see it as forbidden food.

Table 1 (Continued)

*A preliminary set of items to comprise the Psychological Barriers Inventory (PBI), Study 1*

<b>Subscale</b>	<b>Dysfunctional Expectations</b>
Item # 55	When I follow my diabetes care plan and don't get immediate results, I feel that I might as well do whatever I want.
Item # 56	I tend to blame myself for difficulties I have in following my diabetes care plan even if other things beyond my control are involved.
Item # 57	I accept that it is more difficult to follow my diabetes care plan when I am feeling sad.
Item # 58	It bothers me that health care workers are not able to guarantee how to prevent complications of diabetes.
Item # 59	Even when my blood sugar levels are just above normal limits, I get fed up and ask myself: "What did I do wrong?"
Item # 60	In following my diabetes care plan, although I sometimes "slide back" or "slip up", I always keep going forward.
Item # 61	In managing my diabetes, I get mad at myself if I ever eat even a little more than I should, for example, for comfort or fun.
Item # 62	In following my diabetes care plan, I expect too much out of myself.
Item # 63	When I am feeling tired, my diabetes management may not be as good as usual, but I go back to good self-care after a good night's sleep.
Item # 64	In following my diabetes care plan, if I eat something that I should not eat, I hear a voice in the back of my mind saying "you stupid fool, there go the last three days of trying to be good!"
Item # 65	When I worry about diabetes complications, I tend to think to myself: "I will get a good night's sleep, and tackle it again tomorrow".
Item # 66	I would not get frustrated with high blood sugar readings if I only knew what I did wrong.
Item # 67	In managing my diabetes, I get mad at myself if I ever skip self-testing, even if only for a day.
Item # 68	In managing my diabetes, if I occasionally do something I feel I should not, like eat a small piece of cheesecake, I feel angry and criticize myself.
Item # 69	When I finally am able to get my blood sugar levels under control, I expect it to last forever.
Item # 70	I often think I am never supposed to have certain foods.

### **CHAPTER 3**

#### **STUDY 2: ITEM SELECTION AND VALIDATION**

##### **I. Methods**

###### **A. Participants**

169 adults (aged 19 years and older) diagnosed with diabetes mellitus participated in this study. Multiple methods for participant recruitment were utilized to maximize the diversity of the sample. These methods included:

- an advertisement was placed in a local newspaper (see Appendix D for the text of the advertisement).
- posters were placed in 36 pharmacies located in the Halifax Region of Nova Scotia (see Appendix E) as well as at the Diabetes Management Center, the Endocrinology clinic at the QEII, the Cobequid Multi-Service Center, and at the Dartmouth General Hospital's Diabetes Education Program (see Appendix F.).
- The staff members at the Diabetes Management Center were asked to offer invitation letters and permission to be contacted forms to their patients (see Appendix G.).
- Four public lectures were given by both the principal investigator (K. D.) and her supervisor, Dr. Michael Vallis, where individuals with diabetes were informed about the study.

- Finally, the principal investigator received access to a database that contained the names of individuals with diabetes who had participated in previous psychological studies and had agreed to be contacted by investigators in the future.

To be eligible for this study, participants had to be fluent in English, to be diagnosed with type 1 or 2 diabetes for more than a year, to agree to provide permission for investigators to obtain their latest measure of blood sugar control (A1C) from their chart or via contacting their GP, and to be able to sign an informed consent form. Those participants who had difficulties reading were not excluded from the study; however, they had to be able to sign an informed consent form after it was read to them. The principal investigator read the questionnaires to two participants that reported that they could not read them by themselves. These participants did not specify whether they were illiterate or visually impaired. Participants received \$15 as compensation to defray transportation and childcare costs. The protocol for this study was approved by the CDHA Research Ethics Board.

## B. Materials and Procedure

### 1. Procedure

Upon arrival, the participants read and signed an informed consent form and then signed a written permission to obtain the most recent measure of the mean glycosylated hemoglobin levels (A1C) from their medical records. Those participants that had been seen at the Diabetes Management Centre, Endocrinology Clinic at the QEII or at the

Cobequid Multi-Service Center were asked to check off the appropriate medical setting on a form provided to them (see Appendix H). Those participants who had not been followed by the Diabetes Management Centre, Endocrinology Clinic at the QEII or the Cobequid Multi-Service Center, but whose diabetes was managed by their GPs were asked to provide their physician's names and addresses and give a written permission to contact them (see Appendix I). A letter requesting the information on a participant's glycemic control and the information regarding at what laboratory a participant's glycemic control was assessed was subsequently sent to the identified GPs (see Appendix J.) The participants were assured that this information would remain confidential, and that their health care providers would not be informed of their answers on self-report measures.

Each participant was asked to complete a questionnaire package containing the self-report measures administered in a counter-balanced order. The principal investigator looked through the questionnaires upon completion and queried missing items to ascertain whether participants did not wish to answer a particular question or simply forgot to answer it. All the participants chose to answer missing answers, which ensured that there was no missing data in this study.

The participants' height and weight were measured with a scale available in the QEII Diabetes Management Centre (Health-O-Meter 402KL).

## 2. Demographic characteristics questionnaire (see Appendix K).

This measure was developed by the investigator to gather demographic information including participants' age, gender, type and duration of diabetes, marital status,

ethnicity, years of education, occupational status, postal code, and the number of persons in their household.

### 3. Psychological Barriers Inventory, Preliminary

This 70-item measure was composed of 3 subscales, including Psychological Reactance, Helplessness, and Dysfunctional Expectations. Questions from all subscales were randomly ordered into the scale so that the participants would not be inadvertently biased in their responding and would not respond to potential demand characteristics. Participants rated the extent to which they agreed with each item on a 7-point Likert-type scale ranging from 7 “Completely Agree” to 1 (“Completely Disagree”). For the purpose of the current study, each participant had an option of rating each item as 0 (“Don’t understand”). The purpose of having this option was to evaluate the comprehensibility of the items. The final version of the PBI with a reduced number of items did not include this option.

Before any analyses, all reverse-coded items were inverted so that for the PBI higher scores represented higher reported levels of psychological reactance, learned helplessness, or dysfunctional expectations.

### 4. The 11-item Hong Psychological Reactance Scale (see Appendix L).

The Hong Psychological Reactance Scale (HPRS; Hong & Faedda, 1996; Hong & Page, 1989) is an 11-item self-report measure of trait psychological reactance. This is a revised version (by the authors of the scale) of the earlier 14-item Hong Psychological Reactance Scale. It has a four-factor structure, including

- Emotional Response Toward Restricted Choice, which assesses a person's desire to make independent choices without influence or intrusion by others (3 items)
- Reactance to Compliance, which assesses reactance toward complying with other people's wishes and requests (3 items)
- Resisting Influence from Others, which assesses a reactance toward others that attempt to influence one's behaviour (3 items)
- Reactance Toward Advice and Recommendations, which assesses reactance toward people that attempt to impose their advice on the person (2 items)

Each item is rated on a 5-point Likert-type scale ranging from 1 (disagree completely) to 5 (agree completely). It has been shown to have acceptable internal consistency (Cronbach's alpha: .77; Hong & Faedda, 1996). The acceptable 6-week test-retest reliability (.73) was obtained for the 11-item version (Hong & Faedda, 1996). In addition, Hong and Page claim that, as the 11-item HPRS yielded almost perfect correlations with the 14-item previous version of the scale, the 2-week test-retest reliability (.89) from the previous study that evaluated the 14-item HPRS is valid for the 11-items HPRS as well (Hong & Page, 1989).

For the HPRS, the scale is scored in its entirety, but the authors of the HPRS suggest that examining the 4 factors separately might be more appropriate (Hong & Faedda, 1996). Higher scores represented higher levels of psychological reactance (Hong & Faedda, 1996).

### 5. The Attributional Style Questionnaire

The Attributional Style Questionnaire (ASQ; Peterson et al., 1982) is a measure used to determine individuals' explanatory style. As the ASQ is copyrighted, permission to use it for the purpose of this study was obtained from Dr. Seligman; however, permission to include the ASQ as an appendix in this thesis was denied.

The ASQ involves participants rating six positive and six negative hypothetical events about themselves on the following attributional dimensions using a 7-point scale: a) internal-external; b) global-specific, and c) stable-unstable. The measure accesses Composite Negative Attributional Style, Composite Positive Attributional Style, and Composite Positive minus Composite Negative (CPCN). It also provides a number of the individual dimension measures, including Internal Negative, Stable Negative, Global Negative, Internal Positive, Stable Positive, Global Positive, Hopelessness, and Hopefulness. For the ASQ, each of the 36 items could take on a value from 1 to 7.

Several investigations demonstrated test-retest reliability and concurrent and criterion validity of the ASQ (cf. Peterson & Seligman, 1984; Peterson & Seligman, 1987; Tennen & Herzberger, 1986). The internal consistency of the ASQ scales is modest. Peterson et al. (1982) reported the Cronbach's alpha ranging from .44 to .69 for the scales, and other investigations have resulted in comparable results (cf. Tennen & Herzberger, 1986). Tennen and Herzberger (1986) caution that the low internal consistency of the ASQ scales may result in lower correlations with other theory-relevant measures.

The wording in this measure was adapted slightly for the current study, as the majority of the participants were retired or full-time employed rather than students. For example, the item "You apply for a position that you want very badly (e.g., important job,

graduate school admission, etc.) and you get it” was reworded as “You apply for a position that you want very badly (e.g., important job, committee membership, etc.) and you get it.”

#### 6. The Balanced Inventory of Desirable Responding (see Appendix M).

The BIDR (BIDR-6; Paulhus, 1991) is a 40-item measure assessing an individual's need for approval as expressed in responding to questions in a socially desirable manner. It consists of two relatively independent subscales, Self-Deceptive Enhancement (SDE) and Impression Management (IM). The SDE subscale measures the tendency to give an honest but exaggerated self-description. The IM subscale assesses the tendency to provide inflated self-descriptions to an audience. For the BIDR, each of the 40 items could take on a value from 0 to 1, and the scale is intended to produce two primary subscales. Higher values would indicate higher levels of Self-Deceptive Enhancement and Impression Management.

The BIDR has been demonstrated to have high internal consistency as a measure of desirable responding (0.83 – 0.85). Alpha coefficients ranged from .70 to .82 for the SDE and .80 to .86 to IM. Convergent validity for between the IM scale and a cluster of measures traditionally known as lie scales (e.g., MMPI Lie scale) as well as convergent validity between the SDE scale and measures of defense and coping have been demonstrated in several investigations (Paulhus, 1998). As to the reliability of the scale, 5-week test-retest correlations were .69 and .65 for the SDE and IM scale, respectively (Paulhus, 1998).

### C. Data analysis

For Phase 2, the main focus of the analysis was the selection and validation of a reduced set of items for the PBI. In Phase 1, a pool of 70 items was identified. These could be classified into one of three basic categories: 30 items assessing diabetes-specific psychological reactance, 18 items assessing diabetes-specific learned helplessness, and 22 items assessing diabetes-specific dysfunctional expectations. The goal of the current analysis was to reduce this to a smaller, balanced, set of items through the analysis of the psychometric properties of the individual items, the analysis of the relationships between items, and the analysis of validity of the scale. It is important to realize that the selection or rejection of items was not a linear process. Rather, it was circular (recursive) in that the psychometric properties were considered within the context of the relationships between items, and within the context of comprehensibility. No one analysis in isolation lead to the rejection of an item.

For the analysis of validity, three additional measures were included: the Hong Psychological Reactance Scale (HPRS), the Attributional Styles Questionnaire (ASQ) and the Balanced Inventory of Desirable Responding (BIDR). Before these were used within the analysis of convergent validity, their psychometric properties were confirmed. Finally, the PBI was compared to various demographic measures. These can be seen as additional tests of convergent validity.

All data was collected using paper and pencil questionnaires, and then transferred to an SPSS® data file. SPSS version 11 was used for all analyses.

## II. Results

### A. Sample Characteristics

The complete sample consisted of 169 individuals (83 men and 86 women). The average age of the participants was 57.79 years (SD = 13.09, range = 19 – 87). 80.5% of participants were diagnosed with type 2 diabetes and 19.5% were diagnosed with type 1 diabetes. The average length of the time elapsed since the initial diagnosis was 15.75 years (SD = 10.25, range = 1-51). Participants diagnosed with type 1 diabetes were diagnosed for 24.64 years on average (SD = 10.34, range = 7 - 51). Participants diagnosed with type 2 diabetes were diagnosed for 13.60 years on average (SD = 9.03, range = 1 - 40).

Of the 169 participants, 167 individuals described their ethnic background as Caucasian, 1 participant as Asian-Canadian, and 1 person as half Caucasian, half Hispanic. The majority of the participants were married or common-law (72.2%), 12.4% were single, 9.5% were divorced, 4.7% were widowed, and 1.2% were separated. The average number of people living in a participant's household, including the participant was 2.21 (SD = .95, range = 1-5).

The number of years of formal education reported by the participants ranged from 4 to 23 ( $M = 13.61$ , SD = 3.09). Most of the participants were retired or on disability (50.9%), 32.5% were full-time employed, 7.7% were part-time employed, 6.5% were unemployed, 1.8% were students and 0.6% were self-employed. 71.6% lived in the Halifax Regional Municipality, and 28.4% lived in other parts of Nova Scotia. Participants' postal codes were used to obtain the information on the average household

income in 2001 from the STATS Canada (Census of Canada, 2001). The average household income for the postal codes reported by participants was \$56, 400 (SD = \$11, 79, range = \$35, 780 – \$82, 450). Participants were not aware that their postal codes were used to estimate their household income.

. The Body Mass Index (BMI) was computed using a formula based on the participants' height and weight ( $\text{kg/m}^2$ ). The BMI is the number that is associated with body fat and provides an estimate of whether an individual's weight falls within a healthy range. The average BMI was 33.3 (SD = 7.10, range = 19.3 – 66.3). The average BMI of the participants diagnosed with type 1 diabetes was 28.5 (SD = 4.33, range = 20.7 – 41.0). Of the participants diagnosed with type 1 diabetes, 56% had a BMI ranging from 25 to 29.9 (overweight), 30% had a BMI ranging from 30 to 34.9 (Obese Class I), 3% had a BMI ranging from 35 to 39.9 (Obese Class II), and 3% had a BMI equal or above 40 (Obese Class III), and 9% had a BMI within a normal range. (cf. Office of Nutrition Policy and Promotion, 2003, for the BMI definitions.).

The average BMI of the participants diagnosed with type 2 diabetes was 34.45 (SD = 7.17, range = 19.3 – 66.3). 23% of the participants diagnosed with type 2 diabetes had a BMI ranging from 25 to 29.9 (overweight), 32% had a BMI ranging from 30 to 34.9 (Obese Class I), 20% had a BMI ranging from 35 to 39.9 (Obese Class II), 21% had a BMI equal or above 40 (Obese Class III), and 4% had a BMI within a normal range.

In order to manage their diabetes, 45.6% of the participants diagnosed with type 2 diabetes were taking oral medication for diabetes (they were not asked to specify which medications they were taking), 27.9% were on insulin, 16.9% were both on insulin and

oral medication, and 9.6% used diet and exercise alone. For those participants who used insulin, the number of injections per day ranged from 1 to 5 ( $\underline{M} = 2.51$ ,  $\underline{SD} = 1.04$ ).

As for the individuals diagnosed with type 1 diabetes, 72.7% reported using insulin injections and 27.3% were using an insulin pump. The number of injections per day for those participants not using the pump ranged from 1 to 6 ( $\underline{M} = 3.77$ ,  $\underline{SD} = 1.15$ ).

Data on A1C was available only for 117 participants (69% of the sample). The location where the bloodwork was collected was known for 72 participants out of these 117 (27 individuals were diagnosed with type 1 diabetes, and the remaining 45 individuals were diagnosed with type 2 diabetes); 58% of those had their bloodwork done at the QEII. The average time elapsed between the bloodwork collected and participation in the study was approximately 5 months or 20.61 weeks ( $\underline{SD} = 29.04$ , range = 1 – 168). (A1C is an average amount of blood glucose levels over the last 120 days).

A statistical adjustment was made to the data on A1C that was collected at the locations other than the QEII, to assure that data on A1C were comparable. For each of the non-QEII laboratories, the scores were converted to proportion of the upper limit of normal range, using the formula:  $X/\text{upper limit}$ . Then these proportions were reconverted to an A1C value using the QEII referents (7% is the upper limit for the QEII).

After adjusting the data, the average A1C was 7.8 ( $\underline{SD} = 1.3$ , range = 5.2 – 11.7). For participants diagnosed with type 1 diabetes, the average A1C was 8.0 ( $\underline{SD} = 1.5$ , range = 6.0 – 11.7). Out of participants diagnosed with type 1 diabetes, 80% had A1C above the healthy range, that is,  $> 6.5$ . For participants diagnosed with type 2 diabetes, the average A1C was 7.8 ( $\underline{SD} = 1.3$ , range = 5.2 – 11.2). Out of these participants, 79% had A1C above the healthy range that is,  $> 6.5$ .

## B. The Analysis of the PBI

### 1. Overview

The selection of items for the PBI was thorough and methodical, using a multifaceted approach. The goal was to develop a clinically applicable scale that would contain three distinct, but not necessarily orthogonal, subscales. Those subscales would tap diabetes-specific reactance, learn helplessness and dysfunctional expectations. Ideally, each subscale would contain about an equal number of items.

Critically, since orthogonal subscales were neither expected nor demanded, a simplistic approach to scale development based on reliabilities analysis (or item response theory, IRT) could not be used. Reliabilities analysis and IRT work best when the intended scale is uni-dimensional (or when it has uni-dimensional, orthogonal, subscales).

To accomplish the goal of developing a diabetes-specific scale, there were two main analyses, with several sub-analyses within each. These can be summarized as:

- 1) Individual item analysis
  - 1a) Item comprehensibility
  - 1b) Statistical properties (mean, variance, distribution).
- 2) The relationships between items (i.e., the correlations)
  - 2a) The communalities of each item
  - 2b) The mean sampling adequacy of pairs of items
  - 2c) The clustering of items to form subscales.

While considering these analyses, it is important to realize that no single criterion was used to retain or eliminate individual items. Rather, at each stage of the analysis, each individual item was "flagged" as potentially bad if that item failed to meet the criteria of that stage. Thereafter, in the final analysis, the collection of valid items was created by making a decision about each item based on the overall pattern (i.e., the "big picture").

## 2. Individual Item Analysis

The psychometric properties of the individual items of the PBI were evaluated using two primary criteria: the comprehensibility of each item and the pattern of responding.

For this initial scale development phase, the response list for each item included the option "I don't understand", which was coded as a "0". The percentage of the participants that endorsed this particular option was calculated for each item. This analysis was intended to flag items that might be considered questionable rather than automatically eliminate them.

For 97% of the items, the percentage of participants endorsing the 0-option was 3.5% or less. For two items, however, 6.5% of the participants endorsed the 0-option. These two items were "I do not get down very easily when thinking about my diabetes care" and "I tend to blame myself for difficulties I have in following my diabetes care plan even if other things beyond my control are involved". As a number of the participants verbally reported not comprehending these particular items at the time of data collection, the low interpretability of the items was attributed to their poor wording, and the items were flagged as questionable.

The second criterion for item retention was the pattern of responding. Ideally, a valid item would manifest as a unimodal frequency distribution across the 1 to 7 scaling. Such a pattern would correspond to a proper psychometric function (i.e., a cumulative normal distribution, as would be required for IRT or a reliabilities analysis). Hence, the frequencies of endorsement of each option (excluding 0) were computed for each item. Items were considered “problematic” if the distribution were to be bimodal, multimodal, or if the distribution were to be highly skewed (i.e., most respondents choosing option 1 or most respondents choosing option 7), or if the distribution were to be too kurtotic (i.e., most respondents choosing only 1 of the 7 options). At the same time, it should be mentioned that sometimes the content of a particular item identifies something important, even if it is only applicable to a small subset of individuals. Therefore, as noted above, this analysis was not intended to automatically eliminate any items. Rather, it was intended to flag items that may be considered questionable.

Nine items with very high endorsement rates for one alternative out of seven (40% or higher) were considered problematic (for example, “In managing my diabetes, it feels like health care workers are trying to take away my freedom”, 56.2% choosing option 1, i. e., “Strongly Disagree”, or “I often feel that diabetes is ruining my life, so I might as well write off the rest of it”, 46.7% choosing Option 1). The majority of the participants endorsed options “Strongly Disagree” or “Disagree” for these nine items. As such, these nine items were flagged for possible elimination (see Table 2 for endorsement rates for all items. Items that were eventually selected for the PBI are highlighted in bold).

Table 2

*Number of participants endorsing each item*

Item		Endorsement Frequency								
		0	1	2	3	4	5	6	7	
1	In managing my diabetes, it feels like health care workers are trying to take away my freedom.	2	95	22	30	7	11	2	0	×
2	<b>I am afraid that I will get diabetes complications, no matter what I do to manage it.</b>	0	23	8	21	20	58	15	24	√
3	In managing my diabetes, I get frustrated because I cannot find THE answer to what will control my blood sugars.	2	23	19	27	20	32	18	28	√
4	<b>I feel that I have no control over what diabetes is doing to me.</b>	0	31	28	48	16	26	8	12	√
5	<b>When my family or friends encourage me to follow my diabetes care plan better, I feel motivated to work hard at it</b>	1	28	28	45	24	25	10	8	√
6	If a health care worker tells me what to do to manage my diabetes, I say “yes”, but then go home and end up doing the opposite.	1	41	38	36	26	18	3	6	√
7	I expect that my blood glucose levels will be about the same if I do the same thing every day.	0	19	13	45	14	36	22	20	√
8	I am fed up with family or friends telling me what I have to do to manage my diabetes.	2	56	26	44	11	15	7	8	√
9	<b>I feel that there is no part of my life that my diabetes does not touch, and I get overwhelmed.</b>	2	25	21	28	18	26	20	29	√
10	In managing my diabetes, it feels like family or friends are trying to take away my freedom.	3	78	28	43	6	8	3	0	×
11	I get mad if health care workers tell me they need to see my blood sugar record book.	1	115	14	28	2	5	1	3	×
12	I get fed up with myself because after following my diabetes care plan for a while, I just fall “off the wagon”, that is, stop exercising, self-testing and making sensible food choices.	0	17	21	24	28	34	15	30	√
13	I do not get down very easily when thinking about my diabetes care.	11	12	20	40	27	26	15	18	×
14	It does not bother me that I do not always know what affects my blood sugar levels.	2	5	8	20	19	48	37	30	√

Table 2 (Continued)

*Number of participants endorsing each item*

Item	Endorsement Frequency								
	0	1	2	3	4	5	6	7	
<b>15 I feel that I am keeping my freedom when I eat something that my family and friends tell me I cannot have because of my diabetes</b>	<b>0</b>	<b>44</b>	<b>32</b>	<b>41</b>	<b>18</b>	<b>21</b>	<b>7</b>	<b>6</b>	√
<b>16 I feel helpless when I try to control my blood sugar levels, since nothing seems to work.</b>	<b>1</b>	<b>44</b>	<b>29</b>	<b>31</b>	<b>21</b>	<b>23</b>	<b>11</b>	<b>9</b>	√
17 If I felt that health care workers were taking control over my diabetes care, it would stop me from trying to manage my diabetes.	4	75	23	36	9	16	5	1	×
18 In managing my diabetes, when I see a treat, for example, a plate of nachos, I don't see it as forbidden food.	0	24	20	49	25	21	16	14	√
19 Hearing the same advice from different people about how I should manage my diabetes irritates me because it feels like broken record that keeps spinning and spinning.	0	32	31	31	20	25	18	12	√
20 When people suggest that my life will be shortened because of my diabetes, I want to give up because I believe them.	0	62	36	33	10	17	4	7	√
21 I get frustrated if my family or friends tell me something like "you should exercise at least three times a week" because they do not know what it is like to live with diabetes.	1	44	25	35	22	24	9	9	√
22 When I follow my diabetes care plan and don't get immediate results, I feel that I might as well do whatever I want.	0	40	35	47	23	17	2	5	√
<b>23 In managing my diabetes, I feel that somewhere along the line, I've lost the happiness that I once had.</b>	<b>1</b>	<b>35</b>	<b>19</b>	<b>42</b>	<b>26</b>	<b>20</b>	<b>16</b>	<b>10</b>	√
24 If a health care worker told me not to eat any sweets, for example, I would not eat any sweets.	1	11	16	28	23	37	25	28	√
25 In managing my diabetes, I resent that my family or friends seem to be telling me that they know better than I about what is going to work for me.	1	33	23	37	13	29	21	12	√
26 I accept that it is more difficult to follow my diabetes care plan when I am feeling sad.	3	43	35	41	9	15	11	12	√

Table 2 (Continued)

*Number of participants endorsing each item*

Item	Endorsement Frequency								
	0	1	2	3	4	5	6	7	
27 I would feel angry if my family members or friends asked me “why don’t you follow your diabetes care plan better?”	0	19	18	29	27	38	26	12	√
28 It bothers me that health care workers are not able to guarantee how to prevent complications of diabetes.	1	49	23	39	22	19	4	12	√
29 <b>In managing my diabetes, often it seems like no matter what I do it does not work.</b>	2	26	23	36	24	26	11	21	√
30 <b>If a health care worker tells me something like “you should exercise regularly in order to manage your diabetes”, I think “oh no I don’t!”</b>	2	42	37	34	22	15	7	10	√
31 I eat what I want to eat because when it is my time to die, I will die.	0	82	18	34	13	9	6	7	×
32 <b>I get frustrated when health care workers remind me of things I should be doing to manage my diabetes, even though I know they are correct.</b>	2	36	33	41	21	25	6	5	√
33 <b>If my family or friends questioned my food choices because of my diabetes, I would think, “why am I eating that? I don’t even want it!”</b>	5	5	11	33	32	34	27	22	√
34 <b>When it comes to following my diabetes care plan, I tend to be an all-or-nothing type of person.</b>	6	16	13	51	29	26	18	10	√
35 I am fed up with health care workers telling me what I have to do to manage my diabetes.	1	71	45	34	9	6	2	1	×
36 In following my diabetes care plan, although I sometimes “slide back” or “slip up”, I always keep going forward.	1	36	31	63	18	9	5	6	√
37 If my family or friends told me not to eat any sweets, for example, I would not eat any sweets.	1	7	14	20	21	54	19	33	√
38 I often feel that I am not able to exercise self-control to follow my diabetes care plan.	1	11	15	30	24	38	28	22	√
39 <b>Even when my blood sugar levels are just above normal limits, I get fed up and ask myself: “what did I do wrong?”</b>	0	32	25	35	16	32	17	12	√

Table 2 (Continued)

*Number of participants endorsing each item*

Item	Endorsement Frequency								
	0	1	2	3	4	5	6	7	
<b>40 When trying to follow my diabetes care plan, my diabetes feels like a train going 100 miles an hour, and I am out there on the tracks trying to stop it.</b>	<b>5</b>	<b>41</b>	<b>25</b>	<b>35</b>	<b>17</b>	<b>22</b>	<b>15</b>	<b>9</b>	√
<b>41 In managing my diabetes, I get mad at myself if I ever eat even a little more than I should, for example, for comfort or fun.</b>	<b>1</b>	<b>33</b>	<b>25</b>	<b>30</b>	<b>25</b>	<b>26</b>	<b>14</b>	<b>15</b>	√
<b>42 When health care workers encourage me to follow my diabetes care plan better, I feel motivated to work hard at it.</b>	<b>1</b>	<b>39</b>	<b>29</b>	<b>55</b>	<b>27</b>	<b>8</b>	<b>4</b>	<b>6</b>	√
<b>43 In following my diabetes care plan, I expect too much out of myself.</b>	<b>0</b>	<b>18</b>	<b>15</b>	<b>34</b>	<b>27</b>	<b>27</b>	<b>26</b>	<b>22</b>	√
44 When my family or friends tell me what I should or should not do because of my diabetes, it feels like I have one too many nagging parents.	0	28	27	26	26	31	15	16	√
45 I often feel that diabetes is ruining my life, so I might as well write off the rest of it.	1	79	27	30	17	7	4	4	×
46 When I am feeling tired, my diabetes management may not be as good as usual, but I go back to good self-care after a good night's sleep.	0	4	9	14	33	58	33	18	√
47 If someone asked me something like "should you be eating that piece of cake?", I would eat the cake just to show them that I can eat what I want.	1	35	22	42	33	20	7	9	√
48 When I finally am able to get my blood sugar levels under control, I expect it to last forever.	0	42	23	59	22	12	10	1	√
<b>49 I often feel that diabetes is overwhelming, and I want to give up managing it.</b>	<b>0</b>	<b>44</b>	<b>22</b>	<b>38</b>	<b>21</b>	<b>21</b>	<b>15</b>	<b>8</b>	√
<b>50 In following my diabetes care plan, if I eat something that I should not eat, I hear a voice in the back of my mind saying "you stupid fool, there go the last three days of trying to be good!"</b>	<b>0</b>	<b>15</b>	<b>24</b>	<b>27</b>	<b>23</b>	<b>46</b>	<b>13</b>	<b>21</b>	√
51 In managing my diabetes, I resent that health care workers seem to be telling me that they know better than I about what is going to work for me.	2	49	34	46	17	14	3	4	√

Table 2 (Continued)

*Number of participants endorsing each item*

	Item	Endorsement Frequency								
		0	1	2	3	4	5	6	7	
52	When I worry about diabetes complications, I tend to think to myself: "I will get a good night's sleep, and tackle it again tomorrow".	0	15	23	52	23	36	10	10	√
53	When dealing with diabetes health care workers, I always end up thinking: "if I want to have high-sugar treats, for example, every day, then I will!"	1	83	36	42	4	1	0	2	×
54	<b>I would not get frustrated with high blood sugar readings if I only knew what I did wrong.</b>	2	19	12	34	20	32	23	27	√
55	<b>If a family member or friend tells me something like "you should exercise regularly in order to manage your diabetes," I think "oh no I don't!"</b>	4	44	24	42	24	22	3	6	√
56	When trying to control my blood sugar levels, I often feel like giving up because I do not know what I am doing wrong.	0	43	31	47	16	9	6	7	√
57	<b>In managing my diabetes, I get mad at myself if I ever skip self-testing, even if only for a day.</b>	1	37	30	38	26	19	7	11	√
58	I often feel like I just do not care about managing my diabetes anymore.	0	58	29	36	20	12	7	7	√
59	I would feel angry if a health care worker asked me "why don't you follow your diabetes care plan better?"	1	40	25	50	21	16	4	12	√
60	I tend to blame myself for difficulties I have in following my diabetes care plan even if other things beyond my control are involved.	0	11	13	29	25	47	23	21	√
61	<b>I feel that I am keeping my freedom when I eat something that my health care workers tell me I cannot have because of my diabetes.</b>	1	41	32	51	19	15	6	4	√
62	If I felt that family or friends were taking control over my diabetes care, it would stop me from trying to manage my diabetes.	3	57	31	37	18	16	4	3	√
63	When I try hard to control my blood sugar levels, and it does not seem to make any difference, I feel like giving up on my diabetes care plan.	1	40	34	41	18	19	10	6	√

Table 2 (Continued)

*Number of participants endorsing each item*

Item		Endorsement Frequency								
		0	1	2	3	4	5	6	7	
64	<b>In managing my diabetes, if I occasionally do something I feel I should not, like eat a small piece of cheesecake, I feel angry and criticize myself.</b>	0	29	19	50	23	25	15	8	√
65	I get angry when health care workers tell me how to follow my diabetes care plan, for example, have breakfast, because I feel it limits my choices, such as a choice of sleeping in.	1	62	30	58	8	6	2	2	√
66	<b>I feel depressed because I do not know what I am doing wrong in trying to control my blood sugar levels.</b>	1	30	33	34	16	27	16	12	√
67	<b>I often think I am never supposed to have certain foods.</b>	0	35	25	44	19	22	13	11	√
68	<b>I get frustrated if a diabetes care worker tells me something like “you should exercise at least three times a week” because they do not know what it is like to live with diabetes.</b>	1	60	24	52	12	11	6	3	√
69	It is a matter of pure luck if my blood sugar levels are under control.	0	76	31	35	12	10	2	3	×
70	I get mad if health care workers tell me they need to see completed food records.	2	73	30	36	15	9	1	3	×

Note: Items flagged as × were deemed questionable and considered for elimination. Items flagged as √ were considered desirable, according to two primary criteria: the comprehensibility of items and the pattern of responding. Items in bold were eventually selected for the PBI.

### 3. Relationships between the items

To assess the relationships between items, the correlation matrix between items was examined. However, the initial pool consisted of 70 items. This would result in a 70 by 70 correlation matrix, which is simply too difficult to interpret.

Hence, the factor analysis procedures (a principle component analysis) of SPSS were used to help guide the exploration of the relationships between items. It is critical to realize that the goal of this analysis was not the construction of a factor solution (i.e., factors and factor scores). Rather, the goal was to use the tools provided within the factor analysis procedures of SPSS to extract relationships between items in a large and unwieldy correlation matrix. The particular tools of interest included the communalities, the measure of mean sampling adequacy, and the clustering of items (i.e., nominally, the "factors").

A simpler reliabilities analysis could not be used for the following reasons:

1) If all 70 items were combined to create a single total score, this total score would be meaningless because it would represent three subscales. Hence, item-total correlations could not be used to select or reject individual items.

2) On the other hand, three separate reliabilities analyses could not be used for a different reason. At this stage of the research, it was not possible to uniquely assign each item to only one subscale (reactance, learned helplessness, dysfunctional expectations). The subscales might not be orthogonal, and individual items could potentially load on each subscale. We did not make a priori assumption that each item would be related to only one subscale. As such, any item could provide some relevant information for one, two, or three of the subscales. Therefore, we could not create total score per subscale at

this stage, nor could we select or reject items based on the item-total (subscale) correlation, because such an attempt might lead to multiple erroneous conclusions.

3) Using item response theory (IRT) would present the same basic problem. IRT assumes that there is some "gold standard" and that the properties of each item can be compared to that standard. In this exploratory research, there was no such "standard". It would have been possible to construct a composite score based on all the items for each subscale and use it as a standard. However, if a large proportion of items were to be consequently dropped, it would become problematic. Low cohesion among the experts and low inter-rater agreement when attempting to classify the items are additional contraindications to this approach.

To summarize, a proper reliabilities analysis or item-response-theory analysis would require the kind of information that was not available in this exploratory work.

All 70 items were used to create the correlation matrix. Data scored as zero (0 = "I don't understand") were retained. The number of zeros was quite small, and dropping the data that contained these responses would have created other problems. All items were retained for this analysis, and all item responses including zero were retained. This procedure was judged to be the best solution from the possible options. Other options included: a) dropping those cases where participants chose the "zero" option for some of the items on a "listwise" basis (i.e., dropping any case with a 0 from *all* correlations); b) dropping those cases on a "pairwise" basis (i.e., dropping a case with a 0 from those correlations that used the zero); c) using a mean replacement.

Dropping the cases on a "listwise" basis would have severely reduced the sample size, and the sample would have been non-representative of the general population.

Dropping the cases on a “pairwise” basis would have resulted in a correlation matrix with different sample sizes per correlation value. This could lead to problems in a factor analysis procedure (cf., Cohen & Cohen, 1975). Finally, replacing zeros with a mean would beg the question: “what mean to use?” The answer to this particular question would depend on the kind of information the current work is attempting to provide.

The first tool used from the factor analysis procedure was the initial communality of each item. Communality is an estimate of the amount of shared variance between one single item, and all the remaining items. (A good questionnaire will not contain unique single items because a single item is not reliable). The communality is simply a multiple regression analysis for each item. In this analysis, each item, in turn, is the dependent variable, while all other items are independent variables. The communality is expressed by the statistic  $R^2$ , which ranges from 0 to 1. Communalities near 0 (e.g., less than .40) are generally considered low and those items would be considered to be of questionable value to a scale.

The mean initial communality<sup>1</sup> for our items was  $.606 \pm .080$  (range .427 to of .805). It should be noted that this minimum falls within the “acceptable” range for a typical factor analysis. For example, Costello and Osborne (2005) suggest a cut off of communality less than .40 for an item. Communalities are presented in Table 3. Items that composed the final PBI are highlighted in bold.

On the other hand, a communality might be high but meaningless, if the item is loading on an uninterpretable factor. As is the case with all the analyses described in this section, values of communalities should be interpreted with caution and within the context of other analyses.

Table 3

*Initial communalities (with the Mean and SD) for each item*

	Communality		Communality
PBDSCI 01	0.605	PBDSCI 36	0.529
<b>PBDSCI 02</b>	0.617	PBDSCI 37	0.676
PBDSCI 03	0.754	PBDSCI 38	0.656
<b>PBDSCI 04</b>	0.661	<b>PBDSCI 39</b>	0.602
<b>PBDSCI 05</b>	0.585	<b>PBDSCI 40</b>	0.733
PBDSCI 06	0.637	<b>PBDSCI 41</b>	0.691
PBDSCI 07	0.427	<b>PBDSCI 42</b>	0.623
PBDSCI 08	0.732	<b>PBDSCI 43</b>	0.624
<b>PBDSCI 09</b>	0.759	PBDSCI 44	0.706
PBDSCI 10	0.766	PBDSCI 45	0.775
PBDSCI 11	0.615	PBDSCI 46	0.620
PBDSCI 12	0.727	PBDSCI 47	0.650
PBDSCI 13	0.581	PBDSCI 48	0.579
PBDSCI 14	0.541	<b>PBDSCI 49</b>	0.784
<b>PBDSCI 15</b>	0.772	<b>PBDSCI 50</b>	0.694
<b>PBDSCI 16</b>	0.683	PBDSCI 51	0.627
PBDSCI 17	0.572	PBDSCI 52	0.523
PBDSCI 18	0.594	PBDSCI 53	0.615
PBDSCI 19	0.637	<b>PBDSCI 54</b>	0.620
PBDSCI 20	0.604	<b>PBDSCI 55</b>	0.704
PBDSCI 21	0.687	PBDSCI 56	0.706
PBDSCI 22	0.722	<b>PBDSCI 57</b>	0.627
<b>PBDSCI 23</b>	0.680	PBDSCI 58	0.783
PBDSCI 24	0.710	PBDSCI 59	0.722
PBDSCI 25	0.725	PBDSCI 60	0.629
PBDSCI 26	0.605	<b>PBDSCI 61</b>	0.781
PBDSCI 27	0.695	PBDSCI 62	0.699
PBDSCI 28	0.597	PBDSCI 63	0.730
<b>PBDSCI 29</b>	0.705	<b>PBDSCI 64</b>	0.625
<b>PBDSCI 30</b>	0.724	PBDSCI 65	0.680
PBDSCI 31	0.746	<b>PBDSCI 66</b>	0.805
<b>PBDSCI 32</b>	0.697	<b>PBDSCI 67</b>	0.646
<b>PBDSCI 33</b>	0.520	<b>PBDSCI 68</b>	0.644
<b>PBDSCI 34</b>	0.431	PBDSCI 69	0.542
PBDSCI 35	0.731	PBDSCI 70	0.671
<hr/>			
Minimum			0.427
Maximum			0.805
Mean			0.660
Standard Deviation			0.080

The second tool used from the factor analysis procedure was the mean sampling adequacy (MSA) of each item. The MSA identifies pairs of items that are unique. A good questionnaire will not rely on subscales that consist of only two items. The MSA is the sum of the correlations of one item with all the rest, when controlling for the partial correlations of each pair with the rest of the items. If the pair is unique, then the MSA drops toward 0. The MSA ranges from 0 to 1, with values near 1.0 being “good”, and values near 0.0 being “bad”. For factor analysis, one of the commonly used cut-offs for the MSA is above .30 (Tabachnick & Fidell, 1989).

The mean MSA in our sample was  $.772 \pm .109$ , with a minimum of .417 and a maximum of .923. All the MSA were within the acceptable range, i.e., above .30. The MSA are presented in Table 4. Items that composed the final PBI are highlighted in bold.

Table 4

*Final Communalities and MSA of each item (with Means and SD)*

	Communality	MSA		Communality	MSA
PBDSCI 01	0.661	0.823	PBDSCI 35	0.759	0.868
<b>PBDSCI 02</b>	0.654	0.855	PBDSCI 36	0.656	0.743
PBDSCI 03	0.764	0.870	PBDSCI 37	0.689	0.716
<b>PBDSCI 04</b>	0.633	0.880	PBDSCI 38	0.658	0.691
<b>PBDSCI 05</b>	0.708	0.605	<b>PBDSCI 39</b>	0.600	0.837
PBDSCI 06	0.659	0.761	<b>PBDSCI 40</b>	0.658	0.872
PBDSCI 07	0.733	0.525	<b>PBDSCI 41</b>	0.686	0.809
PBDSCI 08	0.728	0.825	<b>PBDSCI 42</b>	0.603	0.567
<b>PBDSCI 09</b>	0.688	0.840	<b>PBDSCI 43</b>	0.642	0.762
PBDSCI 10	0.777	0.789	PBDSCI 44	0.758	0.881
PBDSCI 11	0.737	0.692	PBDSCI 45	0.729	0.859
PBDSCI 12	0.753	0.687	PBDSCI 46	0.659	0.740
PBDSCI 13	0.772	0.582	PBDSCI 47	0.639	0.865
PBDSCI 14	0.761	0.585	PBDSCI 48	0.737	0.765
<b>PBDSCI 15</b>	0.763	0.753	<b>PBDSCI 49</b>	0.732	0.876
<b>PBDSCI 16</b>	0.686	0.851	<b>PBDSCI 50</b>	0.783	0.798
PBDSCI 17	0.813	0.654	PBDSCI 51	0.621	0.852
PBDSCI 18	0.670	0.645	PBDSCI 52	0.676	0.550
PBDSCI 19	0.735	0.866	PBDSCI 53	0.618	0.803
PBDSCI 20	0.601	0.841	<b>PBDSCI 54</b>	0.748	0.706
PBDSCI 21	0.717	0.846	<b>PBDSCI 55</b>	0.749	0.637
PBDSCI 22	0.638	0.880	PBDSCI 56	0.697	0.923
<b>PBDSCI 23</b>	0.668	0.889	<b>PBDSCI 57</b>	0.762	0.717
PBDSCI 24	0.692	0.684	PBDSCI 58	0.765	0.830
PBDSCI 25	0.775	0.866	PBDSCI 59	0.748	0.766
PBDSCI 26	0.754	0.839	PBDSCI 60	0.669	0.796
PBDSCI 27	0.719	0.846	<b>PBDSCI 61</b>	0.789	0.766
PBDSCI 28	0.637	0.854	PBDSCI 62	0.733	0.744
<b>PBDSCI 29</b>	0.691	0.876	PBDSCI 63	0.725	0.883
<b>PBDSCI 30</b>	0.808	0.633	<b>PBDSCI 64</b>	0.653	0.818
PBDSCI 31	0.731	0.778	PBDSCI 65	0.678	0.865
<b>PBDSCI 32</b>	0.653	0.859	<b>PBDSCI 66</b>	0.780	0.879
<b>PBDSCI 33</b>	0.675	0.532	<b>PBDSCI 67</b>	0.664	0.821
<b>PBDSCI 34</b>	0.720	0.417	<b>PBDSCI 68</b>	0.663	0.808
			PBDSCI69	0.636	0.770
			PBDSCI70	0.679	0.747
Minimum				0.600	0.417
Maximum				0.813	0.923
Mean				0.703	0.772
Standard Deviation				0.054	0.109

Next, a factor solution using an oblique rotation was obtained. The criteria were quite relaxed (e.g., all “factors” with eigenvalues greater than 1.0) because the goal was to see how the items related to each other. Alternatively, the aim was to identify items that did not group with the remaining items (i.e., unique items). There was no attempt at this point to create a factor solution, or to find the minimal number of factors that could explain a fixed number of items. This analysis was simply used to identify collections of items that had the highest inter-correlations.

For this solution, there were 19 “factors”. Each “factor” was examined for interpretability. Some of these “factors” included items that were clearly tapping the dimension of learned helplessness and some of these factors included items that were clearly tapping the dimension of psychological reactance. However, items related to dysfunctional expectations were not as obvious. That is, items initially thought to tap dysfunctional expectations tended to share variance with items tapping the other dimensions of learned helplessness and psychological reactance. All items were further evaluated in terms of the strength and uniqueness of their loading. The correlation of the item with its underlying factor is a measure of the degree to which an item is unique. Items that seemed to be ambiguous were flagged for further consideration.

To further clarify the relationships, the resulting “factors” were compared to the subscales of the Attributional Style Questionnaire (ASQ), the 11-item Hong Psychological Reactance Scale (HPRS) and the Balanced Inventory of Desirable Responding (BIDR) using simple correlational analyses. This analysis was not considered definitive, but rather was considered as yet another guide to the interpretation of each “factor”.

Thereafter all this information (descriptives, communalities, MSAs, factor structure) was considered, so that well-defined items were retained and more ambiguous items were deleted. An “ideal” item would be comprehensible, would have a unimodal frequency distribution, high communality and mean sampling adequacy (MSA), would cluster with other items of similar content and would convey something important in its content, while, preferably, tapping in single dimension (i.e., in the "factor" analysis). A “bad” item would be questionable according to more than one criterion of evaluation and would be considered for elimination. In addition, there was a desire to balance the number of items per subscale.

A last tool of the factor analysis procedure was the final communality of items *after* the initial factor solution. This final communality reflects the amount of shared variance between one single item and all the remaining items, but it is based on factor scores, rather than on the raw data. As such, it indicates the amount of shared variance *after* the factor analysis. Therefore, it served as an indicator of the potential utility of an item in the final reduced PBI. As with the initial communalities, final communalities near 0 (e.g., less than .40) are suspect. The mean final communality was  $.703 \pm .054$ , with a minimum of .600 and a maximum of .830 (see Table 4; items that composed the final PBI are highlighted in bold).

The resulting PBI resulted in 27 items, with 9 intended to assess the dimension of Learned Helplessness, 9 intended to assess Psychological Reactance, and 9 intended to assess Dysfunctional Expectations (see Table 5 for the list of items. Please refer to Tables 3, 4, 5 for their psychometric properties – these items are highlighted in bold). These 27

items were subjected to further analyses to check the structure when all other items had been removed from the scale.

Table 5  
*A final set of items to comprise the Psychological Barriers Inventory (PBI)*

<b>Subscale</b>	<b>Psychological Reactance</b>
Item # 1	When my family or friends encourage me to follow my diabetes care plan better, I feel motivated to work hard at it.
Item # 2	If my family or friends questioned my food choices because of my diabetes, I would think, “why am I eating this? I don’t even want it!”
Item # 3	When health care workers encourage me to follow my diabetes care plan better, I feel motivated to work hard at it.
Item # 4	I get frustrated if a diabetes care worker tells me something like “You should exercise at least three times a week”, because they do not know what it is like to live with diabetes.
Item # 5	I feel that I am keeping my freedom when I eat something that my family and friends tell me I cannot have because of my diabetes.
Item # 6	If a health care worker tells me something like “You should exercise regularly in order to manage your diabetes”, I think, “Oh no, I don’t!”
Item # 7	I get frustrated when health care workers remind me of things I should be doing to manage my diabetes, even though I know they are correct.
Item # 8	If a family member or friend tells me something like “You should exercise regularly in order to manage your diabetes”, I think, “Oh no, I don’t! “
Item # 9	I feel that I am keeping my freedom when I eat something that my health care workers tell me I cannot have because of my diabetes.
<b>Subscale</b>	<b>Learned Helplessness</b>
Item # 10	I am afraid that I will get diabetes complications, no matter what I do to manage it.
Item # 11	I feel that I have no control over what diabetes is doing to me.
Item # 12	I feel that there is no part of my life that my diabetes does not touch, and I get overwhelmed.
Item # 13	I feel helpless when I try to control my blood sugar levels, since nothing seems to work.
Item # 14	In managing my diabetes, I feel that somewhere along the line I’ve lost the happiness I once had.
Item # 15	In managing my diabetes, often it seems like no matter what I do it does not work.
Item # 16	When trying to follow my diabetes care plan, my diabetes feels like a train going 100 miles per hour, and I am out there on the tracks trying to stop it.
Item # 17	I often feel that diabetes is overwhelming, and I want to give up managing it.
Item # 18	I feel depressed because I do not know what I am doing wrong in trying to control my blood sugar levels.

Table 6 (Continued)

*A final set of items to comprise the Psychological Barriers Inventory (PBI)*

<b>Subscale</b>	<b>Dysfunctional Expectations</b>
Item # 19	When it comes to following my diabetes care plan, I tend to be an all-or-nothing type of person.
Item # 20	Even when my blood sugar levels are just above normal limits, I get fed up and ask myself: "What did I do wrong?"
Item # 21	In managing my diabetes, I get mad at myself if I ever eat even a little more than I should, for example, for comfort or fun.
Item # 22	In following my diabetes care plan, I expect too much out of myself.
Item # 23	In following my diabetes care plan, if I eat something that I should not eat, I hear a voice in the back of my mind saying "you stupid fool, there go the last three days of trying to be good!"
Item # 24	I would not get frustrated with high blood sugar readings if I only knew what I did wrong.
Item # 25	In managing my diabetes, I get mad at myself if I ever skip self-testing, even if only for a day.
Item # 26	In managing my diabetes, if I occasionally do something I feel I should not, like eat a small piece of cheesecake, I feel angry and criticize myself.
Item # 27	I often think I am never supposed to have certain foods.

### C. Internal Consistency of the PBI

Internal consistency of the final version of the PBI and its subscales were examined using coefficient alphas. According to Nunnally (1978), cutoffs of .70 signify acceptable, .80 good, and .90 excellent reliabilities respectively. Internal consistency of the whole scale showed good reliability (.86).

The subscale of Psychological Reactance-PBI demonstrated unacceptable reliability (.63). The subscale of Learned Helplessness-PBI showed good reliability (.89) and the subscale of Dysfunctional Expectations-PBI showed acceptable reliability (.76).

### D. Factor Analysis

A Principal Components Analysis (PCA) with an oblique rotation was conducted to examine the final resulting 27-item scale. A “relaxed”, Kaiser criterion (eigenvalues > 1.0) was used to choose factors. A 7-factor structure emerged and was examined in terms of its interpretability.

The first factor included all the items representative of Learned Helplessness.

Items representative of Psychological Reactance loaded on factors 2, 3, and 4. The items loading on the factor 2 (Reactance 1) represented non-equivocal expressions of reactance (e.g., “I get frustrated when health care workers remind me of things I should be doing to manage my diabetes, even though I know they are correct”). The items loading on the factor 3 (Reactance 2) were composed of items that were the antithesis of psychological reactance; that is, reversed items (for example, “When my family or friends encourage me to follow my diabetes care plan better, I feel motivated to work hard on it”). Note that reversed items had been recoded to match positive items. Two

items that loaded on factor 4 (Reactance 3) expressed the sense of keeping personal freedom and control when acting opposite to the advice given by family and friends or health care professionals (e.g., “I feel that I am keeping my freedom when I eat something that my family and friends tell me I cannot have because of my diabetes”).

The items representative of Dysfunctional Expectations loaded on factors 5, 6, and 7. The items loading on factor 5 (Dysfunctional Expectations 1) described dysfunctional expectations regarding high-calorie, high-fat foods that should be restricted or avoided by individuals with diabetes (e.g., “I often think I am never supposed to have certain foods.”) The items loading on factor 7 (Dysfunctional Expectations 2) described dysfunctional expectations regarding overall diabetes management (e.g., “In managing my diabetes, I get mad at myself if I ever skip self-testing, even if only for a day.”) An item describing an all-or-nothing approach to diabetes management loaded on factor 6 (Dysfunctional Expectations 3), adding a unique contribution to the PBI (e.g., “When it comes to following my diabetes care plan, I tend to be an all-or-nothing type of person”).

A series of correlational analyses were conducted to evaluate the relations between the scores of the three subscales (Learned Helplessness – PBI, Psychological Reactance – PBI, and Dysfunctional Expectations – PBI). All three subscales were significantly correlated with each other. The subscale of Learned Helplessness-PBI was significantly positively correlated with the subscale of Dysfunctional Expectations-PBI ( $r = .60, p < .01$ ) and with the subscale of Psychological Reactance-PBI ( $r = .43, p < .01$ ). The subscale of Psychological Reactance-PBI was also significantly correlated with the subscale of Dysfunctional Expectations-PBI ( $r = .32, p < .01$ ).

## E. Internal Consistencies of the ASQ, HPRS and BIDR

### 1. Overview

A series of reliability analyses were conducted to evaluate the internal consistencies of the ASQ, HPRS and BIDR, in order to ensure that our findings are comparable with the previous research.

### 2. ASQ

The Attributional Style Questionnaire (ASQ; Peterson et al., 1982) accesses Composite Negative Attributional Style, Composite Positive Attributional Style, and Composite Positive minus Composite Negative (CPCN). It also provides a number of the individual dimension measures, including Internal Negative, Stable Negative, Global Negative, Internal Positive, Stable Positive, Global Positive, Hopelessness, and Hopefulness.

Reliability analysis of the full ASQ demonstrated acceptable internal consistency (.79). The internal consistencies for the composite scores of the ASQ were acceptable as well (.75 for positive events and .74 for negative events). The Cronbach's alphas for the individual subscales of the ASQ ranged from .45 to .75 (see Table 6), consistent with the literature. Peterson and Seligman (1984) suggested that lower reliability coefficients could be explained by the fact that each individual subscale has only 6 items. The investigators are encouraged to use the composite subscales of the ASQ, which tend to yield higher estimates of internal consistency.

Table 6

*Internal consistency (Coefficient alpha) of ASQ subscales*

<b>Subscale</b>	
<b><i>Composite Negative Attributional Style</i></b>	<b>.74</b>
Internal Negative	.47
Stable negative	.56
Global Negative	.73
<b><i>Composite Positive Attributional Style</i></b>	<b>.75</b>
Internal Positive	.48
Stable Positive	.45
Global Positive	.58
Hopelessness	.58
Hopefulness	.66
<b><i>Total ASQ</i></b>	<b>.79</b>

### 3. HPRS

The 11-item Hong Psychological Reactance Scale (HPRS; Hong & Faedda, 1996; Hong & Page, 1989) has a four-factor structure, including Emotional Response Toward Restricted Choice, Reactance to Compliance, Resisting Influence from Others, and Reactance Toward Advice and Recommendations.

The alpha coefficient (Cronbach, 1951) for an 11-item revised HPRS was .83 with internal consistencies, consistent with the literature. Internal consistencies for the 4 “subscales” of 4 psychological reactance factors identified by Hong and Faedda (1996) ranged from .58 to .74 (see Table 7). It should be noted that although Hong and Faedda (1996) suggested that the HPRS would be more appropriately used taking into account the 4-factor structure rather than in its entirety, they did not claim that the four factors were separate subscales, and did not calculate separate internal consistencies for them.

Table 7

*Internal consistency (Coefficient alpha) of HPRS subscales*

<b>Subscale</b>	
Emotional Response Toward Restricted Choice	.74
Reactance to Compliance	.61
Resisting Influence from Others	.68
Reactance Toward Advice and Recommendations	.58
<b>Total HPRS</b>	.83

#### 4. BIDR

The Balanced Inventory of Desirable Responding (BIDR-6; Paulhus, 1991) consists of two relatively independent subscales, Self-Deceptive Enhancement (SDE) and Impression Management (IM).

Reliability of the full scale was acceptable (.74). The SDE subscale demonstrated unacceptable reliability (.62) and the IM subscale demonstrated acceptable reliability (.75).

#### F. The PBI and the Other Scales

##### 1. Overview

A series of correlational analyses were conducted to evaluate the relations between the subscale (Learned Helplessness – PBI, Psychological Reactance – PBI, and Dysfunctional Expectations – PBI) scores of the PBI and the subscales of the HPRS, ASQ and BIDR. This is considered a test of the validity of the PBI.

## 2. The PBI and the ASQ

One of the goals of this exploratory study was to evaluate the convergent validity of the subscale of Learned Helplessness-PBI with the ASQ. The subscale of Learned Helplessness-PBI was significantly positively correlated with the Composite Negative Attributional Style and negatively correlated with the Composite Positive minus Negative Attributional Style subscales of the ASQ ( $r = .25$  and  $r = -.24$  respectively,  $p < .01$ ). Learned Helplessness-PBI scores were also positively related with the Internal Negative ( $r = .18$ ,  $p < .05$ ), Global Negative ( $r = .25$ ,  $p < .01$ ), and Hopelessness ( $r = .22$ ,  $p < .01$ ) subscales.

In addition to these tentatively hypothesized relationships, the Psychological Reactance-PBI scores were negatively related with the scores of the Composite Positive Attributional Style ( $r = -.23$ ,  $p < .01$ ), the Composite Positive minus Composite Negative Attributional Style ( $r = -.24$ ,  $p < .01$ ), Internal Positive ( $r = -.15$ ,  $p < .05$ ), Global Positive ( $r = -.18$ ,  $p < .05$ ), Stable Positive ( $r = -.23$ ,  $p < .01$ ) and Hopefulness ( $r = -.24$ ,  $p < .05$ ) subscales of the ASQ.

Dysfunctional Expectations-PBI scores were positively correlated with the scores of the Composite Negative Attributional Style ( $r = .24$ ,  $p < .01$ ), the Internal Negative ( $r = .27$ ,  $p < .01$ ) Global Negative ( $r = .19$ ,  $p < .05$ ), and Hopelessness ( $r = .16$ ,  $p < .05$ ) subscales of the ASQ.

## 3. The PBI and the HPRS

One of the goals of this exploratory study was to evaluate the convergent validity of the subscale of Psychological Reactance-PBI with the HPRS. The subscale of Psychological Reactance-PBI was significantly correlated with the “subscales” of the

HPRS, including the Emotional Response Toward Restricted Choice ( $r = .34, p < .01$ ), Reactance to Compliance ( $r = .24, p < .01$ ), Resisting Influence from Others ( $r = .27, p < .01$ ) and Reactance Toward Advice and Recommendations ( $r = .38, p < .01$ ). The Dysfunctional Expectations-PBI scores were also related to the Emotional Response Toward Restricted Choice subscale ( $r = .19, p < .05$ ).

In addition to these tentatively hypothesized relationships, Learned Helplessness-PBI scores were also unexpectedly positively correlated with the four factors of the HPRS, including the Emotional Response Toward Restricted Choice ( $r = .329, p < .01$ ) and Reactance Toward Advice and Recommendations ( $r = .165, p < .05$ ).

#### 4. The PBI and the BIDR

One of the tentative hypotheses of this exploratory study was that there will be no significant correlations between the subscales of the PBI and the BIDR. An unexpected negative relationship was observed between the Learned Helplessness-PBI scores and the subscale of Self-Deceptive Enhancement of the BIDR ( $r = -.23, p < .01$ ).

Finally, a negative relation between the scores of the Dysfunctional Expectations-PBI subscale and the Deceptive Self-Enhancement subscale was also observed ( $r = -.20, p < .01$ ).

#### G. The ASQ, the HPRS and the BIDR

A series of correlational analyses was conducted to examine relations between the composite subscales of the ASQ, subscales of the HPRS and BIDR (see Table 8).

Table 8

*Correlations between the composite subscales of ASQ, HPRS and BIDR*

	ER T RC	RC	RI O	RT AR	CN AS	CP AS	HL	HP	SDE	IM
Emotional Response Toward Restricted Choice (ERTRC)	1.00	.37**	.62**	.45**	.18*	.04	.24**	.04	-.10	-.27**
Reactance to Compliance (RC)	.37**	1.00	.32**	.53**	.10	.02	.09	-.02	.01	-.39**
Resisting Influence from Others (RIO)	.62**	.32**	1.00	.47**	.10	.02	.10	-.03	-.11	-.10
Reactance Toward Advice and Recommendations (RTAR)	.45**	.53**	.47**	1.00	.02	-.07	.05	-.10	-.11	-.23**
Composite Negative Attributional Style (CNAS)	.18*	.10	.10	.02	1.00	.30**	.92**	.31**	-.22**	-.15*
Composite Positive Attributional Style (CPAS)	.04	.02	.02	-.07	.30**	1.00	.29**	.94**	.15	-.04
Hopelessness (HL)	.24**	.09	.10	.05	.92**	.29**	1.00	.35**	-.17*	-.13
Hopefulness (HP)	.04	-.02	-.03	-.10	.31**	.94**	.35**	1.00	.16*	-.02
Self-Deceptive Enhancement (SDE)	-.10	.01	-.11	-.11	-.22**	.15	-.17*	.16*	1.00	.32**
Impression Management (IM)	-.27**	-.39**	-.10	-.23**	-.15*	-.04	-.13	-.02	.32**	1.00

Table 8 (Continued)

*Correlations between the composite subscales of ASQ, HPRS and BIDR*

Notes : \*\*. Correlation is significant at 0.01 level (2-tailed).

\*. Correlation is significant at 0.05 level (1-tailed).

Three of the subscales of the HPRS (Emotional Response Toward Restricted Choice, Reactance to Compliance and Reactance Toward Advice and Recommendations) were negatively correlated with the Impression Management subscale of the BIDR at 0.01 level of significance. The Emotional Response Toward Restricted Choice subscale was positively correlated with the Composite Negative Attributional Style ( $r = .18$ ,  $p < .05$ ) and Hopelessness subscales ( $r = .24$ ,  $p < .01$ ) of the ASQ.

The Composite Negative Attributional Style subscale of the ASQ was significantly negatively correlated with both subscales of BIDR, including Deceptive Self-Enhancement ( $r = -.22$ ,  $p < .01$ ) and Impression Management ( $r = -.15$ ,  $p < .05$ ) subscales. The Deceptive Self-Enhancement Subscale was further negatively correlated with Hopelessness ( $r = -.17$ ,  $p < .05$ ) and positively correlated with Hopefulness ( $r = .16$ ,  $p < .05$ ) subscales of the ASQ.

## H. Demographics

### 1. Overview

The analysis of the relations between the demographic data and the PBI was conducted in order to see whether participants responded differently depending on their age, diabetes type and the number of years elapsed since the diagnosis with diabetes. The links with the demographics were also checked for the ASQ, HPRS, and BDIR.

### 2. Demographics and the PBI

#### a. Demographics and Learned Helplessness

Correlations were conducted to evaluate the relations between age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and Learned Helplessness-PBI. Age had a small negative correlation with Learned Helplessness-PBI ( $r = -.178$ ,  $p < .01$ ).

A hierarchical regression analysis was performed to examine the effect of age, diabetes type and the number of years elapsed since the diagnosis of diabetes on the subscale of Learned Helplessness-PBI. The indices of age, diabetes type, and the number of years elapsed since the diagnosis of diabetes, were used as covariates. The subscale of Learned Helplessness-PBI was used as a dependent variable.

Age was entered in Step 1 of the analysis, and contributed to 3.4% of the variance in overall Learned Helplessness reported by the participants,  $\Delta F = 2.95$ ,  $p < .05$ .

Diabetes type was entered in Step 2, and contributed an additional .03% of the variance,

$\Delta F = .46$ , ns. The number of years elapsed since the diagnosis of diabetes was entered in the final step of the analysis, and contributed .01% of the variance,  $\Delta F = .12$ , ns.

#### b. Demographics and Psychological Reactance

A correlational analysis was conducted to evaluate the relations between age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and Psychological Reactance-PBI. Age had a small negative correlation with Psychological Reactance-PBI ( $r = -.22$ ,  $p < .01$ ).

A hierarchical regression analysis was performed to examine the effect of age, diabetes type and the number of years elapsed since the diagnosis of diabetes on the subscale of Psychological Reactance-PBI. The indices of age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and the number of years squared were used as covariates. The subscale of Psychological Reactance-PBI was used as a dependent variable.

Age was entered in Step 1 of the analysis, and contributed to 5.8% of the variance in overall Psychological Reactance reported by the participants,  $\Delta F = 5.09$ ,  $p < .01$ . Diabetes type was entered in Step 2, and contributed an additional 1.9% of the variance,  $\Delta F = 3.41$ , ns. The number of years elapsed since the diagnosis of diabetes was entered in the final step of the analysis, and contributed less than .01% of the variance,  $\Delta F = .013$ , ns.

### c. Demographics and Dysfunctional Expectations

A correlational analysis was conducted to evaluate the relations between age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and Dysfunctional Expectations-PBI. There was a trend toward a correlation between the diabetes type and dysfunctional expectations ( $r = .123$ ,  $p = .055$ ).

A hierarchical regression analysis was performed to examine the effect of age, diabetes type and the number of years elapsed since the diagnosis of diabetes on the subscale of Dysfunctional Expectations-PBI. The indices of age, diabetes type, and the number of years elapsed since the diagnosis of diabetes were used as covariates. The subscale of Dysfunctional Expectations-PBI was used as a dependent variable.

Age was entered in Step 1 of the analysis, and contributed to 0.8% of the variance in overall Dysfunctional Expectations reported by the participants,  $\Delta F = .64$ , ns. Diabetes type was entered in Step 2, and contributed an additional 1.6% of the variance,  $\Delta F = 1.34$ , ns. The number of years elapsed since the diagnosis of diabetes was entered in the final step of the analysis, and contributed 2.7% of the variance,  $\Delta F = .94$ , ns.

A slight negative correlation was found between the Dysfunctional Expectations-PBI and income as measured by the postal code ( $r = -.16$ ,  $p < .05$ ).

### 3. Demographics and the ASQ

A series of correlational analyses was conducted to evaluate the relations between age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and the composite subscales of the Attributional Style Questionnaire. The Composite Attributional Style and Hopelessness subscales were significantly negatively correlated with age ( $r = -.30$ ,  $p < .01$  and  $r = -.39$ ,  $p < .05$ , respectively).

#### 4. Demographics and the HPRS

A series of correlational analyses was conducted to evaluate the relations between age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and the subscales of the Hong Psychological Reactance Scale. The Emotional Response Toward Restricted Choice subscale was negatively correlated with age ( $r = -.29, p < .01$ ) and diabetes type ( $r = -.22, p < .01$ ). Both the Reactance to Compliance and Resisting Influence from others subscales were significantly negatively correlated with age ( $r = -.24, p < .01$  and  $r = -.16, p < .05$ , respectively).

#### 5. Demographics and the BIDR

A series of correlational analyses was conducted to evaluate the relations between age, diabetes type, the number of years elapsed since the diagnosis of diabetes, and the subscales of the Balanced Inventory of Desirable Responding. The Impression Management Subscale was positively correlated with age ( $r = .18, p < .05$ ).

#### I. Body Mass and Metabolic Control

Finally, a series of correlational analyses was performed to evaluate the relation between the subscales of the PBI and the indices of body mass and metabolic control. Only those participants whose A1C was collected within the 13 weeks prior to the study were included for the latter. The scores on the subscale of Learned Helplessness ( $r = .25, p < .05$ ) were positively related to the blood glucose levels assessed within the 13 weeks prior to the study.

#### J. An alternative data analysis.

As an alternative way of looking at the data, a series of principal component analysis (PCA) were conducted to examine the relationships between only those items that were pre-selected in the first study to possibly tap a particular psychological construct. Thus, only 18 items initially selected as representative of the dimension of learned helplessness were used for the first factor analysis; the 22 items selected as representative of the dimension of dysfunctional expectations were used for the second analysis; and finally, the 30 items selected as representative of the dimension of psychological reactance were used for the third factor analysis. These procedures were done to evaluate the possibility that a different set of items with better psychometric properties might be obtained when the three categories of items are examined separately rather than in a 70-item matrix.

A Principal Components Analysis (PCA) with an oblique rotation was conducted to evaluate the relationships between 18 items possibly tapping the dimension of learned helplessness. A “relaxed”, Kaiser criterion (eigenvalues  $> 1.0$ ) was used to choose factors. A 3-factor structure emerged and was examined in terms of its interpretability.

The first factor included items representative non-equivocal expression of Learned Helplessness (for example, “I am afraid that I will get diabetes complications, no matter what I do to manage it”; “When trying to follow my diabetes care plan, my diabetes feels like a train going 100 miles an hour, and I am out there on the tracks trying to stop it”). This factor accounted for 29% of the variance. The items loading on the factor 2 included items that represented a fatalistic and resigned approach to diabetes care (for example, “I eat what I want to eat because when it is my time to die, I will die”; I

often feel like I just do not care about managing my diabetes anymore”). The third factor was non-interpretable.

Only seven items clearly loaded on the factor 1. These seven items are the same items that are included in the final version of the PBI, which is based on my original analyses. Two additional items that are included in the final version of the PBI (i.e., “I often feel that diabetes is overwhelming, and I want to give up managing it” and “In managing my diabetes, I feel that somewhere along the line, I’ve lost the happiness that I once had”) loaded on the factor 1, but tended to share variance with the items loading on factors 2 and 3 respectively. As these two items were selected for the final scale of the PBI based on a number of criteria, including their psychometric properties as well as the importance of their content, there were kept in the final version of the PBI.

A Principal Components Analysis (PCA) with an oblique rotation was conducted to evaluate the relationships between 22 items possibly tapping the dimension of dysfunctional expectations. A “relaxed”, Kaiser criterion (eigenvalues  $> 1.0$ ) was used to choose factors. There were six components extracted, but the rotation failed to converge in 25 iterations, and no factors emerged as a result of this procedure. Therefore, the items that were selected on the basis of the original data analysis described in the earlier sections of this chapter, were kept in the final version of the PBI.

A Principal Components Analysis (PCA) with an oblique rotation was conducted to evaluate the relationships between 40 items possibly tapping the dimension of psychological reactance. A “relaxed”, Kaiser criterion (eigenvalues  $> 1.0$ ) was used to choose factors. There were eight components extracted, but the rotation failed to converge in 25 iterations, and no factors emerged as a result of this procedure. Therefore,

the items that were selected on the basis of the original data analysis described in the earlier sections of this chapter, were kept in the final version of the PBI.

To consider another possibility, two separate PCAs were conducted to examine the relationships between the items possibly representative of psychological reactance in response to perceived behaviour of health service providers and psychological reactance in response to perceived behaviour of family members and friends.

A Principal Components Analysis (PCA) with an oblique rotation was conducted to evaluate the relationships between 16 items possibly tapping the dimension of psychological reactance in response to perceived behaviour of health care providers. A “relaxed”, Kaiser criterion (eigenvalues  $> 1.0$ ) was used to choose factors. A five-factor structure emerged and was examined in terms of its interpretability. Although the four items that clearly loaded on factor 1 were conceptually similar to each other, they were not identifiably different from the items that clearly loaded on factor 2 or 3. For example, the items “In managing my diabetes, I resent that health care workers seem to be telling me that they know better than I about what is going to work for me” and “I get angry when health care workers tell me how to follow my diabetes care plan, for example, have breakfast, because I feel it limits my choices, for example, a choice of sleeping in” loaded on factor 1, while the item “I get mad if health care workers tell me they need to see my blood sugar record book” loaded on factor 2.

A Principal Components Analysis (PCA) with an oblique rotation was conducted to evaluate the relationships between 12 items possibly tapping the dimension of psychological reactance in response to perceived behaviour of health care providers. A

“relaxed”, Kaiser criterion (eigenvalues  $> 1.0$ ) was used to choose factors. A two-factor structure emerged and was examined in terms of its interpretability.

The items loading on the factor 1 represented non-equivocal expressions of reactance (for example, “I am fed up with my family or friends telling me what I have to do to manage my diabetes”). The items loading on the factor 2 were composed of items that were the antithesis of psychological reactance; that is, reversed items (for example, “When my family or friends encourage me to follow my diabetes care plan better, I feel motivated to work hard on it”). Note that reversed items had been recoded to match positive items. All the items clearly loaded on one of the two factors, with minimal shared variance. A subscale of Psychological Reactance in response to the perceived behaviours of family and friends could constitute an alternative to the subscale included in the final version of the PBI. However, many of these items were considered “problematic” in my earlier analyses, for example, the distribution for the item “In managing my diabetes, it feels like family or friends are trying to take away my freedom” was highly skewed, as 47% of respondents chose option 1 from the 7 options. (The remainder of the respondents chose options 2 and 3). Therefore, the items selected for the PBI on the basis of the original data analyses were kept in the final version of the PBI.

## **CHAPTER 4**

### **STUDY 3: TEST-RETEST RELIABILITY**

#### **I. Methods**

##### **A. Participants**

There were 51 participants diagnosed with diabetes mellitus taking part in the 2 week test-retest study. Those individuals that participated in Study 2 of the study were invited to participate in Study 3, with the goal of recruiting 50 participants. Every participant was invited to participate in the study until the desired number was reached. In order to achieve a representative sample of participants diagnosed with type 1 diabetes, an attempt was made to continue to ask these participants even after the total number of 50 was recruited. To be eligible for the study, individuals had to have participated in Study 2 and to have been able to return for reassessment in approximately two weeks.

##### **B. Materials and Procedure**

Upon arrival, participants read and signed an informed consent form. Then they were administered a questionnaire package consisting of several of the self-report measures used in the Phase II of the study. These measures included the PBI, the HPRS, the ASQ and the BDIR (see pp. 38 - 41 for a description of the measures). Participants were reimbursed \$15 to defray childcare and transportation costs associated with their participation in the study.

## II. Results

### A. Sample Characteristics

There were 27 men and 24 women taking part in the study. The average age of the participants was 57.33 (SD = 12.52). Out of these, 80.4% were diagnosed with type 2 diabetes, and 19% were diagnosed with type 1 diabetes. The average length of the time elapsed since the initial diagnosis was 16.94 years (SD = 10.56, range = 2-51). For participants diagnosed with type 1 diabetes, the average length of the time elapsed since the initial diagnosis was 23 years (SD = 13.42, range = 7 – 51). For participants diagnosed with type 2 diabetes, the average length of the time elapsed since the initial diagnosis was 15.46 years (SD = 9.35, range = 2 – 40).

All participants identified themselves as Caucasian. The majority of the participants were married or common-law (72.5%), 11.8% were single, 9.8% were divorced, and 5.9% were widowed. The average number of people living in a participant's household, including the participant was 2.27 (SD = 1.02, range = 1-5).

The number of years of formal education obtained by the participants ranged from 4 to 23 ( $M = 13.65$ , SD = 3.83). Most of the participants were retired (43.1%) or full-time employed (43.1%), 7.8% were unemployed, .3.9% were part-time employed and 2% were self-employed. In terms of the location, 80.4% of the participants lived in the Halifax Metro Region, and the remaining participants resided in other parts of Nova Scotia. Participants' postal codes were used to obtain the information on the average household income in 2001 from the STATS Canada (Census of Canada, 2001). The

average household income for the postal codes reported by participants was \$58, 240 (SD = \$11, 980, range = \$39, 120 – \$82, 450).

The Body Mass Index (BMI) was computed using a formula, based on the participants' height and weight. The average BMI was 32.7 (SD = 6.30, range = 20.7 – 48.7). The average BMI of the participants diagnosed with type 1 diabetes was 27.03 (SD = 3.78, range = 20.7 – 33.4). Out of participants diagnosed with type 1 diabetes, 20% had a BMI within a normal range, 50% had a BMI ranging from 25 to 29.9 (overweight), and 30% had a BMI ranging from 30 to 34.9 (Obese Class I). The average BMI of the participants diagnosed with type 2 diabetes was 34.09 (SD = 5.82, range = 22.1 – 48.7). Out of these, 4% had a BMI within a normal range, 19% had a BMI ranging from 25 to 29.9 (overweight), 36% had a BMI ranging from 30 to 34.9 (Obese Class I), 29% had a BMI ranging from 35 to 39.9 (Obese Class II), and 12% had a BMI equal or above 40 (Obese Class III).

In order to manage their diabetes, the majority of the participants diagnosed with type 1 diabetes were on insulin (90%) and 10% were using an insulin pump. For those participants who were not using an insulin pump, the number of injections per day ranged from 2 to 5 (M = 3.63, SD = 1.19).

The majority of the participants diagnosed with type 2 diabetes were on insulin (41.5%), 29.3% were taking oral medications such as metformin, 22% were taking both insulin and oral medications, and 7.3% managed their diabetes by diet and exercise alone. For those participants who used insulin injections, the number of injections per day ranged from 1 to 5 (M = 2.42, SD = 1.06).

Data on A1C was available only for 38 participants (74% of the sample). The location where the bloodwork was collected is known for 25 participants; 45.1% of those had their bloodwork done at the QEII. The average time elapsed between the bloodwork collected and participation in the study was 17.19 weeks ( $SD = 28.15$ , range = 1 – 167). A statistical adjustment was made to the data on A1C that was collected at the locations other than the QEII. For each of the non-QEII laboratories, the scores were converted to proportion of the upper limit of normal range, using the formula:  $X/\text{upper limit}$ . Then these proportions were reconverted to an A1C value using the QEII referents (7% is the upper limit for the QEII).

After adjusting the data, the average A1C was 7.97 ( $SD = 1.44$ , range = 5.2 – 11.2). For participants diagnosed with type 1 diabetes, the average A1C was 8.67 ( $SD = 1.42$ , range = 7.1 – 11.2). All the participants diagnosed with type 1 diabetes had A1C above the healthy range (i.e.,  $> 6.5$ ). For participants diagnosed with type 2 diabetes, the average A1C was 7.72 ( $SD = 1.39$ , range = 5.2 – 10.3). Out of these, 85% had A1C above the healthy range (i.e.,  $> 6.5$ ).

### B. Test-Retest Reliability

A series of correlational analyses were conducted to evaluate the test-retest reliability of the final, 9-item subscales of the PBI (27 items in total). Both the Learned Helplessness and Dysfunctional Expectations subscales demonstrated acceptable reliabilities ( $r = .74$  and  $r = .72$  respectively,  $p < .01$ ). The test-retest reliability of the Psychological Reactance was below acceptable levels ( $r = .55$ ,  $p < .01$ ).

## **CHAPTER 5**

### **DISCUSSION**

#### **I. Overview**

The goal of this exploratory research was to develop and validate a diabetes-specific measure assessing three psychological barriers to diabetes self-care, specifically Psychological Reactance, Learned Helplessness, and Dysfunctional Expectations. The first study was designed to generate a list of possible items and select a manageable number for future validation. The second study was designed to evaluate the psychometric properties of the items selected in the first study, and to further reduce the number of items to form the final scale, the Psychological Barriers Inventory (i.e., the PBI). In this way, the items that were included in the PBI were considered “best”, both in terms of their psychometric qualities as well as from a phenomenological point of view (i.e., high face or content validity). The third study was designed to evaluate the test-retest reliability of the PBI.

#### **II. Item development**

Seventy items for the Psychological Barriers Inventory were generated using the focus groups method and expert review.

The data from the focus groups was examined using a content analysis. The focus groups generated 841 statements that were transformed into potential items of the future scale. A large number of participants endorsed statements representative of the psychological barriers in question (i.e., psychological reactance, learned helplessness, and dysfunctional expectations), suggesting that, to the extent that the focus group

sample is representative of those living with diabetes, these psychological phenomena are not rare, and are considered relevant to living with diabetes.

While the focus groups provided us with rich and meaningful data, some of the potential limitations of the focus group method merit discussion.

First, the interaction of participants with each other may bias participants' responses, such that individual participants might have agreed with a more dominant group member even if they did not hold this endorsed opinion (Stewart & Shamdasani, 1990). Second, while every effort was made to minimize the bias associated with a focus group facilitator, it is possible that some members of the group still attempted to provide answers that they may have perceived as "desirable".

Third, owing to several no-shows, our sample sizes were somewhat smaller than the recommended 6-12 participants per group (Stewart & Shamdasani, 1990) or 6-8 participants per group for noncommercial topics (Krueger & Casey, 2000.) It is possible that some important ideas that were not discussed would have been uncovered in a larger group.

With regard to the content analysis, the first inter-rater agreement analysis of items was unacceptably low. A large number of narrowly defined categories (11) and the relative unfamiliarity of one of the raters (a person with an undergraduate psychology degree who was not extensively trained by the principal investigator) with the concepts under investigation (i.e., psychological reactance, learned helplessness, and dysfunctional expectations) likely contributed to this low inter-rater agreement.

Further examination of the 11 categories that were used for this analysis indicated that they were, to a large extent, redundant. While devising these categories, the principal investigator attempted to separate behavioural tendencies from emotional reactions in order to elucidate the complex phenomena of psychological reactance and learned helplessness. Another distinction involved separating items that should be scored positively from negatively scored items. This level of differentiation may have negatively affected the inter-rater agreement, as it likely proved confusing to the second rater.

The second rater was an undergraduate research assistant who did not possess any prior knowledge of the psychological barriers to diabetes self-care. Her relative inexperience might have played a role in contributing to the low inter-rater agreement. As the second rater was asked to rank a very large number of similarly phrased items, the task might have been too overwhelming, which would have also contributed to the low inter-rater agreement.

Based on these results, we reformulated the categories to simplify them to the basic constructs of interest. This revised categorization scheme resulted in 3 categories and in a much improved inter-rater agreement. Also, the second rater in this re-analysis was the principal investigator's supervisor (M. V.), who had the in-depth knowledge of the psychological barriers in question based on his clinical and academic work with patients with diabetes.

The expert review component of study 1 also warrants discussion. Unfortunately, this procedure was of mixed use, primarily due to the lack of validity of the numerical ratings of item representativeness. These ratings were inconsistent with written

comments, and the inter-rater agreement for them was unacceptably low. These difficulties likely stemmed from a number of factors, such as length and linguistic complexity of the proposed task and the heterogeneity of the expert population.

It is possible that the experts found the lengthy questionnaire fatiguing, and demonstrated a subsequent decrease of accuracy when ranking the items. Indeed, the experts who declined to participate in the study cited the time required to complete it as their major reason for refusing. It is also possible that the experts who did complete the task did it in stages, which might have affected the ratings. Indeed, some of the experts personally communicated to the investigator that the task was completed over several days. Their operational definition of what is the most representative item might have changed over time.

In addition, it is difficult to provide clearly differentiating numerical rankings when individuals are asked to rank a large number of similarly phrased items. Differences between the items may have been too subtle to be accurately reflected by numerical rankings when using a Likert-type scale.

In retrospect, some of the experts that we invited to participate in the study were not familiar with the task of providing rankings for items, and may have found the task too overwhelming. The area of expertise most relevant to this study is the combination of familiarity with the psychological concepts of psychological reactance, learned helplessness and dysfunctional expectations as well as diabetes. We could not find a sufficient number of experts that would have an in-depth understanding of psychological constructs as well as of area of diabetes. We chose individuals who were either psychologists, only one of which specialized in diabetes,

or certified diabetes educators. So, the psychologists might have been familiar with the constructs but limited in their understanding of these constructs within diabetes. The diabetes educators were clearly expert in diabetes management but limited in their understanding of the psychological constructs. Consistent with this, informal feedback from the certified diabetes educators suggested that they experienced difficulties while completing the questionnaire. As well, not all the psychologists were a priori familiar with the psychological constructs under investigation.

In retrospect, we could have provided an educational session for the experts teaching them how to provide numerical rankings, discussing the psychological constructs under investigation, and living with diabetes. The failure to do so could be seen as a weakness of this study. At the same time, the difficulty in finding appropriate experts reflects the current state of the field in diabetes management. That is, the role of psychological factors in diabetes is just beginning to be recognized, and psychologists, at the present time, do not play a large role in diabetes management. The fact that experts in diabetes management are not familiar with psychological concepts and that psychologists are not experts in diabetes management is one of the motivating factors behind the desire to develop valid psychometric measures of psychological processes in diabetes. Providing training to familiarize the raters with the concepts under investigation begs the question as to whether these individuals would then qualify as experts. For practical reasons, it was beyond the scope of this study to attempt to recruit raters from across the continent, or internationally.

The written comments provided by the experts identified redundant items, contained jargon or value-laden words, or lacked face or content validity. The experts

indicated whether they found any item particularly poorly worded, and suggested potential revisions. Despite being somewhat limited in their understanding of the psychological constructs in diabetes, the experts demonstrated excellent knowledge of what constituted an item that was easy to understand and was non-ambiguous. Following the experts' suggestions, we eliminated the items that were difficult to revise, and incorporated the input of the experts into further revisions of the items used in the Psychological Barriers Inventory.

There were 70 items selected for further evaluation. These items included 30 items assessing diabetes-specific psychological reactance, 18 items assessing diabetes-specific learned helplessness, and 22 items assessing diabetes-specific dysfunctional expectations. Under the heading of psychological reactance, we included items assessing reactions to perceived behaviour of health care professionals and items assessing reactions to perceived behaviour of family and friends.

### III. Psychometric Properties and Further Selection of the Items

#### A. Overview

In study 2, the psychometric properties of the individual items, the relationships between them, and the validity of the Psychological Barriers Inventory were analyzed.

The statistical analyses included:

- 1) evaluating item comprehensibility ratings and the pattern of responding,
- 2) using a factor analytic calculation to extract the relationships between the items,

- 3) evaluating the initial communalities of the items and the final communalities of the items after the factor solution,
- 4) evaluating the mean sampling adequacies (MSA) of each item,
- 5) and conducting a factor solution to help clarify functions of each subscale.

To further reduce the number of items, all this information was taken into account, and those items that were flagged as questionable in one of the 5 analyses were considered for elimination. At the same time, clinical judgement was used to decide whether an item was contributing “unique” information. Thus, the final decision on whether to keep a particular item was done taking into account its “performance” in each analysis and its potential importance to the future measure.

It could be argued that using a recursive (non-linear) process to select the “best” items introduced unacceptable subjectivity into scale construction, as it would be susceptible to the investigator’s bias. At the same time, we felt that it was important for our research to remain grounded in its clinical relevance and the phenomenology of the barriers of interest. Specifically, one of the items included in the PBI did not load on any of the factors with the other items, but represented a unique contribution in terms of its content (When it comes to following my diabetes care plan, I tend to be an all-or-nothing type of person”).

The resulting PBI consisted of 27 items, 9 for each of the 3 subscales (Psychological Reactance, Learned Helplessness, and Dysfunctional Expectations). An equal number of items for each subscale was decided a priori.

## B. Reliability and Convergent validity of the PBI

The Learned Helplessness-PBI subscale of the PBI demonstrated good levels of internal consistency, and the Dysfunctional Expectations-PBI subscale showed acceptable levels of internal consistency. However, the results revealed that the Psychological Reactance-PBI subscale demonstrated poor reliability (.63), according to the cut-offs suggested by Nunnally (1978).

It is possible that heterogeneity of the items comprising the Psychological Reactance-PBI subscale contributed to its lower internal consistency. The multidimensional nature of psychological reactance has been highlighted by a number of researchers (e.g, Buboltz, Thomas, & Donnell, 2002; Hong & Faedda, 1996). Moreover, Hong and Faedda (1996) suggested in relation to their own revised Hong Psychological Reactance Scale (HPRS; Hong & Faedda, 1996; Hong & Page, 1989) that it might be more appropriate to take a multi-dimensional approach and use four factor subscales as opposed to considering the scale in its entirety.

In our investigation, a principal component factor analysis revealed that items describing psychological reactance loaded on 3 factors. These factors included a factor representing unequivocal expressions of psychological reactance, a factor representing the antithesis of psychological reactance, and a factor where items focused on a sense of keeping personal freedom and control. While we considered a possibility of three separate subscales of the psychological reactance, a subscale containing only three or two items would have had even lower internal consistency and would have suffered from other methodological shortcomings as well. (Indeed, when we conducted reliability checks for the HPRS in our study, the whole scale demonstrated good levels of internal

consistency, but the individual “subscales” showed levels of internal consistency ranging from .58 to .74). Had we included more items in our subscale of Psychological Reactance-PBI, we would have retained more ambiguous items with poor psychometric properties and would have further compromised the quality of the PBI. Future research might refine the scale of diabetes-specific Psychological Reactance-PBI by including more well-defined items with acceptable psychometric properties and identifying factors that may tap into particular subscales of such a scale.

The Learned Helplessness-PBI subscale scores showed generally good convergent validity with the scores on the ASQ. Consistent with our tentative hypothesis, the Learned Helplessness-PBI scores correlated with the Composite Negative Attributional Style subscale as well as with a number of individual subscales of the ASQ, including the Helplessness subscale.

The scores on the Dysfunctional Expectations-PBI subscale also positively correlated with the subscales of the ASQ measuring negative attributional style. As previously discussed, the three subscales in our study were not completely orthogonal, and a number of items loaded on factors tapping into more than one subscale, for example Learned Helplessness and Dysfunctional Expectations. It is possible that the correlation between the Dysfunctional Expectations-PBI subscale and the subscales of the ASQ reflected this inter-relation between the subscales.

The Psychological Reactance-PBI subscale scores were negatively correlated with the subscales of ASQ measuring the Positive Attributional Style. At the same time, there was no significant relation between the scores on the Psychological Reactance-PBI subscale and the subscales of ASQ measuring the Negative Attributional Style. This

suggests an intriguing notion that individuals who experience high levels of diabetes-specific psychological reactance do not attribute positive events that happen to them to their own abilities, and yet do not perceive negative events as global, stable and attributable to internal causes. It should be noted that one of the subscales of the HPRS, a generic reactance scale used in this study was positively correlated with the Composite Negative Attributional Style and Hopelessness subscales. One possibility is that individuals who experience high levels of overall reactance *do* view negative events as attributable to global, internal and stable causes. Individuals experiencing diabetes-specific psychological reactance may focus on external causes – the illness itself or the others who are perceived as trying to take away their freedom. In this case, positive events may also be regarded as due to external causes, perhaps to unpredictable factors that may affect their blood sugar levels for better or for worse.

Consistent with our exploratory hypothesis, the subscale of Psychological Reactance-PBI demonstrated good convergent validity with all the subscales of the HPRS. The analyses revealed moderate correlations between the subscale of Psychological reactance and all the subscales of the HPRS (ranging from  $r = .27$  to  $r = .38$ ,  $p < .01$ ). Thus, individuals that score high on a measure of diabetes-specific psychological reactance might be more likely to experience high levels of generic reactance as well.

In addition, the scores on the subscale of Dysfunctional Expectations-PBI were positively correlated with one of the subscales of the HPRS, the Emotional Response Toward Restricted Choice. Again, our subscales were not orthogonal, and some items

were potentially tapping into more than one construct. The non-orthogonal nature of our scale is the most likely explanation for this correlation.

The diabetes-specific Learned Helplessness-PBI scores were also positively correlated with two subscales of the HPRS, specifically the Emotional Response Toward Restricted Choice and Reactance Toward Advice and Recommendations. This is consistent with the correlations seen between the ASQ subscales measuring negative attributional style and hopelessness, and further supports the notion of good convergent validity between our subscale of Learned Helplessness-PBI and the ASQ.

The results revealed a negative relationship between the scores of the Learned Helplessness-PBI and Dysfunctional Expectations-PBI subscales and the scores on the Deceptive Self-Enhancement subscale of the BDIR. The scores of the ASQ Negative Attributional Style and Hopelessness subscales, on the other hand, correlated with both the Deceptive Self-Enhancement and Impression Management subscales. In addition, the scores of the HPRS subscales significantly correlated with the Impression Management subscale scores, while there was no relation between the Impression Management scores and the diabetes-specific Psychological Reactance-PBI scores.

These findings suggest that individuals who score high on a generic learned helplessness scale present themselves in a more negative light as compared to the general population both to themselves (Deceptive Self-Enhancement) and the audience (Impression Management), while individuals who score high on a generic psychological reactance scale, such as the HPRS, present themselves in a more negative light only to the audience (Impression Management). It is possible that the latter individuals genuinely

do not care what their audience thinks of them or they would like to shock their audience and to demonstrate how little the public opinion matters to them.

The situation is very different for individuals who score high on the diabetes-specific Learned Helplessness-PBI and Dysfunctional Expectations-PBI subscales. These individuals tend to give “deflated” self-descriptions and see themselves in a more negative light as compared to the general population (i.e., the opposite of Deceptive Self-Enhancement). At the same time, their presentation to the audience (Impression Management) is not significantly different from the general population, suggesting that these individuals want to make a positive impression. These findings suggest that while an individual scoring high on the Learned Helplessness-PBI or Dysfunctional Expectations-PBI might report feeling hopeless and discouraged or holding unrealistic expectations regarding the process of change, she may try to minimize and gloss over her negative thoughts and feelings when interacting with others.

The scores of the diabetes-specific Psychological Reactance-PBI subscale showed no relation with either the Deceptive Self-Enhancement or Impression Management subscale, suggesting that individuals who experience high levels of diabetes-specific psychological reactance want to come across in the same way the general population does. This possibility may point toward a partial explanation as to why the struggles of individuals who are having difficulties with the psychological barriers to self-care so often go unnoticed in the medical system. These individuals are not more likely to exaggerate their symptoms in order to call attention to themselves, and are as concerned with creating a positive impression as are those people who do not experience any difficulties while managing their diabetes. Therefore, it becomes an attending clinician’s

responsibility to assess for any difficulties such individuals may experience while managing their diabetes, as the individuals with diabetes themselves may not volunteer this information. The purpose of the Psychological Barriers Inventory is to be a helpful tool to health care professionals attempting to assess the psychological barriers to diabetes self-care.

### C. Relations Between the Demographic Characteristics and the Subscales of the PBI

The results revealed a negative relation between the scores of Learned Helplessness-PBI subscale and age. In addition, the scores of the ASQ were also significantly negatively correlated with age in our study. However, these findings are partially inconsistent with the existent literature on age differences in attributional style. Specifically, Lachman (1900) showed that older adults are more likely than young adults to attribute bad events to stable causes (which would actually suggest higher levels of learned helplessness) and specific causes (which would suggest lower levels of learned helplessness). Thus, an older adult experiencing a bad event would expect it happen again in a similar situation, but would not expect it to generalize to other situations, which is not learned helplessness. In addition, Jolley (1984) investigated levels of susceptibility to learned helplessness, and found that it increased as a function of age.

In our study, we found that only the Composite Negative Attributional Style subscale of the ASQ had a negative correlation with age, while individual subscales of the ASQ, such as the Stable Negative and Global Negative subscales, did not demonstrate any significant relations with age. It is possible that these particular relations became

obscured as we did not have a sufficiently large sample of very young adults (indeed, the mean age of our sample was 57.59, with a standard deviation of 13.09).

On the other hand, it is possible that there is something different about individuals who experienced high-levels of diabetes-specific learned helplessness from the general population. Perhaps, individuals who developed learned helplessness as a result of dealing with diabetes have learned to be more philosophical about the fluctuations experienced in their blood glucose levels and more confident in their ability to manage the illness. It is not entirely clear why they would also be experiencing lower levels of generic learned helplessness as measured by the ASQ, although it is possible that the confidence in regards to diabetes management would generalize to other areas of these individuals' lives. Interestingly, the levels of learned helplessness were not affected by the amount of time elapsed since the diagnosis of diabetes, and it was simply being older per se that seemed to make a difference. Future research may attempt to replicate our results and elucidate the relations between learned helplessness as a trait, diabetes-specific learned helplessness, and age.

One more possibility to consider is that older individuals simply try to present themselves as more "functional", that is, reporting lower levels of learned helplessness than they actually experience. Our finding of a slight positive correlation between the Impression Management subscale of the BDIR and age would support this possibility.

The scores of the Psychological Reactance-PBI subscale were also negatively correlated with age. The scores of the three subscales of the HPRS had a negative correlation with age as well. These findings are consistent with the previous literature (Hong et al., 1994). Hong and his colleagues (1994), for example, found that older

participants in their study demonstrated lower levels of psychological reactance. Hong proposed that as individuals mature, they might find fewer situations threatening to their sense of personal freedom. In addition Brehm and Brehm (1981) suggest that older individuals could have better skills in dealing with various dimensions of reactance, including establishing a freedom, prioritizing its importance, and acquiring competence and higher motivation to exercise their personal freedom.

There was a small negative correlation between the subscale of Dysfunctional Expectations-PBI and income as measured by the postal code. It may be possible that individuals in a higher income bracket would have a better access to journals about health care, to personal trainers or nutritionists outside of the public health care system, and therefore be better educated about the process of changing their lifestyles than less affluent individuals. It is also easier for individuals in a higher income bracket to afford the food represented in an appropriate diet for diabetes. In this case, the crucial factor would be having higher levels of health care-specific education, as there was no significant relation between the levels of formal education and the scores of Dysfunctional Expectations-PBI subscale. This possibility is consistent with our proposed intervention for individuals who score high on the Dysfunctional Expectations-PBI subscale. We propose that providing education regarding the process of making changes to their lifestyles could help individuals with diabetes adjust their expectations and experience fewer setbacks when trying to manage their diabetes. One possibility for future research would be developing a manualized psychoeducational intervention to help individuals deal with their dysfunctional expectations.

One of the demographic characteristics of our sample was an important limitation to the generalizability of our findings. Although it had been planned to recruit multiculturally diverse participants, 167 individuals out of 169 identified themselves as Caucasian (White) on the demographic characteristics questionnaire. It is possible that Blacks or the members of the First Nations, for example, would show a different pattern of responding, and their scores on the subscales of the PBI would demonstrate different relations with all measures of interest.

#### D. Relations of the PBI with Glycemic Control and Body Mass Index

A positive relation between the scores of Learned Helplessness-PBI and A1C levels was shown in a correlational analysis. As only A1C levels collected 13 weeks or less prior to the study at a known location were included for this analysis, the sample of the participants' scores eligible for this analysis was considerably smaller than the original sample of 169. The fact that statistical power for this analysis was lower compared to other analyses underscores the strength of the relation between A1C levels and Learned Helplessness-PBI.

As the A1C levels were collected prior to participants' entering the study, it is impossible to speculate about the causality of the relationship. It is possible that individuals experiencing and reporting higher levels of diabetes-specific learned helplessness experienced a rise in their blood glucose levels as a result of it. They might feel too helpless to even attempt to manage their diabetes, or their emotional state could be affecting their sugar levels via physiological pathways. It is also possible that individuals whose blood glucose levels spin out of control and are unpredictable start

experiencing diabetes-specific learned helplessness. High blood glucose levels and learned helplessness may influence each other in a vicious cycle, so that the higher the blood glucose levels would rise the more helpless an individual with diabetes would become, and vice versa. Finally, it is possible that both blood glucose levels and reported levels of diabetes-specific learned helplessness are affected by the third, yet unidentified variable. Future research may focus in a longitudinal direction aiming at elucidating the exact nature between diabetes-specific learned helplessness and the measure of metabolic control.

The average body mass index of the participants was within the obese range. For the participants diagnosed with type 1 diabetes, the average BMI was somewhat lower, and fell within the overweight range ( $M = 28.5$ ,  $SD = 4.33$ ). Even these lower numbers are still associated with considerable health risks, and might serve as a flag that an individual with diabetes might be at an increased risk for complications. Future research may examine whether individuals struggling with psychological barriers to diabetes self-care have higher BMIs than individuals who are able to manage their diabetes without facing these particular difficulties.

#### IV. Test-Retest Reliability of the PBI

Two-week test-retest reliabilities for the PBI scores were evaluated with 51 of the participants that took part in the first part of scale validation study. While both the Learned Helplessness-PBI and Dysfunctional Expectations-PBI subscales demonstrated acceptable reliabilities, the Psychological Reactance-PBI subscale showed unacceptable reliability ( $r = .55$ ,  $p < .01$ ). Some of the possible reasons for the unacceptable reliability

of this subscale have been noted in the earlier discussion about the poor internal consistency levels demonstrated by this subscale. Another possibility is that diabetes-specific psychological reactance is a state rather than a trait characteristic, and is heavily influenced by recent interactions that are fresh in an individual's mind. If an individual has experienced an interaction perceived by him/her as nagging or controlling, he/she might be more likely to report higher levels of diabetes-specific psychological reactance. On the other hand, if an individual had recent positive interactions with his/her family, friends or health care professionals, he/she may report lower levels of psychological reactance. Clearly more reliability research and perhaps a refinement of the scale are needed before the subscale of Psychological Reactance-PBI could be adopted with confidence. One of the possible revisions might include adding more items and separating the scale of diabetes-specific Psychological Reactance-PBI into several distinct subscales. The exact number of these subscales would largely depend on the structure of identifiable factors.

## V. Research and clinical implications

The development and validation of the PBI may allow us to identify the base rate with which these three types of psychological barriers to diabetes self-care occur in the population of individuals diagnosed with diabetes. It may also be used as a clinical tool to identify populations at risk of experiencing these health-impairing reactions. The PBI may prove a cost-effective replacement of long interviews that clinicians sometimes have with individuals with diabetes regarding the obstacles to the process of change. Those individuals who do not put emphasis on their individual

struggles in their presentation and might consequently receive less attention in the medical system will not go unnoticed and may be put referred for psychological interventions.

Once individuals with diabetes who are experiencing difficulties with diabetes-specific psychological reactance, learned helplessness and/or dysfunctional expectations have been identified, clinicians will be able to provide them with appropriate, individually tailored interventions. These interventions might range from psychoeducational (for example, when dealing with dysfunctional expectations) to cognitive-behavioural and specific skills development (for example, when addressing learned helplessness) to interpersonal psychotherapy (perhaps identifying relationship impasses when dealing with psychological reactance).

The PBI may serve as a program evaluation tool in assessing the effectiveness of such interventions. Pre- and post- measures of the PBI could be completed by individuals with diabetes; a 6-month follow-up would demonstrate whether benefits from a received intervention remained in place after a period of time. Blood glucose levels may also be assessed in order to evaluate whether the proposed interventions actually result in improved metabolic control, which would significantly lower risk of complications. In addition, intervention studies should evaluate whether reduced levels of psychological barriers would affect individuals' quality of life.

To put the PBI within the contemporary clinical context, it would be interesting to examine its relation to other measures focusing on emotional aspects of diabetes, such as the Problem Areas in Diabetes Survey (PAID; Polonsky, Anderson, Lohrer, Welch, Jacobson, Aponte and Schwartz, 1995). The PAID is another diabetes-specific scale that

measures diabetes-emotional distress as opposed to generic emotional distress, and has been shown to be related to diabetes outcomes, such as A1C (Polonsky et al., 1995). One of the most recent measures of diabetes-related emotional distress, the Diabetes Distress Scale (DDS; Polonsky, Fisher, Earles, Dudl, Lees, Mullan, and Jackson, 2005) assesses four areas of diabetes-specific emotional distress, including emotional burden, physician-related distress, regimen-related distress and diabetes-related interpersonal distress. It is possible that the scores on the subscales of physician-related distress and diabetes-related interpersonal distress would be correlated with the scores on the subscale of Psychological Reactance-PBI, while the scores on the subscales of emotional burden and regimen-related distress would be related with the scores on the subscales of Learned Helplessness-PBI and Dysfunctional Expectations-PBI. However, future research is needed to examine these hypothesized relationships between the PBI and the DDS, two diabetes-specific measures that tap into psychological difficulties faced by individuals with diabetes.

Some of the possibilities for future studies would involve developing a structured interview to assess diabetes-specific psychological reactance, learned helplessness and dysfunctional expectations. Since it is possible that diabetes-specific psychological reactance is a trait rather than a state characteristic, it would be interesting to look at the relation between the levels of diabetes-specific psychological reactance and relevant interpersonal events, their recency, a number of relevant negative or positive interactions with health care workers, family or friends, as well as other factors that may contribute to the development and maintenance of this psychological reaction, including stress, fatigue, and generic emotional distress. Other possibilities for future research include developing

scenarios of hypothetical situations intended to tap into one of the psychological dimensions in question, and measure the direction and the intensity of responses to these scenarios. Finally, event-sampling methodology may be useful as yet another method of assessing the psychological reactions in question.

## VI. Conclusions

Our investigation demonstrated the two subscales of the PBI, specifically Learned Helplessness-PBI and Dysfunctional Expectations-PBI, to be both valid and reliable. A degree of caution is suggested if using the subscale of Psychological Reactance-PBI that may benefit from further refinement. The newly developed PBI may prove a valuable tool in assisting both researchers and clinicians who work with individuals with diabetes and attempt to help them improve their metabolic control and their quality of life.

**Endnotes**

<sup>1</sup> Note that this was obtained using the factor analysis with the maximum likelihood extraction method. The principle components analysis only provides the communalities *after* obtaining the solution (i.e., it does not provide the communalities *before* obtaining a solution, probably because such are not relevant to a principle components factor solution).

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## **Appendix A**

### **Invitation Letter for Study 1**

Dear Madam/Dear Sir,

you are invited to participate in the study titled “Understanding the psychological impact of behavioural recommendations for diabetes self-care: Identifying potential barriers”. This study is conducted by Kris Devoulyte, a doctoral student from Dalhousie University, and her supervisor, Dr. T. Michael Vallis. This study is about psychological reactions that might occur when you are trying to manage your diabetes and when dealing with diabetes health care providers (physicians, nurses, dieticians or psychologists).

The study involves taking part in a discussion group (called a focus group) that will last for an hour and a half. The group will include 10 individuals with diabetes and two researchers. You will be asked to discuss difficulties that you face trying to manage your diabetes under the care of a diabetes health care provider.

You may take part in the study if you:

Are 18 years old or greater,

and have been diagnosed with type 1 or type 2 diabetes,

and have been diagnosed with diabetes for more than a year,

and you are fluent in English,

and you gave your permission for the information you provide in the discussion group to be tape-recorded.

You may not take part in the study if you:

are pregnant.

If you are interested in finding out more about this study, please complete the next page titled “Permission to be Contacted”, and you will receive a call from a researcher in the next two weeks.

A permission to be contacted means you are providing us with your phone number so that we can call you and tell you more about the study. When we call you, you may still choose to not participate in the study.

If you prefer, you may call Kris Devoulyte at (902) 423-5256 or email her at [kdevouly@dal.ca](mailto:kdevouly@dal.ca). She will be happy to answer any questions regarding this study.

**Permission to be Contacted**

**I agree to be contacted in order to find out more about this study. I may decide to not participate in this study at any time.**

**NAME:**

**PHONE NUMBER:**

**BEST TIME TO CALL:**

**Appendix B****Demographic Characteristics Questionnaire, Study 1**

**Demographic Characteristics Questionnaire**

Please answer to the following questions:

1. Age: \_\_\_\_
2. Gender: F \_\_\_\_ M \_\_\_\_
3. Diabetes type: I \_\_\_\_ II \_\_\_\_
4. A number of years diagnosed with diabetes: \_\_\_\_
5. Marital status (circle one of the following):  
a) single   b) married   c) divorced   d) separated   e) widowed
6. A number of people living in your household, including yourself (circle one of the following):  
a) 1      b) 2      c) 3      d) 4      5) more than 4

**Appendix C**  
**Focus Group Script, Study 1**

### Focus Group Script

Today I would like you to discuss your personal experiences in managing your diabetes since you were first diagnosed. In particular, I would like you to think about the interactions that you have had with others about your diabetes and how you should manage it. We will discuss your experiences for the next hour and a half. As discussed in the informed consent form that you have just read, everything said in this room will remain confidential. Please be considerate of your fellow group members, and do not discuss somebody else's experiences outside this session.

Everybody is encouraged to participate in today's discussion. Your opinion is very important to us. However, feel free to stay silent if you don't feel like talking. You may also choose to write down your experiences in the booklet that is provided to you. As it is very important for us to hear about everybody's experiences and we have only 90 minutes, we may not have enough time to go into great detail concerning one particular experience but will try to give everybody an equal opportunity to speak. Please share only what you feel comfortable with.

Can you tell me what it is like to try to manage diabetes day in, day out? Do you ever feel that having diabetes interferes with control in your life; that is, that you have fewer options and less freedom than before you had diabetes? Can you give some examples?

*(The following probes were used if necessary, in a flexible order. The probes regarding issues that had already been addressed by participants were not asked. The input from any particular participant was followed by a question: what about others? has anyone else had similar experiences since you were diagnosed with diabetes?)*

- 1) Is it just the disease itself that limits your control or does it sometimes feel like others are limiting your freedom?
- 2) When you feel that others are taking control away from you what emotions do you experience? What do you feel like doing?
- 3) In trying to manage your diabetes, have you ever had this reaction: you felt that you were pushed to do something, for instance, to exercise more, and your impulse was to do the opposite?
- 4) In trying to manage your diabetes, have you ever lost your enthusiasm because you felt that others were expecting too much from you?
- 5) Do you ever feel at times that living with diabetes is just too much, and you just want to give up? Can you give me some examples of this experience? What makes you feel this way? Does it have anything to do with the difficulty some people experience trying to keep their blood glucose levels under control? When you feel like giving up, what emotion is this?  
In trying to manage your diabetes, have you ever felt that you did not have ability to manage your diabetes?
- 6) When you finally get your blood glucose levels under control how long do you expect this to last? Do you expect that if you do the same thing every day that your blood glucose levels should be about the same?
- 7) Do you sometimes feel that others expect too much from you, that they do not take into consideration how difficult diabetes management can be?

- 8) In trying to manage your diabetes, have you ever felt that it was all or nothing for you? That is, either you were engaging in all self-management behaviours on a regular basis, or whatever you did to control your diabetes didn't count at all.
- 9) In trying to manage your diabetes, have you ever felt that if you were tired, sad or in a tempting situation, it is easier to just forget about self-management activities?

## **Appendix D**

### **The Newspaper Advertisement for Study 2**

### **Assessing Psychological Barriers to Diabetes Self-care**

We are conducting a study on the psychological experience of living with diabetes. You are invited to participate in a study about what it is like to manage your diabetes day in, day out. You will be asked to answer written questions that will take approximately 1 hour. We will also measure your height and weight. The purpose of this study is to better understand the psychological experience of living with diabetes.

This study is conducted by Kris Devoulyte, Dalhousie Ph.D. Candidate, and Dr. Michael Vallis from the QEII Diabetes Management Center. The results of the study will be used as a part of Kris Devoulyte's doctoral research.

You may participate in this study if you have been diagnosed with diabetes for more than a year.

If you are interested in finding out more about this study, please call Kris Devoulyte at 423-5256 or email her at [kdevouly@dal.ca](mailto:kdevouly@dal.ca).

You will be reimbursed for traveling expenses and childcare cost.

**Appendix E****The Pharmacy Advertisement for Study 2**

### **Assessing Psychological Barriers to Diabetes Self-care**

We are conducting a study on the psychological experience of living with diabetes. You are invited to participate in a study about what it is like to manage your diabetes day in, day out. **You will be asked to answer written questions that will take approximately 1 hour.** We will also measure your height and weight. The purpose of this study is to better understand the psychological experience of living with diabetes.

This study is conducted by Kris Devoulyte, Dalhousie Ph.D. Candidate, and Dr. Michael Vallis from the QEII Diabetes Management Center. The results of the study will be used as a part of Kris Devoulyte's doctoral research.

You may participate in this study if you have been diagnosed with diabetes for more than a year.

If you are interested in finding out more about this study, **please call Kris Devoulyte at 423-5256 or email her at [kdevouly@dal.ca](mailto:kdevouly@dal.ca).**

You will be reimbursed for traveling expenses and childcare cost.

## **Appendix F**

### **The Capital Health Advertisement for Study 2**

### **Assessing Psychological Barriers to Diabetes Self-care**

We are conducting a study on the psychological experience of living with diabetes. You are invited to participate in a study about what it is like to manage your diabetes day in, day out. You will be asked to answer written questions that will take approximately 1 hour. We will also need to measure your height and weight. We will ask for your permission to obtain a measure of your blood sugar control from your medical records. The purpose of this study is to better understand the psychological experience of living with diabetes.

This study is conducted by Kris Devoulyte, Dalhousie Ph.D. Candidate, and Dr. Michael Vallis from the QEII Diabetes Management Center. The results of the study will be used as a part of Kris Devoulyte's doctoral research.

You may participate in this study if you have been diagnosed with diabetes for more than a year.

If you are interested in finding out more about this study, **please call Kris Devoulyte at 423-5256 or email her at [kdevouly@dal.ca](mailto:kdevouly@dal.ca).**

Alternatively, please take one of the invitation letters from the envelope and complete a permission to contact form if you are interested in finding out more about this study. You may return a permission to contact form to your health care provider at the Diabetes management center, the Endocrinology Clinic, the Cobequid Multi-Service Centre, or the Dartmouth General Hospital's Diabetes Education Program or put it in the box titled "Psychological Barriers" located in the waiting rooms of these clinics.

You will be reimbursed for traveling expenses and childcare cost.

**Appendix G**  
**Invitation Letter for Study 2**

Dear Madam/Dear Sir,

This letter is to invite you to participate in the study titled “Understanding the psychological impact of behavioural recommendations for diabetes self-care: Psychometric properties of the Psychological Barriers to Diabetes Self-Care Inventory”. This study is conducted by Kris Devoulyte, a doctoral student from Dalhousie University, and her supervisor, Dr. Michael Vallis, a psychologist in the Diabetes Management Centre at the QEII. This study concerns psychological reactions that might occur when you are trying to manage your diabetes.

**The study involves answering written questions that will take about 1 hour.** We will also measure your height and weight. We will ask for your permission to obtain a measure of your blood sugar control (HbA1c) from your medical records.

You may take part in the study if you:

Are 18 years old or greater,  
and have been diagnosed with diabetes for more than a year,  
and you are fluent in English.

If you are interested in finding out more about this study, please complete the next page titled “Permission to be Contacted”, and you will receive a call from a researcher in the next two weeks.

Granting your permission to be contacted means you are providing us with your phone number so that we can call you and tell you more about the study. When we call you, you may still choose to not participate in the study.

If you prefer, you may call Kris Devoulyte at (902) **423-5256** or email her at [kdevouly@dal.ca](mailto:kdevouly@dal.ca). She will be happy to answer any questions regarding this study.

**Permission to be Contacted**

**I agree to be contacted in order to find out more about this study. I may decide to not participate in this study at any time.**

**NAME:**

**PHONE NUMBER:**

**Appendix H**  
**Permission to Obtain A1C from the Chart**

1

**Permission to obtain a medical data from healthcare record (HbA<sub>1c</sub>)**

I hereby give a permission to Kris Devoulyte and her doctoral supervisor Dr. Michael Vallis to obtain the following medical data from my healthcare record: most recent HbA<sub>1c</sub> (a measure of blood glucose control) level. I have been seen in the following service (check all that apply):

#the Diabetes Management Centre, QEII site

#the Endocrinology Clinic, QEII site

#the Cobequid Multi-Service Centre.

#Dartmouth General Hospital Diabetes Education Program

I understand that this information will remain entirely confidential, and will be used only for the research purposes. I understand that the staff members at my clinic that are in charge of medical records will know that I participate in the study. However, they will not see my written answers nor will they see the written records of my height and weight.

Name:

Signature:

Date:

**Appendix I**  
**Permission to obtain A1C from GP**

**Permission to obtain a medical data from my physician (HbA<sub>1</sub>C)**

I hereby give a permission to Kris Devoulyte and her doctoral supervisor Dr. Michael Vallis to obtain the following medical data from my physician: most recent HbA<sub>1</sub>c (a measure of blood glucose control) level. My family physician is:

Name: \_\_\_\_\_

Clinic (where do you see him/her): \_\_\_\_\_

I understand that this information will remain entirely confidential, and will be used only for the research purposes. I understand that my physician will know that I participate in the study. However, he/she will not see my written answers nor will he/she see the written records of my height and weight.

Name:

Signature:

Date:

**Appendix J**  
**Letter to GP**

Dear Dr.,

We are conducting a study that investigates psychological experiences of individuals diagnosed with diabetes. The purpose of the study is to develop and evaluate a scale that will assess psychological reactions that individuals experience when trying to manage their diabetes. We hope that this scale will eventually prove a useful clinical tool, and will help improve quality of care for individuals with diabetes. The study “Understanding the psychological impact of behavioural recommendations for diabetes self-care: Psychometric properties of the Psychological Barriers to Diabetes Self-Care Inventory” has been approved by the Research Ethics Committee of the Capital District Health Authority.

Your patient, Mr/Ms. \_\_\_\_\_ has given us written permission to obtain his/her last measure of glycemic control (HbA<sub>1c</sub>) (the permission is enclosed). Please forward this information to Dr. Michael Vallis at the Diabetes Management Centre, Bethune Site, 5<sup>th</sup> floor, 1278 Tower Rd, QEII, Halifax B3H 2Y9 (phone 473-8635; fax 473-5526 email tvallis@dal.ca).

Sincerely,

Kris Devoulyte, Ph.D. Candidate

**Appendix K**  
**Demographic Characteristics Questionnaire, Study 2**

**Demographic Characteristics Questionnaire**

Participant # \_\_\_\_\_

Please answer to the following questions:

- 1) Age: \_\_\_\_\_
- 2) Gender: F \_\_\_\_ M \_\_\_\_
- 3) Diabetes type: I \_\_\_\_ II \_\_\_\_
- 4) A number of years diagnosed with diabetes: \_\_\_\_\_
- 5) Marital status (circle one of the following):  
a) single b) married c) divorced d) widowed
- 6) A number of people living in your household, including yourself (circle one of the following):  
a) 1 b) 2 c) 3 d) 4 5) more than 4
- 7) Your ethnic background (circle one of the following):  
a)Caucasian b) African Canadian c) Native Canadian d)Asian Canadian  
e) other (please describe) \_\_\_\_\_
- 8) Number of completed years of education: \_\_\_\_\_
- 9) Occupation (circle one of the following):  
a) full-time employed b) part-time employed c) unemployed d) retired e) student
- 10) Postal code: \_\_\_\_\_
- 11) Type of diabetes management:  
a) oral medication; b) insulin; c) insulin and oral medication; d) insulin pump; e) diet and exercise alone.
- 12) If taking insulin, indicate the number of injections per day: \_\_\_\_\_

You do not have to answer the following questions as these measures will be taken today:

- 13) Height (in cm): \_\_\_\_
- 14) Weight (in kg): \_\_\_\_

**Appendix L****Hong Psychological Reactance Scale (HPRS)**

**HPRS** (Hong & Page, 1989; Hong & Faedda, 1996)

Participant #

Using the following scale please choose **one number from 1 to 5** to indicate to what extent you agree with each statement. Circle the chosen number.

1. Regulations trigger a sense of resistance in me.  
1 (disagree completely)   2   3   4   5 (agree completely)
2. I find contradicting others stimulating.  
1 (disagree completely)   2   3   4   5 (agree completely)
3. When something is prohibited, I usually think “that’s exactly what I’m going to do”.  
1 (disagree completely)   2   3   4   5 (agree completely)
4. I consider advice from others to be an intrusion.  
1 (disagree completely)   2   3   4   5 (agree completely)
5. I become frustrated when I am unable to make free and independent decisions.  
1 (disagree completely)   2   3   4   5 (agree completely)
6. It irritates me when someone points out things which are obvious to me.  
1 (disagree completely)   2   3   4   5 (agree completely)
7. I become angry when my freedom of choice is restricted.  
1 (disagree completely)   2   3   4   5 (agree completely)
8. Advice and recommendations induce me to do just the opposite.  
1 (disagree completely)   2   3   4   5 (agree completely)
9. I resist the attempts of others to influence me.  
1 (disagree completely)   2   3   4   5 (agree completely)
10. It makes me angry when another person is held up as a model for me to follow.  
1 (disagree completely)   2   3   4   5 (agree completely)
11. When someone forces me to do something, I feel like doing the opposite.  
1 (disagree completely)   2   3   4   5 (agree completely)

**Appendix M**  
**Balanced Inventory of Desirable Responding (BIDR)**

Participant #  
**BDIR-6** (Paulhus, 1991)

Using the following scale please choose **one number from 1 to 7** to indicate to what extent you agree with each statement. Put the number that corresponds to the extent to which you agree or disagree in the box beside each statement.

**Not True**

**Very True**

**1      2      3      4      5      6      7**

1.  My first impressions of people usually turn out to be right.
2.  It would be hard for me to break any of my bad habits.
3.  I don't care to know what other people really think of me.
4.  I have not always been honest with myself.
5.  I always know why I like things.
6.  When my emotions are aroused, it biases my thinking.
7.  Once I've made up my mind, other people can seldom change my opinion.
8.  I am not a safe driver when I exceed the speed limit.
9.  I am fully in control of my own fate.
10.  It's hard for me to shut off a disturbing thought.
11.  I never regret my decisions.
12.  I sometimes lose out on things because I can't make up my mind soon enough.
13.  The reason I vote is because my vote can make a difference.
14.  My parents were not always fair when they punished me.
15.  I am a completely rational person.
16.  I rarely appreciate criticism.
17.  I am very confident of my judgements.

- |     | Not True                 |   |   |   |   |   | Very True  |
|-----|--------------------------|---|---|---|---|---|--|
|     | 1                        | 2 | 3 | 4 | 5 | 6 | 7  |
| 18. | <input type="checkbox"/> |   |   |   |   |   | I have sometimes doubted my ability as a lover.                                |
| 19. | <input type="checkbox"/> |   |   |   |   |   | It's alright with me if some people happen to dislike me.                      |
| 20. | <input type="checkbox"/> |   |   |   |   |   | I don't always know the reasons why I do the things I do.                      |
| 21. | <input type="checkbox"/> |   |   |   |   |   | I sometimes tell lies if I have to.  |
| 22. | <input type="checkbox"/> |   |   |   |   |   | I never cover up my mistakes.  |
| 23. | <input type="checkbox"/> |   |   |   |   |   | There have been occasions when I have taken advantage of someone.              |
| 24. | <input type="checkbox"/> |   |   |   |   |   | I never swear.   |
| 25. | <input type="checkbox"/> |   |   |   |   |   | I sometimes try to get even rather than forgive and forget.                    |
| 26. | <input type="checkbox"/> |   |   |   |   |   | I always obey laws, even if I'm unlikely to get caught.                        |
| 27. | <input type="checkbox"/> |   |   |   |   |   | I have said something bad about a friend behind his/her back.                  |
| 28. | <input type="checkbox"/> |   |   |   |   |   | When I hear people talking privately, I avoid listening.                       |
| 29. | <input type="checkbox"/> |   |   |   |   |   | I have received too much change from a salesperson without telling him or her. |
| 30. | <input type="checkbox"/> |   |   |   |   |   | I always declare everything at customs.  |
| 31. | <input type="checkbox"/> |   |   |   |   |   | When I was young I sometimes stole things.                                     |
| 32. | <input type="checkbox"/> |   |   |   |   |   | I have never dropped litter on the street.                                     |
| 33. | <input type="checkbox"/> |   |   |   |   |   | I sometimes drive faster than speed limit.                                     |
| 34. | <input type="checkbox"/> |   |   |   |   |   | I never read sexy books or magazines.  |
| 35. | <input type="checkbox"/> |   |   |   |   |   | I have done things that I don't tell other people about.                       |
| 36. | <input type="checkbox"/> |   |   |   |   |   | I never take things that don't belong to me.                                   |

37. ☐ I have taken sick-leave from work or school even though I wasn't really sick.

**Not True**

**Very True**

1      2      3      4      5      6      7

38. ☐ I have never damaged a library book or store merchandise without reporting it.

39. ☐ I have some pretty awful habits.

40. ☐ I don't gossip about other people's business.