

DISSERTATION

INVESTIGATING SELF-COMPASSION AND MEANING IN LIFE AS FACILITATORS OF  
CHRONIC DISEASE MANAGEMENT

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## ABSTRACT

### INVESTIGATING SELF-COMPASSION AND MEANING IN LIFE AS FACILITATORS OF CHRONIC DISEASE MANAGEMENT

Chronic disease is pervasive in the United States, has a negative impact on health, and is expensive to treat. Much research has been performed to identify barriers to successful chronic disease management, yet research has lagged significantly in investigating overarching salutogenic factors that may support multidimensional behavioral engagement in management of one's health when faced with chronic disease. Both experiencing life as meaningful and acting with compassion toward oneself have been linked to attitudinal, motivational, and support-seeking aspects of health management. In the current study, it was hypothesized that self-compassion and meaning in life would predict better chronic disease management for patients in four disease groups (Type 1 Diabetes, Type 2 Diabetes, Migraines and Asthma) through a proactive orientation to health, increased self-efficacy, and increased social support. Path analyses were conducted using Mplus 7.4 (Muthén & Muthén, 1998–2012). In the path analysis, there were no direct relationships observed among self-compassion and health attitudes, social support, and self-efficacy. Direct relationships were observed between meaning in life and the proposed mediators. An indirect relationship was observed, such that meaning in life and better chronic disease self-management were related via improved disease-related self-efficacy. This finding held both in the cross-sectional data and when chronic disease management was measured three months after initial data collection. Results from this study have important

implications for the role of meaning and meaning-supporting interventions in chronic disease management.

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## CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

### **Chronic Disease**

Chronic disease is pervasive, life-limiting, and expensive to treat. The World Health Organization has defined chronic disease as disease which has one of the following characteristics: permanency, residual disability, nonreversible pathological alteration, requirement of rehabilitation, or the expectation that the disease requires ongoing supervision, observation, or care (Burkart & Sabaté, 2003). Chronic disease affects 60% of the adult population in the United States and is the leading cause of death and disability (Centers for Disease Control and Prevention, 2017). Costs associated with chronic disease represent the vast majority of the nation's 3.3 trillion dollars in health care costs yearly (Centers for Disease Control, 2017). Despite the robust evidence suggesting that management of chronic disease can improve health status (Lorig et al., 1999), reduce risk of morbidity and mortality (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Clark et al., 1991; Fisher et al., 1997; Rao & Pereira, 2005), improve treatment outcomes (DiMatteo, Giordani, Lepper, & Croghan, 2002) and reduce health care costs (Lorig et al., 2001), on average people with chronic diseases receive only 56% of recommended care for chronic conditions (McGlynn et al., 2003) and average adherence to long-term therapies is 50% (Burkart & Sabaté, 2003). Chronic disease poses major health, financial, and personal threats to the United States population.

Considering the immense risks associated with chronic disease for the U.S. population, the overarching purpose of the current study is to test a model of chronic disease self-management which includes overarching psychological factors that are hypothesized to support proactive health attitudes, social support, and disease-related self-efficacy, which, in turn, are

hypothesized to bolster management of chronic disease. Literature on chronic disease management, barriers and facilitators to chronic disease management, applied health behavior theories, positive health, and meaning in life and self-compassion will be reviewed in the current study.

### **Chronic Disease Self-Management**

Of the 195 million people in the United States who experience chronic disease, approximately 30.3 million people have diabetes, 44.5 million people experience migraines or severe headaches, and 18.7 million people have been diagnosed with asthma (American Diabetes Association, 2018; Burch, Loder, Loder, & Smitherman, 2015; Centers for Disease Control, 2009). Self-management of chronic disease requires engagement in daily behaviors in order to minimize symptoms of the disease, reduce the impact on health status and functioning, and cope with psychosocial disease consequences (Clark et al., 1991; Burkart & Sabaté, 2003). Although the unique recommendations for self-management vary based on disease type, overarching aspects of disease self-management fall into three domains: 1) medical or behavioral engagement, which includes specific disease-related behaviors, 2) role management, which includes adaptation to new roles as related to limitations of the disease course, and 3) emotional management, which includes responsiveness to disease-related stress and emotional sequelae (Corbin & Strauss, 1985). Self-management across these domains is critical to the health of people with chronic disease.

The etiology of disease, in part, governs the behavioral self-management recommendations. Type 1 Diabetes (T1D) is an immune disorder in which the body does not produce insulin, a critical hormone that distributes glucose from the blood into cells of the body (American Diabetes Association, 2018). The key components of T1D management include

blood glucose monitoring and insulin therapy (American Diabetes Association, 2018). Exercise, nutrition, and emotional support are also important aspects of care as are preventative practices for eyes, feet, and kidneys to recognize complications of T1D (American Diabetes Association, 2018).

Type 2 Diabetes (T2D), a disease in which the body does not use insulin properly, is largely considered treatable through lifestyle changes, such as managing one's weight, increasing physical activity, engaging in dietary control, and adhering to prescribed medication regimens (e.g., Centers for Disease Control and Prevention, 2014; Look AHEAD Research Group, 2010). Other critical aspects of management of T2D include reduction of cardiovascular disease risk factors, such as high blood pressure (Centers for Disease Control and Prevention, 2014). Preventative care practices for eyes, feet, and kidneys are also advised as they help to prevent complications with poor control of T2D (Centers for Disease Control and Prevention, 2011).

Migraines are a neurological disease in which people experience severe throbbing recurrent head pain, usually on one side. Migraines are often accompanied by other disabling symptoms, including visual disturbances, nausea, vomiting, dizziness, extreme sensitivity to sound, light, touch, and smell, and tingling or numbness in the extremities or face (Migraine Research Foundation, 2018). Management of migraines comprises both acute and preventive therapy. Acute therapy includes medication to treat migraine exacerbations after onset and possible self-administered rescue medication (Bajwa, Smith, Swanson, & Dashe, 2018). Preventative strategies may include use of long-acting medication, nutritional supplements/vitamins/minerals, Botox, relaxation training, biofeedback, hypnotherapy, cognitive-behavioral therapy, and other stress management techniques (Campbell, Penzien, & Wall, 2000).

Asthma is a chronic lung disease in which the airways in the lungs are often swollen or inflamed. Asthma can be triggered by environmental stimuli, such as pet dander or cold weather, which can cause an increase in swelling and a narrowing of space for air to move into and out of the lungs. Muscles that wrap around airways can also tighten, which makes breathing more difficult—commonly known as a flare-up or asthma attack (American Lung Association, 2018). Recommended management of asthma includes assessing and monitoring breathing symptoms, taking medication for both acute and chronic symptoms, development of an asthma action plan, and limiting exposure to asthma triggers (American Lung Association, 2018; Centers for Disease Control and Prevention, 2018).

Recommended self-management of chronic disease often includes multidimensional adoption of new behaviors for the patient, including implementation of new habits, adherence to a plan or program, self-monitoring, a regimented medication schedule and general prevention practices, the plan of which is designed for the patient's disease and specific medical needs. Self-management of chronic disease implies both freedom and responsibility—suggesting that a person is primarily in charge of managing their disease and has decision-making power regarding care, performance of activities that aid in management, and application of skills for optimal psychosocial functioning (Clark et al., 1991).

### **Barriers and Facilitators to Chronic Disease Self-Management**

Ecological models of health behavior change indicate that multiple factors influence chronic disease management, including intrapersonal, interpersonal, organizational, community, physical environment, and policy considerations (Sallis, Owen, & Fisher, 2008). Although a large body of literature highlights the critical role of factors that extend beyond the individual, such as health systems (e.g., Nolte & McKee, 2008), the primary purpose of the current study

was to investigate factors at the personal and interpersonal level. Research evidence to date supports that disease-related knowledge and skills, stress, and psychological well-being are key personal and interpersonal factors that affect chronic disease management.

**Social support.** Social support is linked to better disease self-management (Gallant, 2003), yet the mechanism of action is not clearly delineated. It has been proposed that social support may serve as a buffer to the stress of illness, improve affective states, influence behavior, directly impact hormonal and neuroendocrine systems and/or facilitate other aspects of social and psychological functioning (Cohen, 1988; Connell, Davis, Gallant, & Sharpe, 1994; DiMatteo, Lepper, & Croghan, 2000; Goodenow, Reisine, & Grady, 1990). Social support in the context of chronic disease management can be further delineated. People with chronic disease may receive informational support, which includes provision of education and advice, instrumental support, such as direct help with management of chronic disease, and emotional/affirmational support, which includes the expression of general acceptance of the individual and validation when engaged in self-care related behaviors and efforts (Taylor & Seeman, 1999). Various kinds of social support have been posited as contributory to better chronic disease management.

A review of the empirical literature on the relationship between social support and chronic disease management suggests that social support shares a modest positive relationship with self-management of chronic disease (Gallant, 2003) and social support may have protective effects for poor physical and mental health outcomes (Berkman & Glass, 2000; Kaplan & Toshima, 1990). Better adherence to a chronic disease management program has been affected by perceived availability of support (Lloyd, Wing, Orchard, & Becker, 1993; Ruggiero, Spirito, Coustain, McGarvey, & Low, 1993; Sherbourne, Hays, Ordway, DiMatteo & Kravitz, 1992),

perceived tangible and emotional support (Stanton, 1978), disease-specific support (Connell & D'Augelli, 1990; Wilson et al., 1986), and family support (Clark & Northwehr, 1997; Lo, 1999). In sum, the vast majority of the literature suggests that social support is positively related to better chronic disease management although disease types and the ways in which support are measured may exert specific effects.

A growing body of literature has illustrated the disease-specific impact of social support on disease self-management, with some mixed findings dependent on measured outcome. Individuals with diabetes who reported high stress and high social support had significantly lower glycosylated hemoglobin (i.e., HbA1c) than those who reported high stress and low social support, providing evidence for a stress-buffering model of social support in management of diabetes (Griffith, Field, & Lustman, 1990). In a related study, women who reported higher levels of social support were more likely to exhibit better metabolic control of their diabetes (Whittemore, Melkus, & Grey, 2005). Beyond objective physiological indicators, a number of studies have examined the relationship between support and self-care behaviors in chronic disease. In studies with diabetes patients, social support positively predicts engagement in a dietary plan, exercise, glucose monitoring, and taking medication (Albright, Parchman, Burge, & RRNEST Investigators, 2001; Garay-Sevilla et al., 1995; Tang, Brown, Funnell, & Anderson, 2008; Wilson, Ary, Biglan, Glasgow, & Toobert, 1986). For patients with diabetes, social support is a positive predictor of engagement in self-care behaviors and is positively related to improvements in physiological health.

Although the abundance of literature on social support and chronic disease exists within the sphere of diabetes, social support has been linked with asthma and migraine management as well. When considered together, asthma knowledge and social support positively predicted self-

management behaviors in asthma control and predicted 14% of the variance in self-management (Sin, Kang, & Weaver, 2005). Social support also has been identified as a critical component of migraine management (Tobin, Holroyd, Reynolds, & Wigal, 1989) due largely to the role of social support as a stress-buffer and moderator of vulnerability to the experience of migraine (Martin, 2016). Qualitative interviews with patients further revealed that social support was identified as a key component of disease management (Peters, Abu-Saad, Vydelingum, Dowson, & Murphy, 2004) and seeking social support has been utilized as an emotional coping strategy in a psychosocial intervention designed to improve migraine management (Bromberg et al., 2012). In sum, social support has a positive impact on management of disease and engagement in mediating behaviors that impact management, although the mechanistic influence is somewhat dependent upon disease and social support type.

**Disease-related knowledge and skills.** Knowledge about disease and skills to implement management are considered critical components of chronic disease self-management. Knowledge refers to the acquisition of relevant information associated with disease management, such as understanding the referent numbers on a blood glucose monitor or knowing which medications to use during onset of migraine (Fisher, Kohut, Shachner, & Stenger, 2011; Worthington et al., 2013). Some individuals with T2D report difficulty understanding their overall plan of T2D care and associated confusion about the benefit of such a regimen (Nagelkerk, Reick, & Meengs, 2006; Rubin, 2005). Beyond broader knowledge deficits about the plan of care and its benefits, people with T1D and T2D exhibit knowledge gaps in specific areas of diabetes-related content, such as diet care, prevention of hypoglycemia, and avoidance of harmful over-production of blood acids resultant from poor blood sugar control (i.e., ketoacidosis) (Speight & Bradley, 2001). Even individuals with chronic disease who do possess

pertinent knowledge about their own care may have difficulty with implementing skills associated with self-management of chronic disease. Individuals with T1D and T2D reported experiencing difficulty with blood glucose monitoring, including taking their blood sugar without people noticing, minimizing pain, remembering to test their blood sugar, and accessing blood sugar meters (Fisher, Kohut, Schachner, & Stenger, 2011). Knowledge and skills deficits are widespread—it is estimated that up to 50-80% of individuals with diabetes have knowledge and skills deficits in managing their disease (Breen, Ryan, Gibney, & O’Shea, 2015; Clement, 1995). Health professionals in an influential role also may demonstrate significant knowledge deficits, which may amplify patient gaps in knowledge and relevant skills (Modic et al., 2014; Speight & Bradley, 2001). Diabetes-related knowledge and skills are key contributors to disease management.

Knowledge deficits in migraine patients are primarily related to lack of knowledge of health care providers and prescribers (Wenzel, Dortch, Cady, Lofland, & Diamond, 2014) and insufficient, non-standardized communication to patients about symptom management (Adelman, Adelman, Freeman, Von Seggern, & Drake, 2004; McDonald, Laporta, & Meadows-Oliver, 2006). Although multiple psychological and behavioral treatments for migraines are available (e.g., Holroyd, 2002), many patients and providers are unaware of this type of management (Nicholson et al., 2003), thus limiting important knowledge and behavioral skills acquisition in the treatment of migraines.

Adult asthma patients demonstrate significant knowledge and skills deficits as well. Patients who presented either at the emergency department or in an asthma clinic for routine care demonstrated poor knowledge of asthma and insufficient skills related to inhaler use, which was related to lower health literacy overall (Williams, Baker, Honig, Lee, & Nowlan, 1998). In a

separate study of adults with asthma, 97% of patients reported that their asthma was controlled despite that only 47% of these patients met the symptom requirement for management. In a similar vein, fewer than half of asthma providers (39%) based their recommendations on published asthma guidelines and only 11% of patients had a written asthma plan, which is typically initiated by providers (Fitzgerald, Boulet, McIvor, Zimmerman, & Chapman, 2006). Knowledge of one's condition and requisite skills are foundational for implementation of behavioral change, and the absence of such knowledge and skills present a significant risk for poor management of chronic disease (Nagelkerk, Reick, & Meengs, 2006).

**Psychological factors and stress.** Beyond one's knowledge and skills, patterns of thinking, stress, and mental health can impact chronic disease management. People with diabetes who perceive that their disease is serious, that they are vulnerable to complications and who believe in the efficacy of treatment are more likely to be adherent to their treatment plan (Brownlee-Duffeck et al., 1987). On the contrary, people with diabetes reported that poor emotional well-being, tiredness, worry, and fear associated with diabetes complications were barriers to disease management and reported feeling helpless and frustrated in response to continued disease progression despite adherence to their treatment plan (Nagelkerk, Reick, & Meengs, 2006; Rubin, 2005; Samuel-Hodge et al, 2000). In fact, the risk of depression for people with diabetes is twice that of their non-diabetic counterparts (Anderson, Freedland, Clouse, & Lustman, 2001). In turn, depression can impair adherence to medical treatment, glycemic control, and is linked to increased risk of diabetes complications (de Groot, Anderson, Freedland, Clouse, & Lustman, 2000; DiMatteo, Lepper, & Croghan, 2000; Holt, de Groot, and Golden, 2014; Lin et al., 2010; Littlefield et al., 1992; Lustman et al., 2000; McGill et al., 1992). These findings would suggest that an appropriate amount of perceived vulnerability and hope in

treatment may be helpful in managing diabetes, while persistent stress, hopelessness, worry, and depressive symptoms may be harmful.

For migraine patients, stress has been implicated as a contributor to onset of migraine, amplification of intensity and duration, increased frequency of migraines, and decreased utility of medication to treat a migraine (Sauro & Becker, 2009; Wacogne, Lacoste, Guillibert, Hugues, & Le, 2003). Migraines have also been associated with higher levels of anxiety and depression for people who experience them, with some estimates suggesting that up to 50% of migraine patients experience a comorbid psychological concern (Lanteri-Minet, Radat, Chautard & Lucas, 2005; Wacogne, Lacoste, Guillibert, Hugues, & Le, 2003). Psychological factors have a role in the experience of migraines and may impair a patient's ability to manage them.

Adult asthma patients are more likely than their healthy counterparts to endorse psychological distress, anxiety, and depression (Adams et al., 2004). Patients with asthma who experienced significant psychological distress demonstrated worse self-management and physical health status (Adams et al., 2004). At a physiological level, asthma patients had worse bronchoconstriction than healthy controls in laboratory experiments when exposed to laboratory stress conditions (Miller & Wood, 1994) and in naturally occurring stressful environments (Ritz, Steptoe, DeWilde, & Costa, 2000). Considerable evidence from other disease groups suggest that depression, anxiety, social isolation, low levels of emotional support, and high stress are related to both development of chronic disease and can impair management (e.g., Hemingway & Marmot, 1999; Rozanski & Kaplan, 1999; Schneiderman, Antoni, Saab, & Ironson, 2001).

Chronic disease self-management is complex and includes interwoven aspects of personal knowledge and skills, mental health, and social support. Knowledge about one's disease,

requisite disease-specific skills, and social support are facilitators of disease management while stress and psychological concerns may contribute to worse management.

### **Theory of Planned Behavior**

**Overview.** Research on factors that contribute to chronic disease self-management have been largely atheoretical, which points to the need for health change theory to guide models of chronic disease management. In light of research that suggests that theory-based interventions tend to be more effective than atheoretical interventions, it is important to apply models of health behavior change to understand key factors that may support management of chronic disease (Kok, Schaalma, Ruiter, Van Emepelen, & Brug, 2004; Michie & Abraham, 2004).

The theory of planned behavior (TPB) is a social-cognitive theory of health behavior change that is inclusive of both intrapersonal and interpersonal factors, which makes it highly relevant to chronic disease management (Ajzen, 1991). Consistent with this theory, it is posited that attitudes, subjective norms, and perceived behavioral control (i.e., self-efficacy) influence intentionality of performing a health behavior and further affect whether a target action or behavior will be initiated. According to TPB, attitudes reflect an evaluation of performing a given behavior or behaviors. Subjective norms refer to a person's perception of social expectations to adopt a given behavior, and perceived behavioral control reflects a person's beliefs about how difficult or easy it will be to change a given behavior, often referred to as self-efficacy (Godin & Kok, 1996). Belief systems are thought to underlie attitudes, subjective norms, and behavioral control (Ajzen, 1991). Intention to perform a behavior is considered the primary and most proximal determinant to behavior as it assesses the level of motivation with which a person plans to implement a given behavior (Ajzen, 1991).

Meta-analyses and comprehensive review studies of health behavior change suggest that the theory of planned behavior has some utility in predicting health behaviors (Armitage & Conner, 2001; Conner & Sparks, 2005; Hagger, Chatzisarantas, & Biddle, 2002). In a review study which assessed numerous health behaviors as predicted by the theory of planned behavior, 40% of the variance in intention was accounted for by theory of planned behavior variables—the collective influence of attitudes, subjective norms, and perceived behavioral control. When intention was combined with perceived behavioral control, these two variables together accounted for 27% of the variance in actual health behavior (Armitage & Conner, 2000). Other meta-analyses have found support for TPB across numerous health behaviors, with ranges suggesting that the theory explains between 40-49% of variance in intention and 19-36% of the variance in behavior (Ajzen, 1991; Armitage & Conner, 2001; Godin & Kok, 1996; Hagger et al., 2002; McEachan, Conner, Taylor, & Lawton, 2011; Schulze & Whittmann, 2003; Sniehotta, Pesseau, & Araujo-Soares, 2014; Trafimow, Sheeran, Conner, & Findlay, 2002), providing further support that consideration of TPB variables are pertinent to understanding health behavior change.

**Theory of planned behavior and chronic disease management.** Although TPB has demonstrated some utility in predicting isolated health behaviors in healthy populations, less research has been performed on chronically ill patients who are required to adopt multiple new behaviors to manage their disease and persist in these behaviors over time (Rich, Brandes, Mullan, & Hagger, 2015). In a meta-analysis that reviewed only those studies that utilized TPB variables to predict chronic illness management, TPB variables accounted for 33% of variance in intention and 9% of variance in behavior. Patterns consistent with the theory of planned behavior were found with attitudes, subjective norms, and behavioral control predicting intention

and intention predicting behavior (Rich et al., 2015). Self-efficacy demonstrated the strongest relationship to intention in chronic disease patients followed by attitudes (Rich et al., 2015). Subjective social norms had the least power in predicting chronic disease management (Rich et al., 2015). Effect sizes were small to medium with a notably small effect size for the intention to behavior relationship, which is consistent with other literature that indicates there is often a gap between the intention to perform a behavior and actual performance of the behavior (Orbell & Sheeran, 1998; Sheeran & Webb, 2016). In chronic disease patients, prediction of health behavior is more complex than in healthy populations who set out for one specific health goal, which significantly limits the predictive power of intention in chronic disease patients (Rich et al., 2015). Despite this limitation, the effect sizes for TPB compare favorably to other social-cognitive models of health, such as the health belief model (Brandes & Mullan, 2014; DiMatteo et al., 2007).

Although the above reviewed studies reflect appropriate steps toward developing a TPB-based model of self-management of chronic disease, there are significant oversights in the research which limit a cohesive model of disease self-management that simultaneously has clinical utility. Several of these studies explore only specific facets of the theory of planned behavior and omit relevant variables, which limits the understanding of relevant pathways. For example, White and colleagues (2007) examine beliefs as related to behavior, but omit attitudes, subjective norms, and self-efficacy. Without the inclusion of key predictor variables, it becomes nearly impossible to understand mediating pathways and limits intervention efforts.

A related issue is the omission of relevant disease self-management behaviors in model testing. Several studies isolate one aspect of behavior change or one facet of chronic disease management (e.g., exercise or medication adherence). Based on the etiology, progression, and

management of chronic disease, one self-care behavior in isolation provides little information as to how well people are managing their disease as a whole (Glasgow, McCaul, & Schafer, 1987). For example, an individual with diabetes may be compliant with exercise recommendations, but engage in limited glucose monitoring, may not take prescribed medication, and eat inconsistently with recommendations, which could have a significant, deleterious impact on overall management of disease.

Another heavily criticized aspect of TPB research, not unique to chronic disease management, is the extent to which intentions are studied as the dependent variable in lieu of health behavior, even though numerous studies reflect that there is a significant gap that exists between what people intend to do and how they actually behave (Sheeran, et al., 2005). In fact, the intention to engage in a behavior carries considerably less predictive power in chronic disease patients as compared to healthy individuals (Rich et al., 2015). The focus on intention in lieu of actual behavioral management limits conclusions from these studies and the possibility of health behavior change intervention potential (Fife-Schaw, Sheeran, & Norman, 2007). More specifically related to chronic disease management, subjective social norms have limited predictive power in disease management, and as such, social support will be considered in the current model in lieu of subjective social norms.

Thus far, theorized models of chronic disease self-management typically lack inclusion of general, overarching protective or salutogenic factors. Omission of these overarching factors for chronic disease patients may be particularly deleterious as management of chronic disease necessitates ongoing behavioral engagement and continued motivation. The current study attempts to address several of these concerns by testing a salutogenic, adapted theory-based

model of chronic disease management which includes mediating pathways and a focus on behavioral outcomes.

### **Positive Health and Chronic Disease**

Untested psychological variables may help to explain chronic disease self-management, yet research efforts have lagged in identifying the explanatory power of strengths-based psychological variables that could influence disease self-management. Considering that there is weaker intervention support than theoretical support for the theory of planned behavior in chronic disease management, alternative models to understand and to support health-based interventions are necessary (Hardeman, Johnston, Bonetti, Wareham, & Kimmonth, 2002). Several theorists have called for research that investigates “positive health,” a branch of health-related inquiry that facilitates the psychological and physical promotion of health, rather than an exclusive investigation of illness or barriers to treatment (Ryff & Singer, 2000; Seligman, 2008). Seligman (2008) discussed priorities in his seminal paper on positive health, stating that it was of urgency to understand and systematically investigate positive psychological variables as related to chronic disease. Findings thus far support the rationale that positive psychological variables may deepen the understanding of connections between psychological and physical health. For example, highly optimistic people who have cardiovascular disease are at lower risk for cardiovascular disease death and enjoy increased protection from non-fatal heart attacks, coronary heart disease and angina pectoris, even while controlling for several relevant variables, such as age, sex, chronic disease, education, smoking, alcohol use, history of cardiovascular disease, body mass and cholesterol level (Giltay, Geleijnse, Hoekstra, & Schouten, 2004; Kubzansky, Sparrow, Vokonas, and Kawachi, 2001). This finding, along with several other

robust findings (e.g., DuBois et al., 2015), lend credence to a systematic investigation of positive health variables and a salutogenic approach to health.

No studies to date have provided a comprehensive model that integrates positive psychological variables with pre-existing models of health behavior change across chronic disease groups, which would allow for an understanding of malleable constructs that impact chronic disease management and potential mediators. Investigating self-compassion and meaning in life as two such variables was the primary purpose of this study. The next section will focus on the linkages among self-compassion and relevant TPB variables, including health attitudes, self-efficacy, and social support. Subsequently, meaning in life will be explored in this same fashion, with a summary of important links among meaning, health attitudes, self-efficacy, and social support.

### **Self-Compassion and Theory of Planned Behavior**

**Overview.** Self-compassion may serve as a critical psychological skill to investigate in relation to managing chronic disease. By definition, self-compassion is an attitudinal response to difficult circumstances, pain, or perceived failure-- experiences reported as common when diagnosed with a chronic disease (Browne, Ventura, Mosely, & Speight, 2013; Neff, 2003). Self-compassion includes three components—1) self-kindness or exhibiting caring and understanding to oneself rather than being self-critical, 2) common humanity, which includes perceiving oneself and one's experiences as part of the larger human experience, rather than as isolating or distancing, and 3) mindfulness—which refers to holding painful thoughts and feelings in balanced awareness, rather than over-identifying with them (Neff, 2003a).

In the last ten years, self-compassion has gained significant momentum in the literature as a well-being variable and relevant predictor of psychological health (Neff & Vonk, 2009).

People who are self-compassionate tend to be happier, more optimistic and more satisfied with their lives, and are more likely to experience optimal functioning above and beyond what can be apportioned to personality traits (Neff, 2003a; Neff, 2003b, Neff, Rude, & Kirkpatrick, 2007). Self-compassionate people enjoy better mental health and are less susceptible to mental health risks, such as depression and anxiety. Mediating this relationship is less thought suppression, more accurate appraisals of the self, and less avoidance of challenging tasks for fear of failure (Allen & Leary, 2010; Neff, Kirkpatrick, & Rude, 2007). Self-compassion appears closely related to domains of psychological health and optimal mental health functioning.

Much of the research thus far has focused on the mediating and moderating effects of self-compassion as related to perceived academic or social failures, but there is increasing theoretical and empirical support to suggest that self-compassion has important relationships to physical health (Terry & Leary, 2011). From a behavioral perspective, people who are self-compassionate are more likely to exercise, engage in safer sex, and use less alcohol (Brion, Leary, & Drabkin, 2014; Brooks, Kay-Lambkin, Bowman, & Childs, 2012; Magnus, Kowalski, & McHugh, 2010). Self-compassionate people are more likely to attend doctor visits, report fewer physical symptoms, and exhibit an enhanced immune response to stress (Breines et al., 2014; Herriot, Wrosch, & Gouin, 2018; Terry, Leary, & Mehta, 2010).

Self-compassion also appears to be particularly important during times of stress. In a series of studies designed to investigate the role of self-compassion on various stressful experiences, people who were self-compassionate exhibited adaptive thinking and emotional patterns in response to daily stressors (Leary, Tate, Adams, Allen, & Hancock, 2007). Self-compassion also served as a buffer for negative feelings when imagining a stressful social experience and moderated negative emotions after receiving ambivalent feedback, such that self-

compassion served as a buffer to experiencing negative emotionality as a result of neutral feedback. Finally, in a self-compassion induction experiment, self-compassion helped people to acknowledge their role in a negative event, without feeling overwhelmed by negative emotions (Leary et al., 2007). Although these studies did not specifically investigate physical health, it is reasonable to expect that self-compassion, in the midst of chronic disease self-management, could confer similar benefits, such as protecting people from feeling emotionally overwhelmed in the context of disease management or in helping people to recognize their role in management of their disease, without devolving into guilt or shame.

**Self-compassion and health attitudes.** Although the empirical literature linking self-compassion and health attitudes is somewhat sparse, there are several behavioral metrics and theoretical linkages that would suggest that people who are self-compassionate are more likely to embody a proactive orientation toward their health. Self-compassion is negatively related to aspects of avoidance-oriented coping strategies and experiential avoidance, suggesting that self-compassionate people may be less likely to disengage from care or deny relevant concerns (Neff, Hsieh, & Dejitterat, 2005; Thompson & Waltz, 2008), which has also been demonstrated in a chronic illness patient population (Sirois & Rowse, 2016). Theoretically, self-compassion has also been linked to proactive coping, or the ability to anticipate and plan for future stressful events (Allen & Leary, 2010). In a study that investigated reasons for exercise, women who were self-compassionate were more likely to cite intrinsic reasons for exercising over extrinsic reasons, indicating that self-compassionate people may have attitudes consistent with good health (Magnus, 2007). When people were provided with a range of medical scenarios, those who were high in self-compassion were more likely to seek medical attention generally and were

more likely to do so sooner than their less self-compassionate counterparts, which may represent a general proactive orientation toward health (Terry et al., 2013).

**Self-compassion and self-efficacy.** There are emerging links to suggest that self-compassion may be positively related to self-efficacy, alternatively called behavioral control (Ajzen, 1991). People with celiac disease who reported high self-compassion were more likely to adhere to a gluten-free diet, which was an effect mediated by self-regulatory efficacy beliefs (Dowd & Jung, 2017). When testing the three main components of self-compassion in a learning context, Iskender (2009) found that self-kindness, common humanity, and mindfulness were all significantly, positively related to self-efficacy and self-judgment, isolation, and over-identification, the conceptual opposite components of self-compassion, were negatively correlated with self-efficacy. Although links between self-efficacy and self-compassion are emerging, there is existing evidence to suggest that a lack of self-compassion is related to lowered self-efficacy. Negative self-conscious emotions, such as shame, have been linked to lowered levels of self-efficacy (Turner, Husman, & Schallert, 2002). Thus, self-compassionate individuals, who are more likely to take a balanced perspective regarding their strengths and weaknesses, and who are less susceptible to harsh self-criticism, are more likely to have more accurate, positive perceptions of their abilities. In fact, findings suggest that competence and self-compassion were significantly, positive correlated in samples of college students (Neff, 2003a; Neff, Hsieh, & Dejitterat, 2005).

A highly related concept, self-regulation, which refers to one's capacity to control or alter responses, is considered an antecedent to self-efficacy (Anderson, Wojcik, Winett, & Williams, 2006; Baumeister, DeWall, Ciarocco, & Twenge, 2005). Self-compassion, self-regulation, and health are highly theoretically linked. It has been theorized that individuals who are more self-

compassionate are better able to self-regulate via lowered defensiveness, increased control of emotion that would be deleterious to self-regulation, decreased self-blame, and increased compliance with medical recommendations (Terry & Leary, 2011). In one empirical study that investigated how self-compassion was related to coping after eating personally forbidden food, self-compassionate highly restrictive eaters were less likely to overeat than their less self-compassionate counterparts (Adams & Leary, 2007). When people who were trying to quit smoking experienced a “self-regulatory failure” (i.e., smoked a cigarette), those people that forgave themselves were more likely to be successful in quitting smoking eventually (Curry, Marlatt, & Gordon, 1987). When self-compassionate imagery was utilized as a tool to help people reduce daily smoking, it was successful in significantly reducing daily smoking, especially for those individuals who were highly self-critical and less committed to quitting (Kelly, Zuroff, Foa, & Gilbert, 2010). This is theoretically linked to the kindness component of self-compassion, suggesting that kindness to the self in moments of failure may be highly adaptive for long term positive health behavior change. Considering the multidimensional, daily adoption of new behaviors requisite in chronic disease self-management, self-compassion provides a link to re-engagement with important health behaviors after self-regulatory failures, which may improve confidence in one’s ability to manage their disease (Leary et al., 2007).

**Self-compassion and social support.** Self-compassion appears to have links to one’s levels of social connectedness and social support. In early investigations of self-compassion and its correlates, self-compassionate people reported higher levels of social relatedness (Neff, 2003b). When people were asked to write about their greatest weakness, people who were self-compassionate were more likely to use “socially connected language,” which included increased references to family, friends, and people in general (Neff, Kirkpatrick, & Rude, 2007). A key

theoretical linkage between self-compassion and social support is common humanity. By definition, people who are self-compassionate are more likely to perceive themselves as part of a larger whole, rather than as isolated (Neff, 2003a). This has implications within a health domain as self-compassionate individuals who experience health concerns are less likely to experience these concerns as unique and isolating, thus increasing the likelihood that they would seek support from medical providers and loved ones (Terry et al., 2010). Self-compassion may serve as a buffer for blaming oneself for illness and associated avoidance of behaviors that promote health (Putnam, Finney, Barkley, & Bonner, 1994).

**Self-compassion and chronic disease management.** Although not yet studied with diabetes, asthma, or migraine patients, newer lines of research have investigated the role of self-compassion in psychological and behavioral aspects of managing chronic disease. Patients with chronic disease who were self-compassionate reported better coping, less stress, and were at reduced risk for depression and anxiety than their less self-compassionate counterparts (Pinto-Gouveia, Duarte, Matos, & Fraguas, 2014; Sirois, Molnan, & Hirsch, 2015), which, in part, has been explained by the increased likelihood for self-compassionate people to engage in approach coping rather than avoidant coping during times of stress (Sirois & Rowse, 2016). With regard to self-management of disease, self-compassion predicted stricter adherence to a gluten-free diet for celiac disease patients (Doud & Jung, 2017) and adherence in fibromyalgia, chronic fatigue syndrome, and cancer patients was positively predicted by self-compassion in a separate sample (Sirois & Hirsch, 2018). Among 187 individuals with human immunodeficiency virus (HIV), self-compassion was related to better adjustment to illness, lower stress, and less anxiety and shame (Brion, Leary, & Drabkin, 2014). People in this study who reported higher levels of self-compassion were also more likely to disclose their health status to others and were less

susceptible to feeling shame, which was related to increased willingness to engage in safe sex practices and seek medical care (Brion, Leary, & Drabkin, 2014). Overall, findings from these studies suggest that self-compassion was predictive of better overall coping and adherence across several disease groups, although few mediating pathways have been tested that explain the links between self-compassion and self-management of chronic disease.

Based on the above review of literature, in the current study it was hypothesized that self-compassion, within the context of chronic disease self-management, was positively related to adaptive attitudes toward health, increased self-efficacy, and increased social support.

### **Meaning in Life and Theory of Planned Behavior**

**Overview.** If self-compassion provides a framework for adaptive daily coping in response to chronic disease, then meaning in life provides the overarching framework with which a person interprets their value, overall worth, and potential impact on the world. Meaning, as a construct, is considered to be tri-partite, and is consistent with one's subjective sense that life is a) significant, b) makes sense, and c) is characterized by the embrace or pursuit of one or more highly valued overarching purposes (Steger, 2016). These three components of meaning are commonly termed comprehension, coherence, and purpose (Martela & Steger, 2016).

Intuitively, it is appreciable that meaning would be related to managing one's health, considering that a meaningful, connected life may increase people's willingness to take care of that life (Ryff & Singer, 1998). Empirical findings support these theoretical leanings. In a systematic review of relationships between meaning and health, higher levels of meaning were definitively associated with better physical health (for reviews, see Czekierda, Banik, Park, & Luszczynska, 2017; Roepke, Jayawickreme, & Riffle, 2014). People who reported their lives as meaningful enjoyed a number of health benefits, including longevity, better subjective health, better health-

related quality of life, and increased survival odds in HIV (e.g., Bower, Kemeny, Taylor, & Fahey, 1998; Boyle, Barnes, Buchman, & Bennett, 2009; Low & Molzahn, 2007; Park et al., 2008). Overall, it appears that meaning plays a role in the support of positive health behaviors, personal ratings of subjective health, and objective physiological health markers, such as stress levels.

Meaning may have a particularly important role following a significant life stressor (Park, 2010). This finding appears to hold for physical health stressors as well. Patients who reported a greater sense of purpose in life were more likely to survive 6 years post-transplant than those who reported a lower sense of purpose (Sirri et al., 2010). People who experienced a myocardial infarction (MI), or heart attack, and reported greater purpose immediately after the event were at reduced risk of another heart attack even when controlling for self-rated and objective physical health (Kim, Sun, Park, Kubzansky, & Peterson, 2010). These findings have implications for management of chronic disease. Meaning has links to relevant behaviors in chronic disease management, such as physical activity (Holahan, Holahan, & Suzuki, 2008; Holohan et al., 2011; Takkinen & Ruoppila, 2007), nutrition (Piko & Brassai, 2009), and decreased likelihood to smoke cigarettes (Homan & Boyatzis, 2010; Konkoly et al., 2009). Yet, there has been limited research to decipher the precise mechanisms by which meaning may impact health. The model in the current study was designed to test pathways that may elucidate the meaning and health link.

**Meaning and health attitudes.** Engagement in care-taking behaviors that promote health supposes that, on some level, life is meaningful and worth taking care of (Ryff & Singer, 1998; Steger, Fitch-Martin, Donnelly, & Rickard, 2015). However, there is no evidence to date that meaning directly causes physical health, but rather that meaning is linked to health-

promoting behaviors, which, in turn, may be explained by attitudinal stances oriented toward the importance of health and engagement with information about how to improve health (Steger et al., 2015). Several distinct samples provide rationale for a positive relationship between experiencing life as meaningful and proactive attitudes toward health. In a sample of older adults, presence of meaning positively predicted taking responsibility for one's health (Homan & Boyatzis, 2010). Health investment fully mediated the relationship between purposiveness and leisure time physical activity, suggesting that there is an attitudinal link between purpose and specific health behaviors (Holohan et al., 2011). College students who reported that their lives were meaningful were more likely to espouse a proactive orientation toward health and were less likely to discount relevant health information (Steger et al., 2015). In fact, proactive health orientation carried an indirect relationship between meaning and health symptoms, suggesting that attitude is an important link between meaning and people's physical ailments (Steger et al., 2015). Those who reported higher purpose in life were more likely to take preventative steps to manage their health, such as exercising, engaging with relaxation activities, and getting routine medical exams (Holohan & Suzuki, 2006). Although the latter study describes behavioral maintenance of health, it is implied that people who engage with preventative health behaviors are more likely to have attitudes consistent with a proactive health orientation. Considering the importance of attitudes on health behavior (Dutta-Bergman, 2004), health attitudes may be an important link explaining the relationship between meaning and chronic disease management.

**Meaning and self-efficacy.** The linkages between meaning in life and self-efficacy have been established cross-culturally and within and outside of health domains. In an academic, collegiate context, people who reported themselves as self-efficacious were more likely to report that they had purpose in life, and general self-efficacy was the most significant predictor of

purpose in life scores (DeWitz, Woolsley, & Walsh, 2009). In another college sample, general self-efficacy, college self-efficacy, and social self-efficacy positively predicted purpose in life (DeWitz, 2004). Both of these studies, however, were cross-sectional and there was limited theoretical rationale presented regarding why meaning was modeled as the dependent variable. In international samples, meaning in life was positively related to self-efficacy in a sample of 12,640 Hungarian participants, and meaning in life predicted generalized self-efficacy for menopausal women in Tehran (Jafary, Farahbakhsh, Shafiabadi, & Delavar, 2011; Skrabski, Kopp, Rozsa, Rethelyi, & Rahe, 2005).

Connections between meaning and self-efficacy have been demonstrated in health contexts as well. Meaning mediated the influence of self-efficacy on multiple health behaviors, including hygiene, medical check-ups, dieting, substance use, sun behaviors, driving, preventive sexual behavior, sleep, and relaxation (Wiesmann & Hannich, 2011). This study highlights the important relationship of self-efficacy and meaning on physical health behaviors. However, these data were cross-sectional, highlighting the need for longitudinal designs that investigate temporal associations among meaning, relevant mediators, and physical health. Based on a review of the literature, one such study exists. A meaning-making intervention designed to aid in psychological adjustment to breast or colorectal cancer found that the experimental group participants had higher self-efficacy scores post-treatment as compared to the control group, providing initial support that changes in meaning may have causal implications for self-efficacy (Lee, Cohen, Edgar, Laizner, & Gagnon, 2006). A sense that life is meaningful may provide a foundation with which people can acquire necessary knowledge, skills, and confidence in managing their health.

**Meaning and social support.** It has been well-established that relationships are a significant source of meaning (Debats, 1999; Delle Fave, Brdar, Wissing, & Vella-Brodrick, 2013; Lambert et al., 2010; for review, see O'Donnell et al., 2014) and that social support is highly valuable in managing chronic disease (Gallant, 2003; Griffith, Field, & Lustman, 1990). Although relationships exist as a source of meaning and may predict meaning, for the purpose of the present study, it was important to explore how an existing sense of meaning impacted perceived availability of social support when faced with a challenging event, such as illness.

To date, however, much of the literature on the relationship between social support and meaning has been modeled to understand the influence of social support on meaning in life, rather than what role meaning may play in propensity toward seeking and acquiring support. For the former, in a sample of smoking cessation patients, patients who reported their lives as meaningful were also more likely to endorse higher levels of social support (Steger, Mann, Michels, & Cooper, 2009). Support from significant others in a sample of Central American immigrants significantly contributed to meaning in life (Dunn & O'Brien, 2009).

Several studies with older adults have further explicated the relationship between social support and meaning. In a longitudinal study, older adults who anticipated that support would be available in the future and who received emotional support were more likely to report a deeper sense of meaning over time (Krause, 2007). Interestingly, when life circumstances threatened a personally highly valued role for older adults, such as parent or friend, data revealed that physical health was negatively affected via a deleterious effect on a sense of meaning. However, emotional support served as a buffer in these instances, such that those who received emotional support during these stressful times were less likely to experience decrements in meaning and subsequent physical health concerns (Krause, 2004).

Although connections between social support and meaning have been explored, it appears that little research has been performed to understand the effect of social support in times when people are actively making meaning of their current circumstances. Park (2010) has elucidated the distinction between global meaning, which refers to general orienting systems, goals, beliefs and core schemas (i.e., the “lens” by which a person views the world) and situational meaning, which is the particular meaning ascribed to an environmental encounter. When global meaning and situational meaning are discrepant, the process of meaning-making ensues, which could encompass a number of cognitive and emotional processes (Park, 2010). It is possible that the aforementioned studies have investigated social support as contributory to global meaning, irrespective of how social support may serve as a facilitator in meaning-making processes. It has been posited that one’s personal and social resources are important in the meaning-making process, yet few studies have empirically investigated this chain explicitly (Updegraff et al., 2008).

The present study hypothesized, however, that an existing sense of meaning would increase the likelihood that a person would have support available in times of distress, such as could be presented by chronic disease. As relationships are a key source of meaning, people whose lives are meaningful may have better quality of relationships with which to rely on (Pinquart, 2002). From an emotional framework, shame exists as a salient barrier to seeking medical attention, receiving important informational support, and acquiring emotional support (de Nooijer, Lechner, & de Vries, 2001; Gott & Hinchliff, 2003; Leenaars, Rombouts, & Kok, 1993; Raveis, Siegel, Gorey, 1998). Presence of meaning and shame are inversely related (Steger, Frazier, Oishi, & Kaler, 2006), which tentatively may suggest that people who

experience their lives as meaningful may be less susceptible to the deleterious effects of shame on asking for and receiving various forms of social support.

**Meaning and chronic disease management.** A few studies highlight the role of meaning in life, and the related variable purpose, in chronic disease management. Meaning was associated with better perceived physical health for cancer patients (Sherman & Simonton, 2012) and with better physical outcomes in breast cancer survivors (Taylor et al., 2000). Purpose was positively related to pain tolerance for women with fibromyalgia (Schleicher et al., 2005) and was associated with less functional disability, pain, and stiffness after knee surgery for osteoarthritis patients (Smith & Zautra, 2000). In a nondiabetic sample, Tsenkova and colleagues (2007) found that over time, low-income individuals were more likely to have poor glycemic control and that lower levels of purpose in life intensified that likelihood. Essentially, purpose served as a moderator in the relationship between income and non-diabetic levels of glycated hemoglobin. In a related study, coherence, one facet of meaning, predicted better glycemic control via treatment adherence. Those patients who reported a stronger sense of coherence were more likely to meet target glycated hemoglobin levels than their counterparts with a weaker sense of coherence (Aloha et al., 2010). These findings provide initial evidence that meaning in life may predict treatment adherence and, in turn, better management of chronic disease, although more research is required to fully understand these relationships.

Although initial findings across disease groups suggest that meaning in life predicts less functional disability and better self-management for chronic disease patients, little is known about the specific pathways by which meaning may affect disease self-management. It was hypothesized in the current study that meaning would positively predict disease self-management

through a proactive orientation towards health, increased self-efficacy, and increased social support in the context of managing chronic disease.

### **Review of the Current Study**

Chronic disease is a significant health and financial threat to many people in the United States. Although there has been some research performed to understand contributing factors to chronic disease self-management, most of the literature has been based on barriers to management at the cost of overlooking salutogenic psychological factors that could contribute to successful chronic disease management. Very few studies have piloted a longitudinal design and no study to date has investigated positive psychological variables in conjunction with a theory of health behavior change in a sample of individuals with chronic disease, despite the importance of this line of work in designing psychologically-based interventions to improve chronic disease management. The purpose of the present study was to address these gaps by testing a model in which the relationship between self-compassion, meaning in life, and chronic disease management was explored. Based on previous research, it was hypothesized that meaning and self-compassion would positively predict attitudes, self-efficacy, and availability of social support, which would then predict better self-management of chronic disease.

### **Hypotheses**

The following hypotheses were made for the current study:

H1. Self-compassion would positively predict proactive health orientation, self-efficacy, and social support (DIRECT EFFECT; A-PATHS)

H2. Meaning would positively predict proactive health orientation, self-efficacy, and social support (DIRECT EFFECT; A-PATHS)

H3. Proactive health orientation, self-efficacy, and social support would positively predict chronic disease management (DIRECT EFFECT; B-PATHS)

H4. Self-compassion would predict better chronic disease self-management through proactive health orientation, self-efficacy, and social support (INDIRECT EFFECT)

H5. Meaning would predict better chronic disease management through proactive health orientation, self-efficacy, and social support (INDIRECT EFFECT)

## CHAPTER 2: METHODS

### **Participants**

Participants were 99 people ( $M_{\text{age}} = 29.1$ ,  $SD = 16.5$ ) with Type 1 Diabetes ( $n=13$ ;  $M_{\text{age}} = 48.23$ ,  $SD = 14.44$ ), Type 2 Diabetes ( $n=19$ ;  $M_{\text{age}} = 51.58$ ,  $SD = 12.63$ ), Migraines ( $n=46$ ;  $M_{\text{age}} = 19.04$ ,  $SD = 1.26$ ), or Asthma ( $n=21$ ;  $M_{\text{age}} = 18.95$ ,  $SD = 1.07$ ). The sample was predominantly female (84.8%), European-American (82.8%), single (73.7%), and had been diagnosed with their respective chronic disease six or more years ago (59.2%). The average number of years since diagnosis was 9.3. Most of the sample was between the ages of 18-25 (69.7%) and were predominantly either a student (37.4%) or working full or part-time (35.4%) at the time of initial data collection. The vast majority of participants had medical insurance in the 12 months prior to data collection (98%). See Table 1 for full demographic information. Three months after the initial assessment, the sample was contacted again and valid questionnaires were obtained from 47 participants yielding a 47.5 percent retention rate. There were no significant demographic differences between completers and non-completers.

### **Procedure**

Appropriate IRB paperwork was completed and approval from the board was obtained before collecting data (Protocol ID: 17-7281H), and one site of data collection required a separate IRB process, which was approved on 5/25/2018. Letters of cooperation from collaborating agencies were signed and submitted to the IRB prior to recruitment (see Appendix D).

Participants for the current study were recruited through two primary mechanisms:

**Type 1 and type 2 diabetes patients.** I partnered with several health agencies who provide medical care for patients with diabetes in regions of Colorado, Oregon, and Washington (e.g., diabetes clinic, primary care clinic, nutrition center). Site coordinators at each of the partnering agencies were provided recruiting flyers, each of which contained a single, unique, one-time use link to access the study. Site coordinators were instructed to provide one flyer for each person who had Type 1 or Type 2 Diabetes and was interested in participating in the study (See Appendix C). Participation in this study was voluntary. If patients pursued the link, they were connected with a screening survey (See Appendix A). Participants were considered eligible if they were 18 years of age or older, had been diagnosed with Type 1 or Type 2 Diabetes by a medical provider, and if they indicated they understood written English. If participants screened into the study, they were immediately connected to the full survey (Time 1 Survey). Individuals who completed the full survey were provided a \$10 electronic gift card of their choosing within two weeks of completion of the Time 1 survey. After three months, people who completed the Time 1 survey were e-mailed directly with a link for an additional survey (Time 2 Survey). After completion of the Time 2 survey, the patient was e-mailed an additional \$10 electronic gift card of their choosing and were provided information about disease management (See Appendix E).

**Migraine and asthma patients.** Participants were recruited from the psychology research pool at a large university. In order to enter the research pool, participants filled out a comprehensive screening survey on various measures not limited to this specific study. Individuals who indicated that they had been either diagnosed with migraines or asthma by a medical provider, indicated that they had been symptomatic in the past month, and provided consent to be contacted for other studies were e-mailed a screening survey for the current study.

If participants clicked on the survey, they were connected with a screening survey. Participants were considered eligible if they were over the age of 18, had been diagnosed by a medical provider with migraines or asthma, had been symptomatic in the past month, and indicated that they understood written English. If participants screened into the study, they were immediately connected to the full online survey (Time 1 Survey). After completion of the Time 1 survey, participants indicated whether they would like the survey to count for one research credit or a \$10 electronic gift card of their choosing. After three months, people who completed the Time 1 survey were e-mailed directly with a link to an additional survey (Time 2 Survey). After the Time 2 survey was completed, participants were provided a \$10 electronic gift card of their choosing and were provided information about disease management.

## **Measurement**

**Demographics.** Considering its potential impact on chronic disease self-management, the following demographic information was collected: age, race/ethnicity, education level, family income, employment status, subjective social status, insurance status, and year chronic disease was diagnosed. Given that participants indicated the year that they had been diagnosed with chronic disease, these data were then transformed into years to create a years-since-diagnosis variable.

**Self-compassion.** Self-Compassion was assessed using the 26-item self-compassion scale (SCS; Neff, 2003a). The SCS includes a 5-item self-kindness subscale (e.g., “I try to be understanding and patient toward those aspects of my personality I don’t like”), the 5-item self-judgment subscale (e.g., “I’m disapproving and judgmental about my own flaws and inadequacies”), the 4-item common humanity subscale (e.g., “I try to see my failings as part of the human condition”), the 4-item isolation subscale (e.g., “When I think about my own

inadequacies it tends to make me feel more separate and cut off from the rest of the world”), the 4-item mindfulness scale (e.g., “When something painful happens I try to take a balanced view of the situation”), and the 4-item over-identification subscale (e.g., “When I’m feeling down, I tend to obsess and fixate on everything that’s wrong”). Responses are given on a 5-point Likert scale from “1” (*Almost Never*) to “5” (*Almost Always*). In the current study, the self-judgment, isolation, and over-identification subscales were reverse-coded, and then all items were summed to create an overall self-compassion score. In previous work, confirmatory factor analysis has determined that a single higher order factor of self-compassion explained the intercorrelations between the six subscales (Neff, 2002; Rindskopt & Rose, 1988). In the original validation study, internal consistency for the 26 item Self-Compassion Scale was .92, and self-compassion was found to relate to multiple variables in the expected direction, including a negative relationship with self-criticism and a positive relationship with self-kindness, social connectedness, and mindfulness (Neff, 2003a).

**Meaning in life.** The Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006) is a 10-item survey that assesses both the search for meaning (SFM) and presence of meaning (POM). 5 items assess search for meaning (e.g., “I am seeking a purpose or mission for my life.”) and 5 items assess presence of meaning (e.g., “My life has a clear sense of purpose.”). Responses are given on a 7-point Likert scale from “1” (*Absolutely Untrue*) to 7 (*Absolutely True*). For the current study, only presence of meaning was utilized in the analyses. A presence of meaning score was derived by summing item numbers 1,4,5,6, and 9 (reverse-scored). In the initial MLQ study, confirmatory factor analyses revealed good model fit for a 2-factor structure (search and presence), and internal consistency was good for presence of meaning ( $\alpha = .86$ ) (Steger et al., 2006). Validity for the MLQ was initially established via the

multitrait, multimethod matrix method, which assessed both convergent and discriminant validity. The MLQ-presence subscale was positively correlated with the Purpose in Life Test (PIL; Crumbaugh & Maholick, 1969) and the Life Regard Index (LRI; Debats, 1990), which provided evidence for convergent validity, considering that these measures purport to measure conceptually related constructs. In addition, the MLQ-presence subscale was more closely related to measures of meaning than other well-being variables, thus providing evidence that the MLQ is measuring a construct distinct from other well-being variables (Steger et al., 2006).

**Health attitudes.** A modified version of the Health Orientation Questionnaire (HOQ) scale developed by Steger and colleagues (2015) was utilized to measure attitudes toward health. In its initial version, the HOQ consisted of two sub-scales, the eight-item Proactive Health Orientation Scale, which assessed health attitudes and beliefs in maintenance of health (e.g., “It is important to me to stay healthy all my life”), and the five item Health Information Discounting (HID) sub-scale, which assessed knowledge of and discounting of well-established health guidelines (e.g., “A lot of the guidelines about smoking, alcohol, and drugs are too protective.”). Because the current study sought to investigate an already ill population and the primary interest was proactive attitudes toward health, only the 8-item proactive health orientation sub-scale was utilized, and the wording was slightly adapted in order to best represent the sample in this study. Items that assume health status were changed slightly, which included items 1,2,3,5 and 6, respectively (see Appendix A). For example, “Maintaining a healthy lifestyle is important to me” was changed to “A healthy lifestyle is important to me.” Response choices ranged from “1” (*Strongly Agree*) to “4” (*Strongly Disagree*). In the original study, good model fit was achieved (chi-square=179.05,  $p < .001$ ; CFI=.96; NNFI=.95, SRMR=.05; RMSEA=.06; 90% CI=.05-.07), and the proactive health orientation subscale was highly reliable ( $\alpha = .90$ ).

**Social support.** The Medical Outcomes Study (MOS) Social Support Survey (MOS-SSS) is a 19-item survey measuring availability of four dimensions of social support, including emotional/informational support (8 items), tangible support (4 items), positive social interaction (4 items), and affectionate support (3 items) (Sherbourne & Stewart, 1991). All 19 items have the same stem, which is “Availability of...” and completes with “someone to... (some aspect of supportive behavior)” and are rated on a Likert scale from “1,” indicating *None of the Time* to “5” indicating *All of the time*. Emotional/Informational support intends to measure the extent to which a person experiences the expression of positive affect, empathetic understanding, the encouragement of the expression of feelings and someone whom can offer guidance, information, advice or feedback. Sample items include, “Availability of someone you can count on to listen to you when you need to talk” and “Availability of someone to give you information to help you understand a situation.” The tangible support subscale intends to measure the provision of behavioral help or assistance. A sample item includes “Someone to take you to the doctor if you needed it”. The positive social interaction subscale measures the availability of other people to do fun things with you. A sample item includes “Availability of someone to do something enjoyable with”. The affectionate support subscale involves expressions of love and affection. A sample item includes “Availability of someone to love you and make you feel wanted.” In the original study, the overall scale and all subscale alphas were above .91 and were fairly stable over time. There were high factor loadings for each of the items, ranging from .67 to .88 (Sherbourne & Stewart, 1991). The MOS-SSS was positively correlated with many variables in the expected direction, such as family functioning, marital functioning, mental health, physical functioning, and social activity and inversely correlated with loneliness, physical and emotional role limitations, pain, and physical symptoms (Sherbourne & Stewart, 1991).

**Self-efficacy.** The Diabetes Empowerment Scale (DES; Anderson, Funnell, Fitzgerald, & Marrero, 2000) was utilized to measure diabetes-related self-efficacy. The DES is a 28 item measure with three subscales, which include Managing the Psychosocial Aspects of Diabetes ( $\alpha = .93$ ), Assessing Dissatisfaction and Readiness to Change ( $\alpha = .81$ ), and Setting and Achieving Diabetes Goals ( $\alpha = .91$ ). The overall summative scale has been found to be highly reliable ( $\alpha = .96$ ). Sample items within each domain include: “In general, I believe I know what helps me stay motivated to care for my diabetes.” for the Psychosocial Aspects of Diabetes scale, “In general, I believe I know what part(s) of taking care of my diabetes that I am ready to change.” for the Assessing Dissatisfaction and Readiness to Change sub-scale, and “In general, I believe that I can choose realistic diabetes goals.” for the Setting and Achieving Diabetes Goals sub-scale. Response choices range from *Strongly Agree* to *Strongly Disagree*. In the initial validation study, the DES was related to a number of other diabetes-related measures in the expected direction. The DES was positively correlated with diabetes understanding and positive attitudes toward diabetes and inversely correlated with negative attitudes toward diabetes (Anderson, Funnell, Fitzgerald, & Marrero, 2000). Test-retest correlation for the DES over a 6 week period of time was .79 (Anderson, Funnell, Fitzgerald, & Marrero, 2000). There is also evidence to suggest that changes in DES (i.e., improved self-efficacy) were related to better physiological management of diabetes, as measured by glycated hemoglobin (Anderson et al., 1995).

The Headache Self-Efficacy Scale (HSES; French et al., 2000) was utilized to measure headache related self-efficacy. The HSES is a 25-item measure which loads onto one factor and measures individual’s agreement with statements about their ability to cope with their headaches. A sample item includes, “I can prevent headaches by changing how I respond to stress.” The

HSES uses a Likert scale which ranges from scores of “1” (*Strongly Disagree*) to “7” (*Strongly Agree*). The HSES has been shown to have good internal consistency ( $\alpha = .90$ ) and good construct validity (French et al., 2000).

The Knowledge Attitudes and Self-efficacy Asthma Questionnaire (KASE-AQ; Wigal et al., 1993) is a 60-item measure that assesses patient asthma knowledge, asthma-related attitudes, and self-efficacy related to asthma control. For this study, only the sub-scale (n=20 items) related to self-efficacy was utilized. A sample item includes, “I have confidence in my ability to keep my asthma under control when I am in a different city on vacation or on a business trip.” The self-efficacy items of the KASE-AQ include a Likert scale which ranges from “1” (*True*) to “5” (*False*). Internal consistency for the subscale is good ( $\alpha = .89$ ) as is test-retest reliability (Wigal et al., 1993).

To account for different scales across disease groups, all self-efficacy scores were transformed into standardized z-scores prior to analyses, which allows for this variable to be comparable across disease groups. The z score is in units of standard deviation above or below the mean for the sample (e.g., a Z-score of 2 indicates that a person has reported self-efficacy at a level two standard deviation units above the mean) (Heiman, 2001).

**Chronic disease management.** In order to measure self-care behaviors and self-management of T1D and T2D, the Diabetes Self-Management Questionnaire (DSMQ) was used, which is a 16-item questionnaire designed to measure self-care activities associated with glycemic control (Schmitt et al., 2013). In this sample, we asked participants to respond to their behavior in the prior three months. Internal consistency for the overall scale was good in the original study ( $\alpha = .84$ ; Schmitt et al., 2013). Respondents were asked to rate each statement as it applied to their self-management in the previous 8-12 weeks (for the timeline of this study, it

was 12 weeks) on a 4-point Likert scale from “3” (*Applies to me very much*) to “0” (*Does not apply to me*). Scores were reliable in this sample ( $\alpha = .80$ )

Self-care behaviors and self-management of migraines was measured by adapting the Headache Self-Efficacy Scale (HSES; French et al., 2000) in order to assess the extent to which participants had engaged in migraine-related self-management behaviors in the prior three months. For example, while the HSES stems assess beliefs (“I can prevent headaches by recognizing triggers”), the self-management scale assesses self-reported behavior (“In the past three months, I prevented headaches by recognizing triggers”) and the extent to which each behavior applied to them on a 4-point Likert scale from “3” (*Applies to me very much*) to “0” (*Does not apply to me*). Scores were reliable in this sample ( $\alpha = .91$ ). As expected, higher scores on the adapted migraine self-management scale were associated with fewer days of migraine-related disability ( $r = -.30$ ), fewer days experiencing headaches ( $r = -.38$ ), and lower average pain scores during headaches/migraines in the prior three months as measured by the Migraine Disability Assessment (MIDAS; Stewart, Lipton, Dowson, & Sawyer, 2001).

Self-management of asthma was measured by adapting the self-efficacy subscale of the Knowledge Attitudes and Self-efficacy Asthma Questionnaire (KASE-AQ; Wigal et al., 1993) in order to assess the extent to which participants had engaged in asthma-related self-management behaviors in the prior three months. For example, in lieu of assessing the belief (“I have confidence in my ability to avoid frequent trips to the emergency room because of my asthma.”), the self-management adapted version assessed reported behavior (“In the past three months, I avoided frequent trips to the emergency room because of my asthma.”) and the extent to which each behavior applied to them on a 4-point Likert scale from “3” (*Applies to me very much*) to “0” (*Does not apply to me*). Scores were reliable in this sample ( $\alpha = .89$ ). Higher scores on the

self-management scale in this sample were associated with better asthma control as measured by the Asthma Control Test (ACT; Schatz et al., 2006; Kennedy & Jones, 2007).

To account for different scales across disease groups, all self-management scores were transformed into standardized z-scores prior to analyses, which allows for this variable to be comparable across disease groups. The z score is in units of standard deviation above or below the mean for the sample (e.g., a Z-score of -1 indicates that a person has reported self-management at a level one standard deviation unit below the mean) (Heiman, 2001).

### **Planned Analyses**

A path analysis was conducted to test the study hypotheses that chronic disease self-management was predicted by self-compassion and meaning in life via self-efficacy, proactive health attitudes, and social support, controlling for disease type. Disease types were dummy-coded and entered in the model. Analyses were conducted using Mplus 7.4 (Muthén & Muthén, 1998–2012).

To properly conduct path analysis, several assumptions about the data must be met. To test for violations of normality, each of the independent and dependent variables included in analyses were examined for evidence of skew and kurtosis using SPSS. All variables demonstrated suitable normality. Q-Q plot for residuals indicated that residuals were also normally distributed. Path analysis assumes linearity and homogeneity of variance across levels of the predictor variables. Visual inspection of scatter plots for all variables and their residuals confirmed that the assumptions of linearity and homoscedasticity were met. Variance inflation factors (VIF) were less than 2 indicating that the assumption of non-multicollinearity was also met (Cohen & Cohen, 1983).

Multiple regression techniques, such as in path analysis, are particularly sensitive to

outliers, making it critical to identify extreme scores that may exert undue influence on the relationships between predictor and outcome variables. Outliers were located through a variety of methods. Graphic depictions of the data were generated using box-plot graphs, which are helpful for visual detection of extreme scores. Additionally, variables included in the path analysis were converted into Z-scores, which allow inspection in units of standard deviation above or below the mean for the sample. All z-scores were within  $\pm 3$  (Shiffler, 1988).

The main challenge in making appropriate determinations regarding the strength of an indirect effect is that the product of two regression slopes is not normally distributed. The violation of the normality assumption results in a loss of statistical power for many customary approaches to testing mediation (e.g., the Sobel Test). In order to avoid this issue, the best practices approach is to assess asymmetrical confidence intervals (ACIs) that more accurately represent the true distribution of the product of coefficients. ACIs that do not contain zero are considered to be statistically significant. The indirect effects of each predictor variable on outcomes were examined using bias-corrected bootstrapped estimates based on 10,000 bootstrapped samples, which provided a powerful test of mediation and are asymmetrical (Efron & Tibshirani, 1994; Fritz & MacKinnon, 2007)

To evaluate overall model fit, model fit criteria suggested by Hu and Bentler (1999) were used, including the comparative fit index (CFI)  $> .95$ , Tucker–Lewis Index (TLI)  $> .95$ , root mean square error of approximation (RMSEA)  $< .06$ , and standardized root mean square residual (SRMR)  $< .08$ . In addition, the Chi-Square test of model fit was evaluated, where a non-significant test indicates perfect fit of the model to the data. Paths that were not significant were trimmed from the model. Time 1 cross-sectional data was used to model mediation pathways, although it is understood that it is not viable to assess causal mediation in cross-sectional

datasets. Then, a trimmed model based on results from the initial model was tested to investigate relevant Time 1 predictors on Time 2 disease self-management scores through Time 1 mediators.

## CHAPTER 3: RESULTS

### Descriptive Statistics and Correlations

Table 1 provides descriptive statistics and correlates for the variables in this study. Migraine ( $r = -.45$ ,  $p = .000$ ) and Asthma ( $r = .54$ ,  $p = .000$ ) disease types were significantly correlated with disease self-management at Time 1, which is consistent with the literature suggesting that management can depend on disease type (DiMatteo, 2004a). Years Since Diagnosis was also correlated with Time 1 disease management ( $r = .21$ ,  $p = .04$ ). However, when disease types were dummy-coded and simultaneously entered into a regression model with Years Since Diagnosis, this variable no longer significantly predicted self-management ( $t = 1.22$ ,  $p = .22$ ). Thus, illness types were dummy-coded and entered as covariates in the path analysis. Although age of participants was wide-ranging (18-70), age was not significantly related to disease management at Time 1 ( $r = .01$ ,  $p = .91$ ) or at Time 2 ( $r = -.03$ ,  $p = .86$ ). There were no other demographic differences.

Table 1.

*Demographic Characteristics of the Sample for Study Completers at Time 1 and 2*

Characteristic	Time 1 (n=99)	Time 2 (n=47)
Age, Mean (SD)	29.1(16.50)	29.7(16.0)
Age Range	18-70	18-69
Illness Type		
Migraine	46.5%	40.4%
Asthma	21.2%	23.4%
Type 1 Diabetes	13.1%	21.3%
Type 2 Diabetes	19.2%	14.9%
Years Since Diagnosis, Mean (SD)	9.3(8.9)	--
5 Years or Less	41.4%	42.6%

6-10 Years	26.2%	23.5%
11-15 Years	14%	12.8%
15 Years or More	19%	23.2%
Sex		
Female	84.8%	85.1%
Male	15.2%	14.9%
Marital Status		
Never Married	73.7%	68.1%
Married	18.2%	27.7%
Separated/Divorced	5.1%	2.1%
Widowed	3%	2.1%
Race and Ethnicity		
White	82.8%	80.9%
Black or African-American	3%	4.3%
Hispanic	10.1%	10.6%
Asian or Pacific Islander	2%	0
Other	2%	4.3%
Education		
Some high school	1%	0
High school graduate/GED	15.2%	10.6%
Some college/technical school	73.7%	74.5%
College graduate	7.1%	8.5%
Graduate degree	3%	6.4%
Employment		
Working full or part-time	35.4%	31.9%
Unemployed	13.2%	10.7%
Homemaker	3%	4.3%
Student	37.4%	44.7%
Retired	5.1%	4.3%
Disabled	3.0%	2.1%
Other	3%	2.1%
Insurance Status		
Insured in last 12 months	98%	100%
Uninsured in last 12 months	2%	0
Subjective Social Status, US (Mean, SD)	5.6(1.7)	--

Subjective Social Status, Community (Mean, SD) Family Income (per year)	6.0(2.0)	--
Less than \$25,000	23.2%	23.4%
\$25,000-\$75,000	17.2%	19.1%
\$75,000-\$150,000	27.2%	34.1%
More than \$150,000	16.2%	17%
Don't Know/Decline to Respond	16.2%	6.4%
Self-Rated Health		
Excellent	7.1%	4.3%
Very Good	30.3%	31.9%
Good	41.4%	44.7%
Fair	18.2%	17%
Poor	3%	2.1%

Meaning was positively and significantly correlated in the expected direction with the mediators, Proactive Health Orientation ( $r = .39, p < .001$ ), Social Support ( $r = .41, p < .001$ ), and Self-efficacy ( $r = .44, p < .001$ ). Meaning was correlated in the expected direction with Time 1 Disease Self-Management ( $r = .18, p = .07$ ), although not statistically significant, and was positively and significantly related to Time 2 Disease Self-Management ( $r = .46, p < .01$ ). Self-compassion was positively and significantly associated with Proactive Health Orientation ( $r = .22, p = .03$ ) and Self-efficacy ( $r = .30, p = .002$ ), but not significantly associated with Social Support ( $r = .19, p = .07$ ). Self-compassion was not significantly correlated with Time 1 Disease Self-Management ( $r = .05, p = .66$ ) or Time 2 Disease Self-Management ( $r = .18, p = .22$ ). Time 1 Disease Self-Management was only significantly correlated with Time 1 Self-Efficacy ( $r = .59, p < .001$ ). Time 2 Disease Self-Management was significantly correlated with Time 1 Social Support ( $r = .30, p < .04$ ) and Time 1 Self-Efficacy ( $r = .51, p < .001$ ). Correlations are presented in Table 2. Means and standard deviations of self-efficacy and disease management by disease type are presented in Table 3.

Table 2.

*Descriptive Statistics and Correlations among Measures*

Measure	M(SD)	$\alpha$	1	2	3	4	5	6	7
1. Time 1 Presence of Meaning	23.34(6.53)	.89							
2. Time 1 Self-Compassion	76.12(17.64)	.93	.46**						
3. Time 1 Proactive Health Orientation	26.22(4.59)	.87	.39**	.22*					
4. Time 1 Social Support	78.36(14.45)	.96	.41**	.19	.43**				
5. Time 1 Disease Management Self-Efficacy Z-Score	0(.99)	.89	.44**	.30**	.23*	.45**			
6. Time 1 Disease Self-Management Z-Score	-.68(.66)	.87	.18	.05	.19	.19	.59**		
7. Time 2 Disease Self-Management Z-Score	0(.98)	.85	.46**	.18	.08	.30*	.51**	.30*	

*Notes.* \*\*Correlation is significant at the .01 level; \*Correlation is significant at the .05 level.  $\alpha$  levels for Time 1 Self-Efficacy Z-Score, Time 1 Disease Self-Management Z scores are average across the individual alphas for each disease group (Time 1 Self-Efficacy by Disease Group = Migraine = .91, Asthma = .82, Diabetes = .93); (Time 1 Self-Management by Disease Group = Migraine = .92; Asthma = .89, Diabetes = .80); (Time 2 Self-Management by Disease Group = Migraine = .88; Asthma = .91; Diabetes = .76); All measures were recoded and summed to reflect higher scores as greater endorsement of the quality/engagement with behavior

Table 3.

*Means and Standard Deviations for Self-Efficacy and Self-Management by Disease Group*

Measure	Migraine M(SD)	Asthma M(SD)	Type 1 Diabetes M(SD)	Type 2 Diabetes M(SD)
Time 1 Self-Efficacy (z)	0(1)	0(1)	.07(.84)	-.05(1.11)
Time 1 Self-Management (z)	-1(.33)	0(1)	-.64(.28)	-.68(.37)
Time 2 Self-Management (z)	0(1)	0(1)	-.08(.82)	-.12(1.27)

## Model Testing

**Overall model fit for cross-sectional analyses.** The initial path analysis with all model paths (Figure 1) resulted in poor model fit. The Chi-Square test of model fit was significant ( $\chi^2(12) = 30.14, p = .00$ ) and overall fit indices were poor (RMSEA = .12 [90% CI = .07, .18]; CFI = .90; SRMR = .09). In order to improve model fit, a step-wise data-driven approach was utilized to trim the model. Considering that the betas in the a-paths from self-compassion to the mediators were all non-significant (See Figure 1), self-compassion was trimmed from the subsequent model (Figure 2). This model resulted in poor model fit as well. The Chi-Square test of model fit was significant ( $\chi^2(12) = 29.96, p = .003$ ) and overall fit indices were unchanged (RMSEA = .12 [90% CI = .07, .18]; CFI = .90; SRMR = .09). The model was then tested with health attitudes, social support, and self-efficacy as serial mediators (See Figure 3). The Chi-square test of model fit was non-significant ( $\chi^2(10) = 17.94, p = .06$ ) and model fit was adequate (RMSEA = .09 [90% CI = .00, .16]; CFI = .96; SRMR = .07). Health attitudes was next eliminated from the serial mediation model (See Figure 4). The Chi-square test of model fit was non-significant ( $\chi^2(6) = 5.49, p = .48$ ) and model fit was excellent (RMSEA = .00 [90% CI = .00, .12]; CFI = 1; SRMR = .05). Next, in order to test a more parsimonious model, health attitudes and social support were trimmed from the model (Figure 5). Resultant model fit was excellent. The Chi-Square test of model fit was non-significant ( $\chi^2(3) = .75, p = .86$ ) and overall fit indices were excellent (RMSEA = .00 [90% CI = .00, .09]; CFI = 1; TLI = 1; SRMR = .01).

**Overall model fit for longitudinal analysis.** The final, trimmed model from the cross-sectional analyses was then utilized to test a longitudinal model (n=47) to predict Time 2 Chronic Disease Management from Time 1 Meaning and Time 1 Self-Efficacy (See Figure 6). Prior to evaluating this model, t-tests were performed to compare differences between

completers (i.e., participants who completed surveys at Time 1 and Time 2) and non-completers (i.e., participants who completed Time 1 surveys but did not complete surveys at Time 2). There were no significant differences between completers and non-completers for age ( $t(97) = .35, p = .72$ ), self-reported health ( $t(97) = .11, p = .92$ ), presence of meaning ( $t(97) = .83, p = .41$ ), self-efficacy ( $t(97) = -.62, p = .54$ ), or self-management of disease ( $t(97) = .52, p = .61$ ). When this model was tested, model fit was excellent. The Chi-Square test of model fit was non-significant ( $\chi^2(3) = .75, p = .86$ ) and overall fit indices were excellent (RMSEA = .00 [90% CI = .00, .09]; CFI = 1; TLI = 1; SRMR = .03). All model fit indices are presented in Table 3.

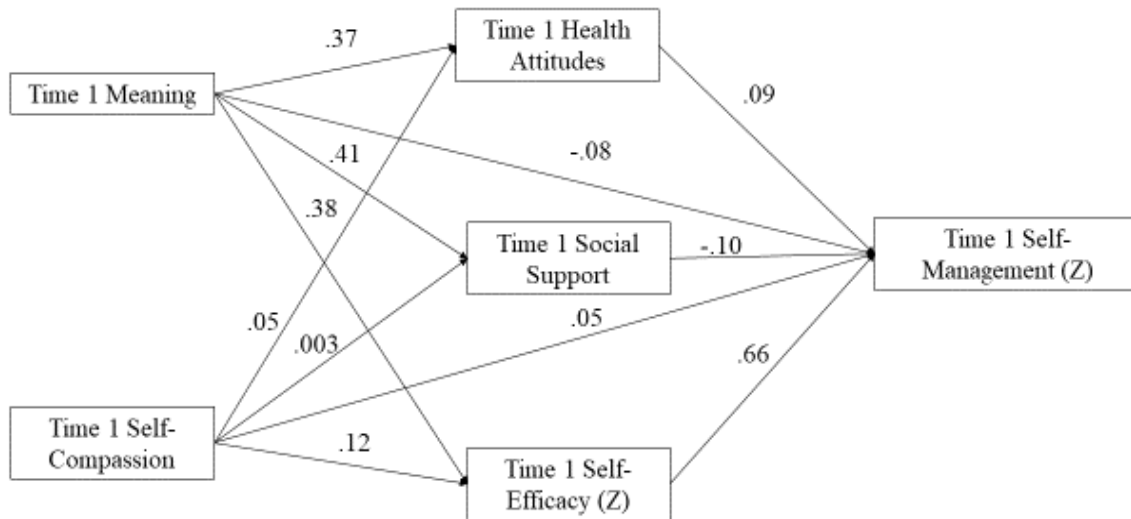


Figure 1. All model paths.

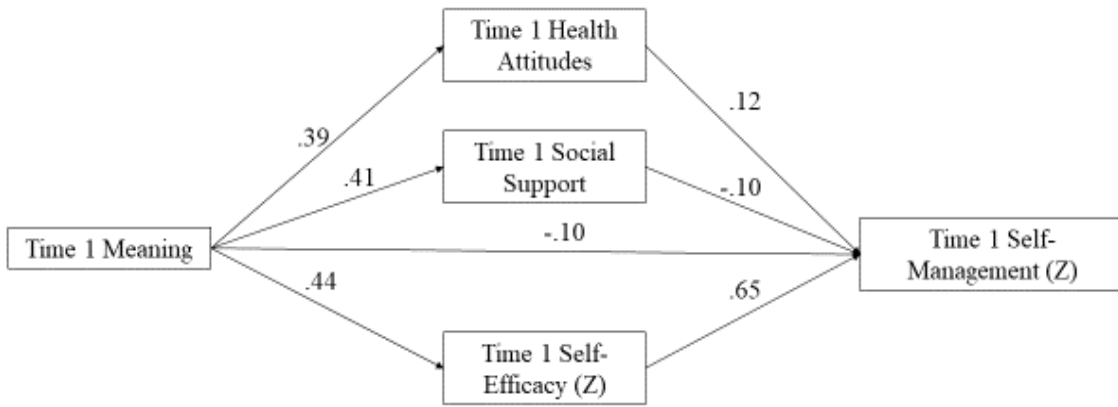


Figure 2. Self-compassion trimmed from model.

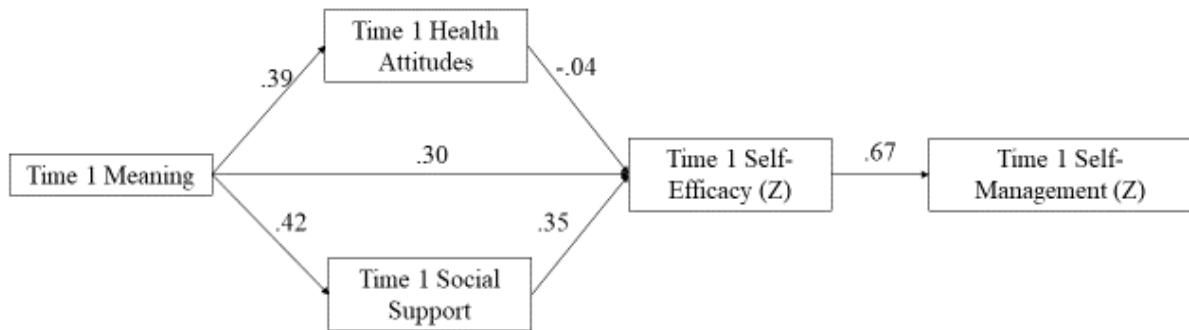


Figure 3. Health attitudes, social support, and self-efficacy as serial mediators.

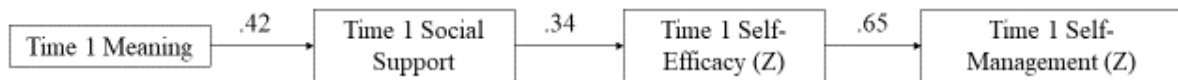


Figure 4. Health attitudes trimmed from serial mediation model.

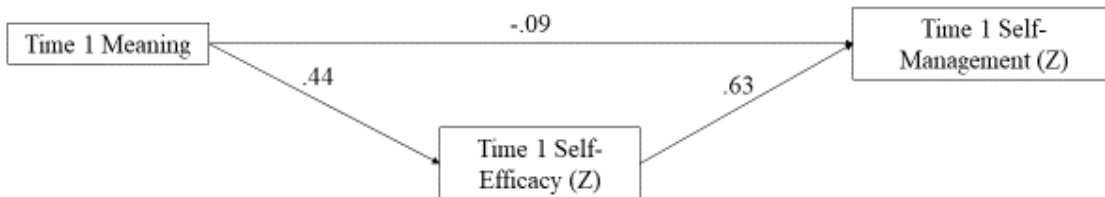


Figure 5. Social support and health attitudes trimmed entirely from model.

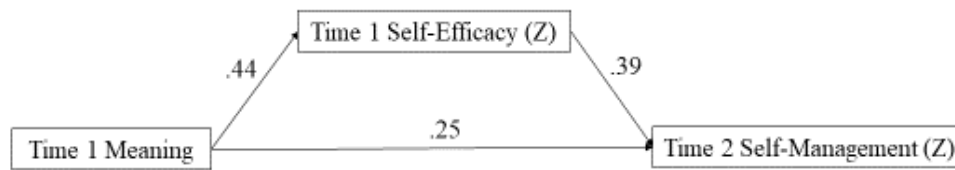


Figure 6. Longitudinal trimmed model.

Table 4.

*Model Fit Indices by Model*

Model	Chi-square	df	p	CFI	SRMR	RMSEA
1. All Model Paths (Figure 1)	30.14	12	.00	.90	.09	.12
2. Meaning as Predictor (Trimmed Self-Compassion) (Figure 2)	30.00	12	.00	.90	.09	.12
3. Meaning as Predictor for Serial Mediators (Figure 3)	17.94	10	.06	.95	.06	.09
4. Health Attitudes Trimmed from Serial Mediation Model (Figure 4)	5.49	6	.48	1	.05	.00
5. Meaning as Predictor (Trimmed Health Attitudes & Social Support) (Figure 5)	.75	3	.86	1	.01	.00
6. Meaning as Predictor for Time 2 Self-Management (Figure 6)	.75	3	.86	1	.02	.00

Notes. CFI=Comparative fit index; SRMR= Standardized Root Mean Square Residual; RMSEA=Root Mean Square Error of approximation; All models control for disease type.

**Direct Effects**

**Direct effects for cross-sectional analyses.** In Model 3, Time 1 Meaning significantly and positively predicted Time 1 Health Attitudes ( $b = .39$ ,  $SE = .09$ ,  $p = .01$ ), Time 1 Social Support ( $b = .42$ ,  $SE = .09$ ,  $p < .001$ ), and Time 1 Self-Efficacy ( $b = .30$ ,  $SE = .11$ ,  $p = .01$ ). Time 1 Social Support significantly and positively predicted Time 1 Self-Efficacy ( $b = .35$ ,  $SE = .10$ ,  $p < .001$ ). Time 1 Self-Efficacy predicted Time 1 Self-Management ( $b = .67$ ,  $SE = .09$ ,  $p < .001$ ). In Model 4, Time 1 Meaning significantly and positively predicted Time 1 Social Support  $b = .42$ ,  $SE = .10$ ,  $p < .001$ . Time 1 Social Support significantly and positively predicted Time 1

Self-Efficacy ( $b = .34$ ,  $SE = .10$ ,  $p = .001$ ) and Time 1 Self-Efficacy significantly and positively predicted Time 1 Self-Management ( $b = .65$ ,  $SE = .09$ ,  $p < .001$ ). The A and B paths in Model 5 were significant. Specifically, Time 1 Meaning in Life significantly and positively predicted Time 1 Self-Efficacy ( $b = .44$ ,  $SE = .09$ ,  $p < .001$ ), and Time 1 Self-Efficacy predicted Time 1 Self-Management ( $b = .63$ ,  $SE = .07$ ,  $p < .001$ ). Higher values on meaning in life were associated with higher values of social support, health attitudes, and self-efficacy. Higher values of social support were associated with higher self-efficacy and self-efficacy was associated with better self-management of disease cross-sectionally. All direct paths are presented in Table 5.

**Direct effects for longitudinal analysis.** The A and B paths in Model 6 were significant. Time 1 Meaning in Life significantly and positively predicted Time 1 Self-Efficacy ( $b = .44$ ,  $SE = .09$ ,  $p < .001$ ), and Time 1 Self-Efficacy predicted Time 2 Self-Management ( $b = .39$ ,  $SE = .18$ ,  $p = .03$ ). Higher values on meaning in life were associated with higher values of self-efficacy and higher values of self-efficacy at Time 1 were associated with better management of disease when measured three months later at Time 2. The C path from Time 1 Meaning to Time 2 Self-Management was not significant. All direct paths are presented in Table 5.

Table 5.

*Standardized path coefficients, standard errors and t-values for direct pathways for Models 3, 4, 5 & 6.*

<b>Model 3 (Figure 3)</b>	Estimate	SE	Est/S.E.	p
T1 Meaning→T1 Health Attitudes	.39	.09	4.20	.01
T1 Meaning→T1 Social Support	.42	.09	4.47	.00
T1 Meaning→T1 Self-Efficacy	.30	.11	2.82	.01
T1 Health Attitudes→T1 Self-Efficacy	-.04	.08	-.52	.60
T1 Social Support→T1 Self-Efficacy	.35	.10	3.58	.00
T1 Self-Efficacy→T1 Self-Management	.67	.09	7.70	.00
<b>Model 4 (Figure 4)</b>				
T1 Meaning→T1 Social Support	.42	.10	4.45	.00
T1 Social Support→T1 Self-Efficacy	.34	.10	3.39	.001
T1 Self-Efficacy→T1 Self-Management	.65	.09	7.60	.00
<b>Model 5 (Figure 5)</b>				
T1 Meaning→T1 Self-Management (C-path)	-.09	.06	-1.56	.12
T1 Meaning→T1 Self-Efficacy (A-path)	.44	.09	4.99	.00
T1 Self-Efficacy→ T1 Self-Management (B-path)	.63	.07	8.67	.00
<b>Model 6 (Figure 6)</b>				
T1 Meaning→T2 Self-Management (C-path)	.25	.16	1.56	.12
T1 Meaning→T1 Self-Efficacy (A-path)	.44	.09	4.99	.00
T1 Self-Efficacy→T2 Self-Management (B-path)	.39	.18	2.13	.03

*Note.* All models control for disease type.

### **Indirect Effects**

**Indirect effects for cross-sectional analyses.** Examination of the bias-corrected bootstrapped confidence intervals for Model 3 revealed that only the specific indirect effect from Time 1 Meaning in Life to Time 1 Self-Management through Time 1 Self-Efficacy was statistically significant (Time 1 Meaning in Life→Time 1 Self-Efficacy→Time 1 Self-

Management = .02 [.006, .04]). Examination of the bias-corrected bootstrapped confidence intervals for Model 4 revealed that the specific indirect effect from Time 1 Meaning in Life to Time 1 Self-Management through Time 1 Self-Efficacy was statistically significant (Time 1 Meaning in Life → Time 1 Self-Efficacy → Time 1 Self-Management = .02 [.006, .04]) as were the total effects of the model (Model 4 Total = .02 [.002, .03]). Examination of the bias-corrected bootstrapped confidence intervals for Model 5 revealed that the total effect and specific indirect effects were statistically significant (Model 5 Total = .02 [.006, .03]; Time 1 Meaning in Life → Time 1 Self-Efficacy → Time 1 Self-Management = .03 [.02, .04]).

**Indirect effects for longitudinal analysis.** Examination of the bias-corrected bootstrapped confidence intervals for Model 6 revealed that the total effect and both specific indirect effects were statistically significant (Model 6 Total = .06 [.02, .10]; Time 1 Meaning in Life → Time 1 Self-Efficacy → Time 2 Self-Management = .03 [.001, .05]).

Table 6.

*Unstandardized indirect and total effects and confidence intervals for Models 3, 4, 5 & 6.*

<b>Model 3 (Figure 3)</b>	Estimate	SE	95% CI Lower	95% CI Upper
T1 Meaning→T1 Health Attitudes→T1 Self-Management	.005	.004	-.001	.01
T1 Meaning→T1 Social Support→T1 Self-Management	-.005	.003	-.01	.000
T1 Meaning→T1 Self-Efficacy→T1 Self-Management	.02	.008	.006	.04
T1 Meaning→T1 Health Attitudes→T1 Self-Efficacy→T1 Self-Management	-.001	.002	-.007	.003
T1 Meaning→T1 Social Support→T1 Self-Efficacy→T1 Self-Management	.000	.000	-.001	.000
Total Effects	.009	.008	-.007	.02
<b>Model 4 (Figure 4)</b>	Estimate	SE	95% CI Lower	95% CI Upper
T1 Meaning→T1 Social Support→T1 Self-Management	-.003	.003	-.01	.001
T1 Meaning→T1 Self-Efficacy→T1 Self-Management	.02	.008	.006	.04
Total Effects	.02	.008	.002	.03
<b>Model 5 (Figure 5)</b>	Estimate	SE	95% CI Lower	95% CI Upper
T1 Meaning→T1 Self-Efficacy→T1 Self-Management	.03	.007	.016	.04
Total Effects	.02	.006	.006	.03
<b>Model 6 (Figure 6)</b>	Estimate	SE	95% CI Lower	95% CI Upper
T1 Meaning→T1 Self-Efficacy→T2 Self-Management	.03	.01	.001	.06
Total Effects	.06	.02	.02	.10

*Note.* Significant indirect effects (i.e., confidence intervals do not include zero).

## CHAPTER 4: DISCUSSION

This study is among the first to use a health behavior change model to test relevant mediating factors in the relationship between positive psychological variables and chronic disease self-management for adults with diabetes, asthma, and migraines. There is accumulating evidence to suggest that meaning in life and self-compassion may have an important role in physical health, but these relationships have not yet been tested with a comprehensive health behavior change model with patients managing chronic disease. The majority of previous studies on this topic have primarily isolated one health behavior of interest (e.g., adherence to a medication regimen) or used a single, overarching chronic disease measurement item as the dependent variable, which provides limited utility in understanding how well people are managing the multiple facets critical to chronic disease self-management. Other similar studies have measured *intention* to perform a behavior in lieu of actual reported behavior although there is a demonstrable gap between the intent to perform a behavior and actual engagement in behavior (Sheeran & Webb, 2016), which is even more pronounced in chronic disease patients (Rich et al., 2015). The primary purpose of this study was to address these gaps in the literature and explore the influence of overarching positive psychological factors on chronic disease self-management via an adapted version of a widely researched health behavior change model, the theory of planned behavior.

It was hypothesized that both self-compassion and meaning in life would positively predict chronic disease self-management through more proactive attitudes toward health, increased social support, and higher disease-related self-efficacy. The proposed model was only partially supported. Results from this study provide evidence that people with a chronic disease

who report higher meaning in their lives are more likely to report better engagement in chronic disease self-management and that this effect is, in part, explained by their confidence in managing their respective disease. This finding was supported both in the cross-sectional data and longitudinally when disease self-management was measured three months after the initial data collection. Contrary to what was hypothesized, in a predictive model, self-compassion was not directly linked to a proactive health orientation toward health, increased availability of social support, or better disease self-efficacy nor did self-compassion predict self-management indirectly via these same mediators.

### **Modeling Direct and Indirect Effects of Self-Compassion and Chronic Disease Management**

Self-compassion was correlated significantly and in the expected direction with a proactive health orientation and disease-related self-efficacy, yet when self-compassion was entered into a path analysis with meaning in life, self-compassion was not significantly associated with any of the mediators (attitudes, self-efficacy, and social support) nor did self-compassion directly relate to chronic disease self-management. In sum, the current study did not find the proposed links between self-compassion and chronic disease self-management either through direct or indirect pathways.

These findings represent a departure from the current available literature on the influence of self-compassion in chronic disease self-management. Previous studies have found that people who report higher self-compassion demonstrate better management across some disease groups, including stricter adherence to a gluten-free diet for those with celiac disease (Dowd & Jung, 2016), better compliance with HIV medication (Brion et al., 2014), and better glycemic control for individuals with diabetes (Friis et al., 2016). One possible explanation for our divergent

findings is that recently proposed models of self-compassion and health highlight the role of emotion regulation, alleviation of mental health symptoms, (Friis, Consedine, & Johnson, 2015; Sirois & Rowse, 2016; Terry & Leary, 2011) and promotion of positive coping strategies (Allen, & Leary, 2010; Sirois, 2015) as key explanatory pathways, none of which were explicitly modeled in my current study.

One plausible explanation is that self-compassion may differentially benefit people who are managing chronic disease and are highly distressed. People who experience a highly negativistic cognitive bias toward the self (e.g., Beck, 1976) may have more degrees of freedom to benefit from a skill focused on self-kindness, balanced thinking, and mindfulness. Friis and colleagues (2015) found that self-compassion was a moderator in the relationship between diabetes-related distress and glycated hemoglobin, such that self-compassion served as a buffer for the deleterious impact of diabetes-related distress on A1C. In a study which investigated the utility of a self-compassion imagery intervention for smoking cessation, people who were highly self-critical at baseline received disproportionate positive benefit from the self-compassion intervention as compared to those who were less critical of themselves at initial data collection (Kelly et al., 2010). In fact, the only published randomized controlled trial to test the impact of self-compassion on disease management found that people randomized to an 8-week mindful self-compassion intervention reduced their glycated hemoglobin by 1% at 3 months after intervention (Friis, Johnson, Cutfield, & Consedine, 2016). At the same time, however, over half of the participants who opted into the study had clinically significant depression, which is notably higher than the normative population of people with diabetes (van Son et al., 2013). Psychological symptoms were not a focus in the current study. Thus, it is possible that self-compassion has a significant role in helping to alleviate psychological symptoms for those

managing distress in the context of chronic disease, but self-compassion may not in and of itself have an overarching salutogenic effect. Future studies could benefit from inclusion of psychological screeners to parse out mood symptoms as relevant moderators in the relationship between self-compassion and chronic disease self-management.

It is also possible that the type of disease and the requisite management of disease type may play a significant role in the relationship between self-compassion and disease self-management. One additional proposed mechanism in the relationship between self-compassion and health, more broadly, is self-regulation. It has been proposed that self-compassion influences self-regulation by lowering defensiveness, reducing negative emotional states and self-blame that can interfere with self-regulation, and increasing medical compliance (Terry and Leary, 2012). Self-regulation, in turn, has been proposed as an antecedent to self-efficacy insofar as the ability to control or alter one's response in the face of disease management could potentially boost confidence. All of the studies to date that have linked self-compassion to better disease management have focused on one target behavior, such as a gluten-free diet for people with celiac disease (Dowd & Jung, 2016) or medication adherence for people with HIV (Brion et al., 2014). Insofar as these behaviors associated with management have specific goal-attainment indices, self-compassion may aid in re-engagement in behaviors in which one receives immediate feedback (e.g., a patient with celiac disease is aware that they ate something with gluten) or with behaviors that are easier to perform, such as taking medication (Sheeran, Trafimow, & Armitage, 2003). Corroborating this idea, researchers conducting a smoking cessation study in the 1980's found that people who were kind to themselves after they experienced a self-regulatory failure by smoking a cigarette were more likely to eventually be successful in quitting smoking than those who were harshly punitive or overly self-critical

(Curry, Marlatt, & Gordon, 1987). Findings from the current study suggest that self-compassion may have limited applicability to multidimensional adoption of behavior or with targets of disease management in which the patient does not receive immediate feedback (e.g., stress management for prevention of migraines).

### **Modeling Direct and Indirect Effects of Meaning in Life and Chronic Disease Management**

As hypothesized, meaning was significantly and positive correlated with a proactive health orientation, higher availability of social support, and higher disease-related self-efficacy. When entered into the full model, however, meaning did not independently predict Time 1 Disease Self-Management nor Time 2 Disease Self-Management, although the latter relationship was in the expected direction. This finding is consistent with literature that suggests that meaning may primarily exert an indirect effect on health (Steger et al., 2015). In previous chronic disease literature, meaning has been linked to better perceived physical health and better physical outcomes (Sherman & Simonton, 2012; Taylor et al., 2000), better pain tolerance (Schleicher et al., 2005), and less functional disability (Smith & Zautra, 2000). Although meaning in life has been linked to psychological states of people navigating chronic disease (e.g., Deroon Cassini et al., 2009; Dezutter et al., 2013) and to health behaviors longitudinally in a non-disease sample (Brassai, Piko, & Steger, 2015) to my knowledge this is the first study to look at the mechanisms by which meaning impacts chronic disease management longitudinally.

In the cross-sectional data, self-efficacy was the only proposed mediator that explained the relationship between meaning and chronic disease self-management. By virtue of the cross-sectional nature of these data, it is not viable to test causal mediation. However, with inclusion of our three month follow-up, I was able to test whether meaning and self-efficacy during our initial data collection was predictive of disease management three months later. This

relationship was supported. Overall, my findings suggest that experiencing higher meaning in life is related to better disease self-management via higher disease-specific self-efficacy.

The link between meaning and self-efficacy is consistent with other literature across health domains as well as within the education literature. In a previous study, meaning mediated the relationship between self-efficacy and health-supporting behaviors, such as use of sunscreen and engagement in preventive sexual behavior (Wieshmann & Hannich, 2011). In addition, researchers who implemented a meaning-making intervention for patients with cancer (Lee, Cohen, Edgar, Laizner, & Gagnon, 2006) found that those randomized to the meaning intervention condition had higher scores on self-efficacy post-treatment, although self-efficacy was not a specific target of the intervention itself. Taken together, these findings provide initial support that perceiving life to be meaningful may provide a basis by which people develop confidence in managing their health. The current study advances the literature in a critical way from the previously established connection between meaning and generalized self-efficacy to suggest a link between global meaning in life and disease-specific self-efficacy for those who are navigating chronic disease.

The current study further supports a growing body of literature that highlights the salutogenic role of meaning in physical health (Czekierda, Banik, Park, & Luszczynska, 2017; Roepke, Jayawickreme, & Riffle, 2014). Although meaning has demonstrated small to moderate effects for both subjective and objective indicators of health, the majority of these studies have been focused on health behaviors with assumedly disease-free populations (Steger et al., 2015) or with aging populations (e.g., Krause & Shaw, 2003). Meaning in life may be particularly important for adaptation to a chronic condition as serious illness may impact goals and life plans (Pinquart, Silbereise, & Frohlich, 2009), challenge fundamental assumptions about health, and

require enactment of coping resources (Dezutter, 2010; Sherman & Simonton, 2012). Little is known, however, about the ways in which meaning is related to physical health. It has been proposed that meaning may have a direct physiological effect on immune and stress-response systems, may form a cognitive pathway through control and self-efficacy, and/or work through optimism and positive affect (Roepke et al., 2013). The current study points to the notion that one way in which meaning may be related to health for chronic disease patients is via an improved sense of control and confidence in managing health.

Although these findings provide support for one relevant mechanism in the link between meaning and disease management, there are several unexplored areas that require further study. As meaning is considered a tri-partite concept, which consists of cognitive and motivational components (Steger & Martela, 2016), it is unclear which component(s) of meaning are most relevant to managing chronic disease. For example, it is plausible that people who comprehend themselves in light of their illness may be better at managing their disease, or it is equally likely that someone whose life is imbued with significance and who works toward a higher purpose may be particularly invested in protecting their health. Although a large meta-analysis did not find that conceptualization of meaning impacted physical health (Czekierda, Banik, Park, & Luszczynska, 2017), ongoing measurement development in the field of meaning (Steger and Martela, in progress) may allow future research designs to identify the most critical aspects of meaning's influence on management of chronic disease.

Finally, it is important to highlight a key distinction in global versus situational meaning. Although the current study focused on assessing subjective global meaning via the Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006), it is possible that those who engaged in processes to support situational meaning in light of their chronic disease diagnosis

(Park, 2010) are better able to manage their chronic disease. Qualitative research that discerns processes by which people arrive at situational meaning during illness and how that contributes to global meaning may inform intervention efforts that aim for inclusion of existential and humanistic factors. Future research can address these issues by utilizing mixed-methods designs and highlighting the shared experiences of those navigating chronic disease management.

### **Theory of Planned Behavior and Chronic Disease Management**

The theory of planned behavior (TPB; Ajzen, 1991) is a theory which suggests that health attitudes, subjective social norms, and self-efficacy have utility in predicting engagement in health behaviors. In a review study that analyzed only studies that looked at TPB as applied to samples with chronic disease, they found that across 27 studies, attitudes, subjective norms, and self-efficacy predicted 33% of the variance in intention to perform a behavior and 9% of the variance in engagement in the behavior (Rich et al., 2015). Considering the relatively weak predictive power of subjective social norms on engagement in health behavior for chronic disease patients, I intentionally modified TPB to include social support in lieu of subjective social norms. Although a proactive health orientation and social support were positively correlated with disease self-management at both Time 1 and Time 2, when health attitudes, social support, and self-efficacy were entered into the path model with meaning and self-compassion, self-efficacy alone was influential in the link between meaning and disease self-management.

In many previous studies of TPB and chronic disease, self-efficacy has emerged as the most robust predictor of health behavior engagement (Brandes, Mullan, & Hagger, 2015) and has been highlighted as the main influence on successful disease self-management (Clark et al., 1991; Plotnikoff, Brez, & Holtz, 2000; Senécal, Nouwen, & White, 2000), which is reflected in

multiple disease management interventions in which self-efficacy is a main target (Clark & Dodge, 1999; Farrell, Wicks, & Martin, 2004; Lorig & Holman, 1993). Our results suggest that self-efficacy may be the only TPB variable that explains the unique relationships between meaning in life and chronic disease self-management. Although meaning in life, self-compassion, and health attitudes were correlated in the expected direction, it is also possible that by measuring general health attitudes, rather than disease-specific attitudes, the specificity required to draw conclusions about the influence of attitudes on disease-related health and management was not achieved. In addition, our sample was primarily drawn from people who were either presenting at health clinics for treatment or were willing to endorse experiencing a health condition on a general survey, which may disproportionately represent people who are more likely to endorse a generally more proactive orientation toward health.

There is strong evidence to suggest that social support, when measured in various ways, is a positive predictor of disease management and health (Gallant, 2003). Our current study did not find a direct path between social support and chronic disease-management nor an indirect path via positive psychological factors. This lack of relationship may have been impacted by the way in which social support was measured. I deliberately chose to measure the perceived availability of social support across social support domains, such as whether people felt that they had someone to call if they needed help with transportation to a doctor's appointment, someone to give them a hug, or someone to have a good time with (Sherbourne & Stewart, 1991). By foregoing measuring actual support received, it is still unknown how much support this sample actually acquired, which is problematic considering that some studies suggest that perceived and actual support only share a modest relationship (DiMatteo, 2004b). Studies which include ecological momentary assessment are more adeptly able to address this concern by measuring

the extent to which people actually seek and receive support in domains relevant to management of chronic disease.

Another complementary line of work may help explain our findings. Gallant (2003) proposed that the impact of social support may predominantly lie in its ability to impact self-efficacy. In the current model, I proposed social support and self-efficacy as simultaneous mediators which may undermine the relationship and shared variance in predicting chronic disease self-management. In the current sample, social support and self-efficacy were moderately correlated ( $r = .45$ ), and as such, it is possible that a proportion of the variance explained by social support was subsumed by the influence of self-efficacy. Future research may benefit from a time-lagged model that measures these variables at different time points in relation to disease self-management.

### **Limitations**

Despite being a novel approach to salutogenic and existential approaches to disease management, the results from this study should be considered in light of several limitations. Our sample was predominantly female (84.8%) and White (82.8%), which significantly limits the generalizability of our conclusions. In addition, one of our major sampling techniques included recruitment from medical centers and primary care clinics, which may have impacted our results by oversampling people who are already at least somewhat engaged in managing their health.

In addition, disease self-management was measured by self-report, which may be susceptible to an overestimation of treatment adherence (Horne et al., 2005). Moreover, TPB studies and previous meaning and health studies have found that relationships among psychosocial predictors and subjective health variables are stronger than objective measures, such as biomarkers (Armitage & Conner, 2001; Czekierda, Banik, Park, and Luszczynska, 2017;

McEachan et al., 2011; Schlenker & Leary, 1982). Future studies may benefit from inclusion of objective measures of health, such as A1C for diabetes management or cortisol for stress for people who experience migraines.

Management of chronic disease cuts across three primary domains: behavioral management, role management, and emotional management (Corbin & Strauss, 1985). Although screening measures have been designed and tested to assess presence or absence of symptoms and related functional impairment for migraine (MIDAS; Stewart, Lipton, Dowson, & Sawyer, 2001) and asthma patients (ACT; Schatz et al., 2006; Kennedy & Jones, 2007), reliable and valid tools that assess management of chronic disease in these domains is critically lacking. In the current study, I was required to measure management of asthma and migraine as a function of the extent to which people reported doing the behaviors and actions that have been deemed important for validated tools of self-efficacy. While questionnaires that measure multiple specific behaviors have been demonstrated to better predict management (Sumartojo, 1993), this method of measurement may increase the risk of self-report bias and points to the larger need in the field for empirically-driven efforts to develop chronic disease management scales that highlight domain-specific self-care behaviors for each disease group respectively.

Finally, retention rate was low in this study from the initial data collection to the second data collection three months later (47.5%). Despite multiple reminders and incentives provided both after initial data collection and the second data collection, the majority of participants did not complete the second survey, and I was underpowered to measure the full model longitudinally. The majority of the findings in this study, then, represent cross-sectional relationships, which limits our understanding of the predictive nature of meaning and self-compassion on chronic disease management.

## **Summary and Clinical Implications**

The current study addresses several gaps in the literature by testing a comprehensive model of the impact of positive psychological constructs on chronic disease management by adapting a well-established health theory, testing mediators, and including chronic disease management behaviors as the primary outcome of interest. Consistent with other literature that links meaning and self-efficacy to health, my findings suggest that meaning in life may have a salutogenic impact on chronic disease self-management through a sense of control and confidence regarding aspects of managing chronic disease. This finding suggests that people who have made sense of their life and are driven by an overarching purpose may be more motivated to protect their health when faced with chronic disease.

Multiple interventions designed to promote better management of chronic disease target self-efficacy (Clark & Dodge, 1999; Farrell, Wicks, & Martin, 2004; Lorig & Holman, 1993), yet how to generate and sustain motivation for chronic disease management has largely remained elusive (World Health Organization, 2003). Results from the current study suggest that intervention efforts designed to promulgate meaning in life may support development of self-efficacy. While the knowledge, skills, and attitudes requisite in sustaining confidence in managing one's health may answer the question of "what" is important for health, meaning may have an especially valuable role in the "why" protecting one's health matters. Thus far, meaning interventions have been developed for subtypes of chronic disease management, such as for cancer patients (e.g., Breitbart et al., 2010; Lee et al., 2006). The current study underscores the need for widely applicable meaning interventions that supports chronic disease management across disease types (O'Donnell, Morse, & Steger, in progress) and a potential for meaning and purpose driven health care.

In the case of understanding the role of self-compassion in predicting disease management, the findings suggest that health attitudes, social support, and self-efficacy are not pathways by which self-compassion influences chronic disease management. Based on other hypothesized mechanisms, it may be critical to investigate stress, coping, emotion-focused, and mental health pathways to further elucidate relationships between self-compassion and health. Even in light of the limitations of this study, the current study represents a critical step in identifying salutogenic pathways toward chronic disease management. Findings from the current study suggest that meaning-focused intervention as adjunctive to chronic disease self-management efforts may represent a vital step in a holistic approach to health.

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## APPENDICES

### Appendix A: Measures

#### Screening Questionnaire

Welcome to the Chronic Illness Study through the Department of Psychology at Colorado State University. We appreciate your interest. First, we will ask you a few questions to see if you are eligible to take part in this study. If you are eligible, you will then be connected with the full survey.

What is your age? \_\_\_\_ (Younger than 18 Not Eligible)

Do you have a diagnosis of (Type 1 Diabetes/Type 2 Diabetes/Migraines/Asthma) from a medical provider?

Yes

No (Not Eligible)

I don't know. (Not eligible)

(For migraine and asthma patients) Have you experienced any (migraines/flare-ups or asthma attacks) or (migraine/asthma) symptoms in the past 30 days?

Yes

No (Not Eligible)

Do you understand written English?

Yes

No (Not Eligible)

If eligible: You are eligible for this study. Do you wish to continue?

Yes

No (Routed to ineligible message)

If ineligible or indicated that they do not wish to proceed: Unfortunately, you are not eligible to take this survey or have indicated you do not wish to proceed. Thank you for your interest!

#### Demographic Questions/General Information

Please answer each of the following questions by filling in the blanks with the correct answers or by choosing the single best answer:

Please enter your e-mail address (Your e-mail address is ONLY used for this study in order to distribute gift cards and to send a follow-up survey in 3 months. All records of the e-mail address are destroyed after study conclusion):

Where did you hear about this study?

Please enter today's date:

Please enter your age:

Please enter your birth date:

Please enter your zip code:

Sex:

Male

Female

What year were you first told you had (Type 1 Diabetes/Type 2 Diabetes/Migraines/Asthma)?

What is your marital status? Please check one box.

Never married

Married

Separated/Divorced

Widowed

What is your ethnic origin/race?

White

Black or African American

Hispanic

American Indian or Alaska Native

Asian or Pacific Islander

Arabic

Other \_\_\_\_\_

How much schooling have you had? Please count years of formal schooling and check one box.

8 grades or less

Some high school

High school graduate or GED

Some college or technical school

College graduate (bachelor's degree)

Graduate degree

Which of the following describes your current employment status? Please check one box.

Working full-time, 35 hours or more per week

Working part-time, less than 35 hours per week

Unemployed or laid off and looking for work

Unemployed and not looking for work

Homemaker

In school

Retired

Disabled, not able to work  
Something else? Please specify \_\_\_\_\_

How would you describe the insurance plan(s) you have had in the past 12 months? Please check all that apply.

An individual plan- the member pays for the plan premium

A group plan through an employer, union, etc.- the employer pays all or part of the plan premium

U.S. governmental health plan (e.g., military, CHAMPUS, VA)

Medicaid

Medicare

I have not had an insurance plan in the last 12 months

In general, would you say your health is:

Excellent

Very good

Good

Fair

Poor

Which of these categories best describes your total combined family income for your household for the past 12 months? This should include income (before taxes) from all sources, wages, rent from properties, social security, disability and/or veteran's benefits, unemployment benefits, workman's compensation, help from relatives (including child payments and alimony), and so on.

Less than \$25,000

\$25,000 to \$49,999

\$50,000 to \$74,999

\$75,000 to \$99,999

\$100,000 to \$149,999

\$150,000 or greater

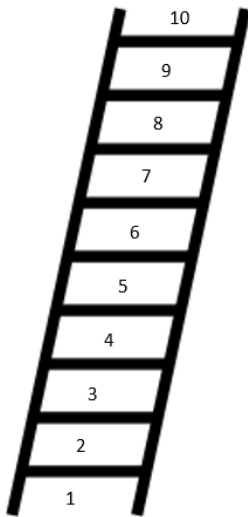
Don't know/Not sure

Decline to respond

**The MacArthur Scale of Subjective Social Status (Adler, Epel, Castellazo, & Ickovics, 2000)**

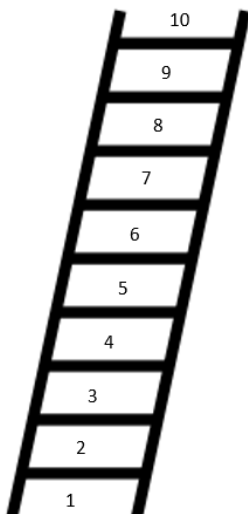
Think of this ladder as representing where people stand in the United States. At the top of the ladder are the people who have the most money, most education, and most respected jobs. At the bottom are the people who have the least money, least education, and least respected jobs or no job. The higher you are up on this ladder, the closer you are to the people at the very top, and the lower you are, the closer you are to the people at the very bottom.

Where would you place yourself on this ladder? Please indicate the number of the rung where you think you stand at this time in your life, relative to other people in the United States.



Think of this ladder as representing a person's status within his or her community. By community, we mean friends, family, neighbors, and coworkers. At the top of the ladder are the people who have the highest standing in their community and are best thought of by other community members. At the bottom are the people who have the lowest standing in their community. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the people at the very bottom.

Where would you place yourself on this ladder? Please indicate the number of the rung where you think you stand at this time in your life, relative to other people in your community.



**Self-Compassion Scale (SCS; Neff, 2003)**

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

- | Almost Never |   |   |   |   | Almost Always   |
|--------------|---|---|---|---|---|
| 1            | 2 | 3 | 4 | 5 |   |
| _____        |   |   |   |   | 1. I'm disapproving and judgmental about my own flaws and inadequacies.   |
| _____        |   |   |   |   | 2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.                                      |
| _____        |   |   |   |   | 3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.             |
| _____        |   |   |   |   | 4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world. |
| _____        |   |   |   |   | 5. I try to be loving towards myself when I'm feeling emotional pain.   |
| _____        |   |   |   |   | 6. When I fail at something important to me I become consumed by feelings of inadequacy.                              |
| _____        |   |   |   |   | 7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.         |
| _____        |   |   |   |   | 8. When times are really difficult, I tend to be tough on myself.   |
| _____        |   |   |   |   | 9. When something upsets me I try to keep my emotions in balance.   |
| _____        |   |   |   |   | 10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people. |
| _____        |   |   |   |   | 11. I'm intolerant and impatient towards those aspects of my personality I don't like.                                |
| _____        |   |   |   |   | 12. When I'm going through a very hard time, I give myself the caring and tenderness I need.                          |
| _____        |   |   |   |   | 13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.                      |
| _____        |   |   |   |   | 14. When something painful happens I try to take a balanced view of the situation.                                    |
| _____        |   |   |   |   | 15. I try to see my failings as part of the human condition.  |
| _____        |   |   |   |   | 16. When I see aspects of myself that I don't like, I get down on myself.   |
| _____        |   |   |   |   | 17. When I fail at something important to me I try to keep things in perspective.                                     |
| _____        |   |   |   |   | 18. When I'm really struggling, I tend to feel like other people must be having an easier time of it.                 |
| _____        |   |   |   |   | 19. I'm kind to myself when I'm experiencing suffering.   |
| _____        |   |   |   |   | 20. When something upsets me I get carried away with my feelings.   |
| _____        |   |   |   |   | 21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.                                       |
| _____        |   |   |   |   | 22. When I'm feeling down I try to approach my feelings with curiosity and openness.                                  |
| _____        |   |   |   |   | 23. I'm tolerant of my own flaws and inadequacies.  |
| _____        |   |   |   |   | 24. When something painful happens I tend to blow the incident out of proportion.                                     |
| _____        |   |   |   |   | 25. When I fail at something that's important to me, I tend to feel alone in my failure.                              |
| _____        |   |   |   |   | 26. I try to be understanding and patient towards those aspects of my personality I don't like                        |

### **Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006)**

Please take a moment to think about what makes your life and existence feel important and significant to you. Please respond to the following statements as truthfully and accurately as you

can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according to the scale below (ranging from 1, “Absolutely Untrue” to 7, “Absolutely True”). *Note:* Presence of meaning items (which were the only ones included in the present study are marked with (P)).

- |                      |   |   |   |   |   |   |                    |
|----------------------|---|---|---|---|---|---|--------------------|
| Absolutely<br>Untrue |   |   |   |   |   |   | Absolutely<br>True |
| 1                    | 2 | 3 | 4 | 5 | 6 | 7 |                    |
- 
- \_\_\_\_\_ 1. I understand my life’s meaning. (P)
- \_\_\_\_\_ 2. I am looking for something that makes my life feel meaningful.
- \_\_\_\_\_ 3. I am always looking to find my life’s purpose.
- \_\_\_\_\_ 4. My life has a clear sense of purpose. (P)
- \_\_\_\_\_ 5. I have a good sense of what makes my life meaningful. (P)
- \_\_\_\_\_ 6. I have discovered a satisfying life purpose. (P)
- \_\_\_\_\_ 7. I am always searching for something that makes my life feel significant.
- \_\_\_\_\_ 8. I am seeking a purpose or mission for my life.
- \_\_\_\_\_ 9. My life has no clear purpose. (P)
- \_\_\_\_\_ 10. I am searching for meaning in my life.

**Health Orientation Questionnaire (HOQ; Adapted from Steger, Fitch-Martin, Donnelly, & Rickard, 2015)**

Please rate the following statements from “1” Strongly Disagree to “4” Strongly Agree.

- \_\_\_\_\_ 1. A healthy lifestyle is important to me.
- \_\_\_\_\_ 2. It is important to me to stay as healthy as possible all my life.
- \_\_\_\_\_ 3. Staying as healthy as possible helps me pursue important life goals.
- \_\_\_\_\_ 4. Living life in the best possible health is important to me.
- \_\_\_\_\_ 5. Eating right, exercising, and taking preventative measures will me as healthy as possible for life.
- \_\_\_\_\_ 6. I watch what I eat because it helps me stay as healthy as possible.
- \_\_\_\_\_ 7. My health depends on how well I take care of myself.
- \_\_\_\_\_ 8. I feel confident that I can access the health care I need.

**Medical Outcomes Study- Social Support Survey (Sherbourne & Stewart, 1991)**

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it? Choose one number from each line.

- |                  |                         |                  |                  |                 |
|------------------|-------------------------|------------------|------------------|-----------------|
| None of the time | A little of the<br>time | Some of the time | Most of the time | All of the time |
| 1                | 2                       | 3                | 4                | 5               |

- \_\_\_\_\_ 1. Someone you can count on to listen to you when you need to talk.
- \_\_\_\_\_ 2. Someone to give you information to help you understand a situation.
- \_\_\_\_\_ 3. Someone to give you good advice about a crisis.
- \_\_\_\_\_ 4. Someone to confide in or talk to about yourself or your problems.
- \_\_\_\_\_ 5. Someone whose advice you really want.
- \_\_\_\_\_ 6. Someone to share your most private worries and fears with.
- \_\_\_\_\_ 7. Someone to turn to for suggestions about how to deal with a personal problem
- \_\_\_\_\_ 8. Someone who understands your problems.
- \_\_\_\_\_ 9. Someone to help you if you were confined to bed.
- \_\_\_\_\_ 10. Someone to take you to the doctor if you needed it.
- \_\_\_\_\_ 11. Someone to prepare your meals if you were unable to do it yourself.
- \_\_\_\_\_ 13. Someone to help with daily chores if you were sick.
- \_\_\_\_\_ 14. Someone who shows you love and affection.
- \_\_\_\_\_ 15. Someone to love and make you feel wanted.
- \_\_\_\_\_ 16. Someone who hugs you.
- \_\_\_\_\_ 17. Someone to have a good time with.
- \_\_\_\_\_ 18. Someone to get together with for relaxation.
- \_\_\_\_\_ 19. Someone to do something enjoyable with.
- \_\_\_\_\_ 20. Someone to do things with to help you get your mind off things.

**Diabetes Empowerment Scale (DES; Anderson, Funnell, Fitzgerald, & Marrero, 2000)**

Please rate the following statements using the following scale.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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In general I believe that I:

- \_\_\_\_\_ 1. Know what part(s) of taking care of my diabetes that I am satisfied with.
- \_\_\_\_\_ 2. Know what part(s) of taking care of my diabetes that I am dissatisfied with.
- \_\_\_\_\_ 3. Know what part(s) of taking care of my diabetes that I am ready to change.
- \_\_\_\_\_ 4. Know what part(s) of taking care of my diabetes that I am not ready to change.
- \_\_\_\_\_ 5. Can choose realistic diabetes goals.
- \_\_\_\_\_ 6. Know which of my diabetes goals are **most** important to me.
- \_\_\_\_\_ 7. Know the things about **myself** that either help or prevent me from reach my diabetes goals.
- \_\_\_\_\_ 8. Can come up with good ideas to help me reach my goals.
- \_\_\_\_\_ 9. Am able to turn my diabetes goals into a workable plan.
- \_\_\_\_\_ 10. Can reach my diabetes goals once I make up my mind.
- \_\_\_\_\_ 11. Know which **barriers** make reaching my diabetes goals more difficult.
- \_\_\_\_\_ 12. Can think of **different** ways to overcome barriers to my diabetes goals.
- \_\_\_\_\_ 13. Can try out different ways of overcoming barriers to my diabetes goals.
- \_\_\_\_\_ 14. Am able to decide which way of overcoming barriers to my diabetes goals works best for me.
- \_\_\_\_\_ 15. Can tell how I'm feeling about **having** diabetes.
- \_\_\_\_\_ 16. Can tell how I'm feeling about **caring** for my diabetes.



- \_\_\_\_\_ 13. If cigarette smoke is bothering me, I feel that I can ask the person to stop smoking.
- \_\_\_\_\_ 14. During an asthma attack, I can refrain from panicking in order to better manage the attack.
- \_\_\_\_\_ 15. I have confidence in my ability to avoid frequent trips to the emergency room because of my asthma.
- \_\_\_\_\_ 16. There is nothing I can do to relieve an asthma attack before it gets worse.
- \_\_\_\_\_ 17. I don't have a lot of confidence in my ability to manage my asthma.
- \_\_\_\_\_ 18. I can generally figure out what is causing an episode of my asthma.
- \_\_\_\_\_ 19. Once an attack starts, I am not capable of stopping it. I just have to wait until it subsides.
- \_\_\_\_\_ 20. I have a lot of confidence in my ability to detect the early warning signs of my asthma.

### **Headache Self-Efficacy Scale (HSES; French et al., 2000)**

Below you will find a number of statements related to headaches. Please read each statement carefully and indicate how much you agree or disagree with the statement by marking a response next to it.

Strongly	Moderately	Slightly	Neither	Slightly	Moderately	Strongly
Disagree	Disagree	Disagree	Agree nor Disagree	Agree	Agree	Agree

- \_\_\_\_\_ 1. I can keep even a bad headache from disrupting my day by changing the way I respond to the pain.
- \_\_\_\_\_ 2. When I'm in some situations, nothing I do will prevent headaches.
- \_\_\_\_\_ 3. I can reduce the intensity of a headache by relaxing.
- \_\_\_\_\_ 4. There are things I can do to reduce headache pain.
- \_\_\_\_\_ 5. I can prevent headaches by recognizing headache triggers.
- \_\_\_\_\_ 6. Once I have a headache, there is nothing I can do to control it.
- \_\_\_\_\_ 7. When I'm tense, I can prevent headaches by controlling the tension.
- \_\_\_\_\_ 8. Nothing I do reduces the pain of a headache.
- \_\_\_\_\_ 9. If I do certain things every day, I can reduce the number of headaches I will have.
- \_\_\_\_\_ 10. If I can catch a headache before it begins, I often can stop it.
- \_\_\_\_\_ 11. Nothing I do will keep a mild headache from turning into a bad headache.
- \_\_\_\_\_ 12. I can prevent headaches by changing how I respond to stress.
- \_\_\_\_\_ 13. I can do things to control how much my headaches interfere with my life.
- \_\_\_\_\_ 14. I cannot control the tension that causes my headaches.
- \_\_\_\_\_ 15. I can do things that will control how long my headache lasts.
- \_\_\_\_\_ 16. Nothing I do will keep a bad headache from disrupting my day.
- \_\_\_\_\_ 17. When I'm not under a lot of stress, I can prevent many headaches.
- \_\_\_\_\_ 18. When I sense a headache is coming, there is nothing I can do to stop it.
- \_\_\_\_\_ 19. I can keep a mild headache from disrupting my day by changing the way I respond to the pain.
- \_\_\_\_\_ 20. If I am under a lot of stress, there is nothing I can do to prevent headaches.
- \_\_\_\_\_ 21. I can do things that make a headache seem not so bad.
- \_\_\_\_\_ 22. There are things I can do to prevent headaches.



- \_\_\_\_\_ 4. I prevented asthma in almost all situations.
- \_\_\_\_\_ 5. I kept my asthma under control when I was in a different city on vacation or on a business trip.
- \_\_\_\_\_ 6. I took the necessary steps to avoid or to manage an asthma attack effectively.
- \_\_\_\_\_ 7. I felt comfortable taking my asthma medications when I was at school/work or away from home.
- \_\_\_\_\_ 8. I was able to exercise without having an asthma attack.
- \_\_\_\_\_ 9. I did very well at perceiving the level of my asthma at all times, including when I was experiencing no asthma at all, when I was experiencing slight asthma, when I was experiencing moderate asthma, and when I was experiencing severe asthma.
- \_\_\_\_\_ 10. I handled the problems asthma caused.
- \_\_\_\_\_ 11. I was an effective asthma self-manager.
- \_\_\_\_\_ 12. If cigarette smoke was bothering me, I asked the person to stop smoking.
- \_\_\_\_\_ 13. I took my asthma medications as prescribed by my doctor.
- \_\_\_\_\_ 14. I had enough information about asthma to allow me to manage my asthma.
- \_\_\_\_\_ 15. I avoided frequent trips to the emergency room because of my asthma.
- \_\_\_\_\_ 16. I was not able to manage my asthma.
- \_\_\_\_\_ 17. I generally figured out what was causing an episode of my asthma.
- \_\_\_\_\_ 18. I was able to detect the early warning signs of my asthma.
- \_\_\_\_\_ 19. I avoided or minimized most of my asthma triggers.

### **Migraine Management Questionnaire (Adapted from HSES; French et al., 2000)**

The following statements describe self-care activities related to your migraines. Thinking about your self-care over the past 12 weeks (roughly 3 months), please specify the extent to which each statement applies to you.

Applies to me very much 4	Applies to me to a considerable degree 3	Applies to me to some degree 2	Does not apply to me 1
---------------------------------	--	--------------------------------------	---------------------------

- \_\_\_\_\_ 1. I kept bad headaches from disrupting my day by changing the way I responded to the pain.
- \_\_\_\_\_ 2. In some situations, nothing I did prevented headaches.
- \_\_\_\_\_ 3. I reduced the intensity of headaches by relaxing.
- \_\_\_\_\_ 4. There are things I did to reduce headache pain.
- \_\_\_\_\_ 5. I prevented headaches by recognizing headache triggers.
- \_\_\_\_\_ 6. Once I had a headache, there was nothing I could do to control it.
- \_\_\_\_\_ 7. When I was tense, I prevented headaches by controlling the tension.
- \_\_\_\_\_ 8. Nothing I did reduced the pain of a headache.
- \_\_\_\_\_ 9. If I did certain things every day, I reduced the number of headaches I had.
- \_\_\_\_\_ 10. If I caught a headache before it began, I often stopped it.
- \_\_\_\_\_ 11. Nothing I did kept a mild headache from turning into a bad headache.
- \_\_\_\_\_ 12. I prevented headaches by changing how I responded to stress.
- \_\_\_\_\_ 13. I did things to control how much my headaches interfered with my life.
- \_\_\_\_\_ 14. I could not control the tension that caused my headaches.

- \_\_\_\_\_ 15. I did things that controlled how long a headache lasted.
- \_\_\_\_\_ 16. Nothing I did kept a bad headache from disrupting my day.
- \_\_\_\_\_ 17. When I wasn't under a lot of stress, I could prevent many headaches.
- \_\_\_\_\_ 18. When I sensed a headache was coming, there was nothing I could do to stop it.
- \_\_\_\_\_ 19. I could keep a mild headache from disrupting my day by changing the way I responded to the pain.
- \_\_\_\_\_ 20. If I was under a lot of stress, there was nothing I could do to prevent headaches.
- \_\_\_\_\_ 21. I could do things that made a headache seem not so bad.
- \_\_\_\_\_ 22. There were things I could do to prevent headaches.
- \_\_\_\_\_ 23. If I was upset there was nothing I could do to control the pain of a headache.
- \_\_\_\_\_ 24. I could control the intensity of headache pain.
- \_\_\_\_\_ 25. I could do things to cope with my headaches.

## **Appendix B: Consent**

### **Consent to Participate in a Research Study Colorado State University**

**TITLE OF STUDY:** Investigating Psychological Factors of Chronic Illness Management

**PRINCIPAL INVESTIGATOR:** Michael F. Steger, Ph.D., Professor, Department of Psychology, (970) 491-7324, [michael.f.steger@colostate.edu](mailto:michael.f.steger@colostate.edu)

**CO-PRINCIPAL INVESTIGATOR:** Maeve B. O'Donnell, M.S., Doctoral Student, Department of Psychology, (970) 430-5266, [Maeve.Odonnell@colostate.edu](mailto:Maeve.Odonnell@colostate.edu)

#### **WHY AM I BEING INVITED TO TAKE PART IN THIS RESEARCH?**

You are being invited to take part in this research because you are a person that has a chronic illness (type 1 diabetes (T1D), type 2 diabetes (T2D), asthma, or migraines). We are interested in understanding more about you and the ways in which you manage your illness.

#### **WHO IS DOING THE STUDY?**

Michael F. Steger, PhD, and Maeve B. O'Donnell, MS

#### **WHAT IS THE PURPOSE OF THIS STUDY?**

The purpose of this study is to understand psychological aspects of management of chronic illness

#### **WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?**

This study will take approximately 30-60 minutes to complete at two time points twelve weeks apart (total: 1-2 hours) and is being conducted via survey which can be taken on a computer, tablet, or internet-capable cell phone.

### **WHAT WILL I BE ASKED TO DO?**

You will be asked to complete two surveys that inquire about management of chronic illness. These surveys will be spaced three months apart and can be taken on a home computer, laptop, tablet, or internet-capable cell phone.

### **ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY?**

If you are under the age of 18 or do not have one of the chronic illnesses listed above (T1D, T2D, asthma, or migraines) you are not eligible to participate in the study. If you are under the age of 18 or do not have one of the chronic illnesses mentioned above, you should click or circle cancel below.

### **WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?**

The possible risks and discomforts from participating in this study are those similar to normal computer viewing and usage. You will be asked to complete two surveys as part of this study, and thus there is a risk of becoming fatigued from reading and answering all of the questions or psychological discomfort. You are free to skip any question that you do not feel comfortable answering. You can discontinue participation at any time without penalty. It is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

### **ARE THERE ANY BENEFITS FROM TAKING PART IN THIS STUDY?**

There may be no direct benefit to you from participating in this research, but you may learn about the research process, which you may find interesting. Knowing that you are participating in research that may benefit management of chronic illness, which will benefit the overall welfare of society, may also provide you with some beneficial feelings.

### **DO I HAVE TO TAKE PART IN THE STUDY?**

Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

### **WHO WILL SEE THE INFORMATION THAT I GIVE?**

We will keep private all research records that identify you, to the extent allowed by law. Only the research team (the PI and Co-PI) will have access to your email address, phone numbers, and survey responses. One month after completion of the data-collection process, we will delete the link between your survey responses and your email address and link your data to a non-

identifying code. We may be asked to share the research files for audit purposes with the CSU Institutional Review Board ethics committee, if necessary. When we write about the study to share with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private

### **WILL I RECEIVE ANY COMPENSATION FOR TAKING PART IN THIS STUDY?**

After completion of the two surveys, you will receive a \$10 electronic gift card (or research credit if you are eligible and choose to receive credit in lieu of the gift card) each time that will be sent to you by e-mail. You will also receive some information on management of chronic illness that you may find useful. Your email address/record of receiving compensation (NOT your data) may be made available to CSU officials for financial audits

### **WHAT IF I HAVE QUESTIONS?**

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now by emailing the co-principal investigator, Maeve O'Donnell at [maeve.odonnell@colostate.edu](mailto:maeve.odonnell@colostate.edu) or calling her at 970-430-5266. Later, if you have questions about the study, you can contact the co-principal investigator, Maeve B. O'Donnell, M.S, using the same contact information. If you have any questions about your rights as a volunteer in this research, contact the CSU IRB at: [RICRO\\_IRB@mail.colostate.edu](mailto:RICRO_IRB@mail.colostate.edu); 970-491-1553. We will provide this information to you on a webpage that you can save or print out when you finish participating in the study.

Clicking continue below acknowledges that you have read the information stated and willingly consent to participate in this research.

If you do not wish to continue please click cancel.

Continue  
Cancel

### **Appendix C: Recruiting Materials**

#### **For asthma and migraine patients (Time 1 by e-mail):**

Hello!

You are being contacted by researchers in the psychology department at Colorado State University because you consented to being contacted for studies and you indicated experiencing (migraines/asthma). This survey will take approximately 30 minutes to complete. You should know that participation in this study is voluntary, and you can stop participation at any time and/or choose not to answer any questions on the survey. You will receive EITHER 1) a \$10 electronic gift card from a company of your choosing as compensation for your time, which will be e-mailed directly to you OR 2) 1 research credit. At the end of the survey, you can indicate

whether you would like a gift card OR research credit.

If you complete a follow-up survey in 3 months (which will be e-mailed to you), you will earn an additional \$10 gift card of your choosing.

If you are interested in taking this study, click below.

Please contact the co-principal investigator on this study, Maeve O'Donnell by e-mail at [maeve.odonnell@colostate.edu](mailto:maeve.odonnell@colostate.edu) if you have any questions or concerns.

Thank you for your consideration,

**Follow this link to the Survey:**  
XXXXXXXXXXXXXXXXXXXX

For Type 1 Diabetes and Type 2 Diabetes patients (flyer distributed in medical clinics):



**(Type 1 Diabetes/Type 2 Diabetes) Research**  
Maeve O'Donnell, MS, and Michael Steger, PhD

As researchers at Colorado State University, we are interested in understanding links between personal characteristics and management of diabetes. Participants in this study will be asked to complete surveys at two time points three months apart and will be compensated with a \$10 electronic gift card for each survey they complete. Each survey takes approximately 30 minutes-1 hour to complete. Results of this study will be used to help medical and psychology professionals in best working with people to manage health concerns.

In order to take part in this study, you must:

- 1) Be aged **18 or over**
- 2) Have a diagnosis of **(Type 1 Diabetes/Type 2 Diabetes)** from a medical provider. This **does not** include pre-diabetes or gestational diabetes.
- 3) Understand written English

If you are 18 or over, have a diagnosis of (Type 1 Diabetes/Type 2 Diabetes), understand written English, and would like to participate in both parts of this study (two surveys completed online three months apart), please use this link to access the survey:

XXXXXXXXXXXX

If eligibility criteria is met and the survey is completed, a \$10 gift card will be distributed within two weeks of completion of each survey.

If you have any questions, please contact Maeve O'Donnell at [maeve.odonnell@colostate.edu](mailto:maeve.odonnell@colostate.edu)  
Thank you very much for your consideration.

#### **Appendix D: Letter of Cooperation Template**

This letter/e-mail is to certify that NAME OF ORGANIZATION desires to take part in the study, “INVESTIGATING PSYCHOLOGICAL FACTORS OF CHRONIC ILLNESS MANAGEMENT” (Colorado State University IRB Protocol No. 17-7281H), a study led by Michael Steger, PhD and Maeve O'Donnell, MS, researchers in the Department of Psychology at Colorado State University. We understand that this study has been approved by the Institutional Review Board at Colorado State University, and all efforts will be employed to protect the research participants. We are aware that the researchers will take reasonable steps to keep private information confidential and will not identify anyone individually. We are satisfied that individuals participating in this study are adequately protected as human research participants.

Participation in this study by our patients is completely voluntary, and potential participants will opt into the study of their own accord and can leave the study at any time. We are aware that this study includes a 30-60 minute initial data collection, in which individuals diagnosed with (Type 1 Diabetes/Type 2 Diabetes) will fill out an online survey related to their thoughts, feelings, attitudes, and behaviors pertaining to management of (Type 1 Diabetes/Type 2 Diabetes). We are aware that the same participants will be contacted again in 12 weeks to complete a 30-60 minute follow-up survey about their thoughts, feelings, attitudes, and behaviors pertaining to management of (Type 1 Diabetes/Type 2 Diabetes). We are aware that participants will receive a \$10 electronic gift card after both completion of the initial survey and after completion of the follow-up survey. We know that participation is voluntary, and participants can leave the study at any time or opt out of answering any specific questions they choose. NAME OF ORGANIZATION is aware that they will distribute flyers to eligible participants, and researchers at Colorado State University will provide all materials (e.g., flyers) and will correspond directly with participants, should questions arise.

#### **SIGNATURE**

Name of authorized individual in the organization

If letter: The letter needs to be signed by someone who has the authority to authorize the research for their organization (this is the person who is designated to legally, contractually, obligate the organization) and should be on letterhead. The IRB will accept a scanned letter with a signature.

If e-mail: Please e-mail to [Maeve.Odonnell@colostate.edu](mailto:Maeve.Odonnell@colostate.edu) E-mail should include a subject line referencing a Letter of Cooperation.

#### **Appendix E: Debrief Form and Information about Compensation**

## **Investigating Psychological Factors of Chronic Illness Management Debrief Form and Information about Compensation**

Thank you for participating in this study! A \$10 electronic gift card should arrive in your e-mail in the next 5-10 business days. Directions to activate this gift card will be included in the e-mail. If you have chosen to receive course credit instead of the gift card, this will be assigned in the next 5-10 business days. Please contact the Co-PI, Maeve O'Donnell, at [Maeve.Odonnell@colostate.edu](mailto:Maeve.Odonnell@colostate.edu) or by phone at (970) 430-5266 should you have any questions or concerns with regards to redemption of your gift card or with regards to course credit.

As we discussed during the consent process, there were questions that asked about some topics that people may find sensitive, such as how you experience stress or questions about your health. Sometimes people find that talking to someone, like a counselor, may be helpful to work through any concerns that have arisen as a result of taking this survey. The American Psychological Association has a tool that can help you locate a therapist in your area:

<http://locator.apa.org/>

We also have some websites that might be helpful for you to look at if you want to learn more about managing chronic illness:

For Type 1 Diabetes:

<http://www.diabetes.org/diabetes-basics/type-1/>

For Type 2 Diabetes:

<http://www.diabetes.org/diabetes-basics/type-2/>

For Asthma:

<http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/asthma/>

For Migraines:

<https://americanmigrainefoundation.org/>

If you have other questions about this study, please contact the researcher, Maeve O'Donnell, at [maeve.odonnell@colostate.edu](mailto:maeve.odonnell@colostate.edu)