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The Relationship Between Problem-Solving Ability/Eating Motivation and Perceived Quality of Life in Individuals Diagnosed with Celiac Disease

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Philadelphia College of Osteopathic Medicine

Department of Psychology

THE RELATION BETWEEN PROBLEM-SOLVING ABILITY/EATING
MOTIVATION AND PERCEIVED QUALITY OF LIFE IN INDIVIDUALS
DIAGNOSED WITH CELIAC DISEASE

By Vincenzo Zaccheo

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DEPARTMENT OF PSYCHOLOGY

Dissertation Approval

This is to certify that the thesis presented to us by Vincenzo Zaccheo
on the 7th day of April, 2016, in partial fulfillment of the
requirements for the degree of Doctor of Psychology, has been examined and is
acceptable in both scholarship and literary quality.

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Abstract

Celiac disease (CD) is a digestive disorder resulting from gluten intolerance that leads to damage of the small intestine. The only current available treatment for CD involves adherence to a strict gluten-free diet. Due to the restrictive nature of this treatment diet, and the increasing prevalence of CD in recent years, much research has been conducted examining factors that impact the quality of life (QOL) of individuals with CD. However, there has been a dearth of literature identifying those factors which can be modified within a treatment setting. Thus, a need for further research in this area was identified. Through an extensive literature review, the variables of social problem solving and hedonic eating were identified as factors which have been shown to impact the QOL of individuals with disease states similar to those of CD, namely diabetes mellitus and treatment seeking individuals with obesity. Due to the similarities between these chronic diseases and CD, the present study aimed to identify the relationship between problem-solving ability, relationship to food and perceived QOL in regard to one's psychological health and social relationships in individuals with CD, who are attempting a gluten free diet. A cross-sectional observational design was implemented. Potential participants were recruited through online social media. A snowball sampling method was additionally utilized. Participants completed study questionnaires via Survey Monkey. These measures included: the Dietary Compliance Scale, the Celiac Disease Symptom Questionnaire, the Social Problem Solving Inventory-Revised: Short Form, the Power of Food Scale, the World Health Organization Quality of Life-BREF questionnaire, the Eating Disorder Examination Questionnaire, and a Demographic Questionnaire. Findings from this study revealed a relationship between positive and negative problem solving

orientation, the presence of gastrointestinal symptoms, and psychological QOL.

Moreover, a relationship was identified regarding negative problem solving orientation, gastrointestinal symptoms and QOL related to social relationships. Such findings have potential implications for future treatment and assessment considerations.

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Chapter 1: Introduction

Statement of the Problem

Celiac disease (CD) is a digestive disorder that damages the small intestine (National Institute of Health [NIH], 2008). Individuals with CD are unable to tolerate gluten, a protein found in such foods as wheat, rye, and barley (NIH, 2008). Ingestion of gluten in these individuals leads to an autoimmune response, whereby the villi of the small intestine (small fingerlike protrusions important for absorption of nutrients from digested food) are attacked and destroyed (NIH, 2008). Without healthy villi, individuals become susceptible to malnourishment (NIH, 2008). Although there is no cure for CD, once affected, individuals are put on a strict gluten-free diet, symptoms diminish and damage is avoided (NIH, 2008).

Given the severely limiting nature of this treatment diet, much research has been conducted examining the factors impacting quality of life among individuals suffering from CD. The results of these studies have demonstrated that variables such as gender, presence of symptomatology, and treatment adherence correlate with quality of life (Casellas et al., 2008; Johnston, Rodgers, & Watson, 2004; Zarkadas et al., 2006). However, the breadth of research appears limited because there is a scarcity of studies investigating those variables which can be directly affected within a clinical setting (i.e. behaviors, cognitive misperceptions, etc.). Despite this state of affairs, investigations have been conducted with other disease states similar to CD, which require strict dietary and social readjustments (e.g., diabetes mellitus, obesity [in particular, individuals with obesity who seek to change their eating habits]), that may inform Celiac research in this regard.

Specifically, there is a wealth of literature demonstrating problem-solving ability to be correlated with increased quality of life, treatment adherence, and decreased depression among obese/diabetic individuals (King et al., 2010; Hills-Briggs & Gemmell, 2007; Glasgow, Fisher, Skaff, Mullan, & Toobert, 2007). This relationship has been found because obese/diabetic individuals are often placed in situations where adhering to a strict diet can be difficult, thus requiring the ability to problem solve and come up with solutions. Because CD individuals are likely to face similar dilemmas, this factor may prove relevant within this population. Furthermore, based on the obesity literature, certain individuals display a hedonic versus homeostatic approach to eating. In other words, some people are driven to eat for gratification rather than for physiological purposes (e.g., live to eat vs. eat to live individuals) (Sass, 2012; Beck 2010). For such individuals, being placed on a strict dietary regimen may be difficult (because these strong re-enforcers are withheld), resulting in less treatment adherence and quality of life. Given the fact that certain CD individuals may also display a hedonic approach to food and therefore suffer similar consequences, this is a pertinent factor to examine within this population.

These identified variables (i.e., problem-solving ability and approach to eating) are important to investigate within the Celiac population for a number of reasons. First, they are salient enough for clinicians to work with and to help modify. Concerning problem solving difficulties, a mode of treatment has been developed, termed problem-solving therapy (PST). PST aims to teach individuals the skills necessary to resolve problematic situations, including one's reactions to them, or both. Expanding on this, much research has been done demonstrating the efficacy of PST in improving

management of chronic illnesses (e.g., diabetes) (Glasgow et al., 2007; Grey & Berry, 2004; King, et al., 2010; Malouff, Thorsteinsson, & Schutte, 2007). In addition, cognitive-behavioral therapy (CBT) has been shown, empirically, to be an effective treatment for various hedonically driven disorders (e.g., compulsive gambling, substance abuse) (McHugh, Hearon, & Otto, 2010; Petry et al., 2006). It is also important to examine these variables, given the relatively high prevalence of CD. Currently, 3 million Americans are impacted by this disease (The University of Chicago, 2005). Therefore, greater knowledge must be gained regarding how to directly improve the quality of life of this group.

Purpose of the Study

The main purpose of this study was twofold. First, the relationship between problem solving ability and perceived quality of life among individuals with CD on a gluten free diet was examined. The basis for this examination flowed from past research demonstrating that such a relationship exists within disease states similar to those of CD (e.g., obesity [specifically, treatment seeking individuals with obesity], diabetes mellitus) (King et al., 2010; Hills-Briggs & Gemmell, 2007; Glasgow et al., 2007).

The second purpose of this study was to investigate the impact of perception of food on perceived quality of life among individuals with CD on a gluten free diet. As research has shown, certain individuals are driven to eat by hedonic purposes as opposed to physiological purposes. Therefore, it may be assumed that quality of life will be differentially affected by such eating motivation when a patient is placed on a restrictive diet (Sass, 2012; Beck, 2010). Given the absence of studies within Celiac research

investigating salient, clinically treatable variables, it is important to examine these factors.

Chapter 2: Celiac Disease

Celiac disease is an inherited autoimmune disorder (The University of Chicago, 2005). When individuals with CD ingest gluten, the immune system is triggered, attacking the villi of the small intestine (The University of Chicago, 2005; Mayo Clinic, 2013; NIH, 2008). The villi are microscopic protrusions which line the wall of the small intestine and are important for absorbing nutrients, such as vitamins and minerals, from digested food (The University of Chicago, 2005; Mayo Clinic, 2013; NIH, 2008). The damage caused by CD results in atrophy or flattening of the villi (The University of Chicago, 2005; Mayo Clinic, 2013; NIH, 2008). Due to this loss of villi, untreated CD may lead to malnourishment, osteoporosis, anemia, infertility, and cognitive difficulties (e.g., issues with memory and concentration), as well as increase in one's risk of developing intestinal lymphoma or cancer (The University of Chicago, 2005; Mayo Clinic, 2013 ;NIH, 2008).

Age of onset can vary, and ranges across the lifespan (Pruessner, 1998). When the disease manifests in infants and children, the presentation/symptomatology is different as compared with an adult onset (NIH, 2008; Mayo Clinic, 2013). The symptoms within children/infants include abdominal bloating, diarrhea, vomiting, constipation or fatty stool, failure to thrive (in infants), delayed growth and puberty and dental defects (NIH, 2008; Mayo Clinic, 2013). In contrast, many adults display mild symptoms, and are less likely to present with digestive issues (NIH, 2008; Mayo Clinic, 2013). Instead, adult onset CD typically manifests as anemia, fatigue, joint pain, osteoporosis, tingling/numbness in the extremities, seizures, infertility, and itchy skin rashes (NIH, 2008; Mayo Clinic, 2013).

Diagnosis of CD involves a two step-process. If an individual is suspected of having CD he or she is initially given a set of serological or blood tests (NIH, 2008; Mayo Clinic, 2013). These measures are used to assess the levels of three specific antibodies released during gluten ingestion in individuals with CD (NIH, 2008; Mayo Clinic, 2013). These antibodies include: anti-tissue transglutaminase antibodies, endomysial antibodies, and deamidated gliadin antibodies (NIH, 2008; Mayo Clinic, 2013). If the levels of these antibodies are found to be high, then it is likely the individual has CD (NIH, 2008; Mayo Clinic, 2013). To confirm the diagnosis, a biopsy is done of the individual's small intestine to determine the presence of villous atrophy, or flattening of the villi (NIH, 2008; Mayo Clinic, 2013).

Currently, the only available treatment for CD involves adhering to a strict gluten-free diet (NIH, 2008; Mayo Clinic, 2013). After these affected individuals have been placed on this diet, symptoms typically cease (although for a small group of individuals some symptoms persist), intestinal damage is allowed to heal, and future damage/complications are avoided (NIH, 2008; Mayo Clinic, 2013). CD is a chronic illness, meaning that individuals must maintain this diet for the rest of their lives in order to avoid further harm (NIH, 2008; Mayo Clinic, 2013).

Variations of CD

Along with the typical presentations of CD, two variants of the disease exist as well. Individuals diagnosed with latent CD are found to have positive serological tests, but normal biopsy results (Anderson, 2011). Such individuals are symptom free, and are designated as not having true CD (Anderson, 2011). Therefore, they are not placed on a

gluten-free diet. However, the majority of these individuals eventually go on to develop full-blown CD (Anderson, 2011).

In addition, certain individuals may be diagnosed with asymptomatic CD (Anderson, 2013). In this case, a formal diagnosis of CD is made, based upon positive serological and biopsy results (Anderson, 2013). However, the individual does not display any noticeable symptoms common with this disease (Anderson, 2013). For this reason, this form of CD is also called silent CD (Anderson, 2013). This form of the disease appears to be quite prevalent among the CD population, accounting for 60% and 41% of affected children and adults (The University of Chicago, 2005).

Prevalence and Statistics

Recent data indicate that CD currently affects about 1 in 133 individuals in the United States (US) (The University of Chicago, 2005). Altogether it is estimated that 3 million people (or 1% of the population) have this disease (The University of Chicago, 2005). According to these figures, CD is more prevalent than a number of other chronic illnesses, such as: epilepsy (2.7 million), Parkinson's disease (1 million), Crohn's disease (500,000), and Rheumatoid Arthritis (2.1 million) (The University of Chicago, 2005). A genetic component has also been found. In individuals who have a first degree relative diagnosed with CD, as many as 1 in 22 have the disease as well (The University of Chicago, 2005). Ethnic differences have similarly been found; the disease is more common among Caucasians and those of European ancestry (Mayo Clinic, 2013). The revelation of such statistics in recent years has, consequently, led to greater awareness and action, represented in numerous domains.

Gluten-Free Labeling

Given the increasing prevalence of CD, and other common food allergies, the Food Allergen and Consumer Protection Act was passed in 2004 and became effective in 2006 (The University of Chicago, 2005; NIH, 2008). This legislation requires that food labels clearly identify wheat, gluten, and other allergens in their lists of ingredients (The University of Chicago, 2005; NIH, 2008). As a result of this law, individuals with CD are now easily able to identify whether or not a food product is safe to eat, making maintenance of a gluten-free diet more manageable and less cumbersome (The University of Chicago, 2005; NIH, 2008). Aside from such legal action, much research has also been done in recent years in examining the psychiatric effects of this disease.

Mental Health & Quality of Life

Mental health. Many studies have demonstrated a possible link between CD and depression/anxiety in individuals both with treated and with untreated CD (Fera et al., 2003; Anderson, 2012; Addolorato et al., 2001; National Foundation for Celiac Awareness, 2011). However, there are inconsistencies in the literature. Hauser et al (2010) compared level of anxiety and depression between adults with CD on a gluten free diet and healthy controls. The level of depression was not found to differ between the two groups. However, the authors did discover that the level of anxiety was significantly higher in female celiac patients. In contrast, Smith and Gerdes (2011), conducted a meta-analysis and found the level of depression to be more common among CD patients, as compared with healthy adults but the rate of anxiety did not differ.

In addition to these varied findings, there is also no general consensus on what factors may underlie the possible link between CD and anxiety/depression. Some researchers attribute a higher risk of anxiety/depression to feelings towards the disease state itself (e.g., gastrointestinal issues, fatigue) because these symptoms are likely to cause distress, worry, and negatively impact one's well-being (National Foundation for Celiac Awareness, 2011; Fera et al., 2003; Smith & Gerdes, 2011). In addition, such psychiatric issues may be a consequence of living with a chronic illness because this entails ongoing challenges in maintaining a strict lifestyle and disruption in one's social life (National Foundation for Celiac Awareness, 2011; Fera et al., 2003; Smith & Gerdes, 2011).

Aside from these potential factors, others have asserted that anxiety/depression is possibly caused by the disease itself. The reasoning behind this argument stems from the fact that the intestinal damage seen in CD leads to an inadequate absorption of certain nutrients, particularly vitamin B, calcium, magnesium, folate, and tryptophan (National Foundation for Celiac Awareness, 2011, Smith & Gerdes, 2011; Anderson, 2012). Deficiencies in these nutrients have been known to be linked to anxiety/depression (National Foundation for Celiac Awareness, 2011). Because of such discrepancies within the literature, as well as to the ongoing debate over causal factors, much more research is needed in order to better understand the psychiatric consequences of CD, as well their underlying mechanisms. That being said, quality of life represents another psychological variable worthy of attention and research.

Quality of life. A number of studies have been conducted examining the effects of CD and a gluten free diet on quality of life. This has been driven by the severely

limiting nature of the treatment diet and its financial constraints (i.e., foods labeled gluten-free have been found to be more expensive than gluten-containing foods [Steven & Rashid, 2008]), requiring both major social and personal readjustments.

Measuring one's perceived quality of life can help determine the long term consequences that living with such a chronic illness entails. Quality of life is broadly defined as the perception one has of his or her position in life, given his or her culture, value system, goals, and expectations (World Health Organization [WHO], 1997). It is a multidimensional concept that involves or is affected by a person's physical health, emotional state, social life, level of independence, and personal beliefs (WHO, 1997).

Research has identified a number of possible factors that may be associated with decreased quality of life among the CD population. One such variable relates to whether an individual is symptomatic as opposed to being asymptomatic (Kurppa, Collin, Maki, & Kaukinen, 2011; Casellas et al., 2008; Nordyke et al., 2013; Mustalahti, 2002; Johnston, Rodgers, & Watson, 2004). Symptomatic individuals likely face added stressors and duress as a result of experiencing the gastrointestinal and typical symptoms seen in CD. Nonadherence to a gluten free diet has also been found to be detrimental to one's perceived quality of life, but adherence has been shown to have a positive influence (Johnston et al., 2004; Kolsteren, Koopman, Schalekamp, & Mearin, 2000; Mustalahti, 2002; Kurppa et al., 2011; Casellas et al., 2008). Again, this is likely due to the fact that ingestion of even a small amount of gluten can cause a number of unpleasant symptoms in individuals with CD, resulting in discomfort and distress.

In addition, a number of studies have demonstrated that early detection can have a positive influence on one's quality of life. In a study by Koppen et al. (2013), the authors

assessed the quality of life of 32 children with CD, aged 2-4 years, over the course of a decade. The participants were compared with a reference population of healthy peers. The quality of life of children with CD was lower than that of their healthy peers at the time of diagnosis; it began to improve once treatment was initiated, and was similar to that of the referenced population by 10 years. This finding is also supported by Ciacci and colleagues (2003); these authors assessed the quality of life of 581 adults with Celiac disease. Using a modified version of the Zung Self-Rating Depression Scale, the authors found that participants diagnosed before the age of 20 indicated higher Happiness scores than those diagnosed after the age of 20. A possible reason why early detection is associated with greater quality of life may be that the younger the individual is at time of diagnosis, the less disruptive the lifestyle adjustment would be, as compared with an older individual with an established social life.

There is also evidence indicating comorbidity as a detrimental factor to CD (Casellas et al., 2008; Kurppa, et al., 2011). The reasons for this appear obvious. Individuals with CD, who also have another illness/disease, have to contend with the stressors, symptoms, and challenges of multiple ailments. Such a confounding of issues is likely to impede one's life negatively. Interestingly, the literature has also asserted that women with CD have a poorer quality of life than men who have CD (Casellas et al., 2008; Kurppa et al., 2011). However, this finding must be viewed with caution because the majority of participants in studies regarding of quality of life and CD are indeed female, possibly leading to biased results.

Although current studies have proved useful in identifying factors that are associated with quality of life within the CD population, these variables, for the most

part, do not lend themselves to clinical treatment. Indeed, there is a dearth of literature within the field which has attempted to examine variables which can be modified within a clinical setting. It would be important to identify such variables in order to help improve the livelihood of this group. In light of this issue, research identifying such factors has been done with other disease states, similar to CD, which require strict dietary adherence (e.g., diabetes mellitus and obesity [the specific comparison pertains to individuals with obesity who seek to change their eating habits]), and these studies may help guide CD research. In particular, such literature has pointed to the influential powers of social problem solving ability and eating motivation on quality of life.

Social Problem-Solving

Social problem-solving refers to the process of problem solving in one's natural environment (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). Such abilities influence one's adaptive functioning in their social world (D'Zurilla et al., 2004). In this regard, social problem solving incorporates different types of problems that a person may encounter, such as impersonal problems (e.g., debt, robbery, etc.), intrapersonal problems (e.g., health issues, emotional difficulties, etc.), interpersonal problems (e.g., relationship conflicts), and societal problems (e.g., discrimination, crime, etc.) (D'Zurilla et al., 2004).

Many different models of problem solving have been put forth. Of these, the most well-known and popular is that of D'Zurilla, Nezu, and Maydeu-Olivares (D'Zurilla et al., 2004). Within this model, D'Zurilla et al. define three major concepts: problem solving, problem, and solutions (D'Zurilla et al., 2004). *Problem-solving* is conceptualized as a conscious, voluntary, cognitive-behavioral process which serves to identify and uncover solutions to everyday problems (D'Zurilla et al., 2004). The goal of

such an endeavor is to reduce distress and make problematic situations better (D’Zurilla et al., 2004).

Building upon this, a *problem* is defined as any life situation which requires a response for adaptive functioning, but one for which such a response is not immediately known or apparent due to certain obstacles (D’Zurilla et al., 2004). Such obstacles may include ambiguity of the situation, novelty of the task, or lack of resources (D’Zurilla et al., 2004).

Finally, a *solution* is classified as a situation- specific response, related to a specific problem situation that represents the final product of the problem-solving process (D’Zurilla et al., 2004). An effective solution achieves the problem solving goal of reducing distress and bettering a problematic situation by maximizing positive consequences and minimizing negative ones (D’Zurilla et al., 2004).

In addition to these concepts, D’Zurilla and colleagues state that social problem solving is not a unitary construct, but rather a multidimensional one involving numerous components (D’Zurilla et al., 2004). Specifically, this model asserts that problem solving is composed of the following variables: problem orientation and problem solving skills (D’Zurilla et al., 2004). Problem orientation is described as the cognitive schema that one holds of the problems he or she faces and his or her ability to solve such problems (D’Zurilla et al., 2004). Based upon this, two problem orientations are possible: a positive orientation and a negative orientation (D’Zurilla et al., 2004). An individual with a positive orientation views the problems he or she faces as manageable, believes in his or her ability to solve such problems, and puts effort into such endeavors (D’Zurilla et al., 2004). On the other hand, an individual with a negative orientation views daily

problems as threatening and insurmountable, is pessimistic about his or her problem solving abilities, and gives up easily on problem solving tasks (D’Zurilla et al., 2004).

Problem-solving skills are conceptualized as the cognitive and behavioral processes used by individuals to understand problems and find solutions for them (D’Zurilla et al., 2004). According to this model, five major skills exist that reflect appropriate problem solving (D’Zurilla et al., 2004). These include: (a) identifying, defining, and understanding the problem, (b) setting goals, (c) generating possible solutions, (d) weighing the advantages and consequences of each solution, (e) implementing the best solution and monitoring its effectiveness (D’Zurilla et al., 2004). Expanding on this, D’Zurilla and colleagues state that different problem solving styles exist, based on one’s ability to implement these skills (D’Zurilla et al., 2004). These styles include: rational problem solving style, impulsivity-carelessness style, and avoidance style (D’Zurilla et al., 2004).

An individual with a rational problem solving style is able to use the problem solving skills in an effective, deliberate, and meticulous manner (D’Zurilla et al., 2004). On the other hand, one who displays an impulsive-careless style hurries through the problem solving process in a careless and unsystematic manner (D’Zurilla et al., 2004). In contrast to this, the avoidance style is characterized by inaction, passivity, and procrastination (D’Zurilla et al., 2004). Individuals with this style put off problem solving, waiting for issues to resolve themselves (D’Zurilla et al., 2004). According to D’Zurilla and colleagues the best problem solvers are those who have both a positive orientation and rational style; poor problem solvers are characterized as having a negative orientation or any one of the other dysfunctional styles (D’Zurilla et al., 2004).

Quality of life. Within the field of social problem-solving, much research has been conducted examining its relationship to quality of life in individuals facing various issues and difficulties, including chronic illness. Studies of chronic illness have largely demonstrated problem-solving ability to be associated with reduced distress, improved self-efficacy, quality of life, and mental and physical health (Malouff, Thosteinsson, & Schutte, 2007; Bodenheimer, Lorig, Holman, & Grumbach, 2002). These same results have been found for illnesses similar to CD, namely diabetes mellitus and obesity (i.e., treatment seeking individuals with obesity). Individuals with these diseases like CD, face such challenges as strict dietary adherence, lifestyle readjustment, and self-management throughout life, with such issues increasing the probability of distress. Among both groups, efficient problem-solving ability has been found to be related to improved self-efficacy (Hill-Briggs & Gemmell, 2007), disease management (Hill-Briggs & Gemmell, 2007; Murawski et al., 2009; Elliott, Shewchuk, Miller, & Richards, 2001; Glasgow, Fisher, Skaff, Mullan, & Toobert, 2007; King et al., 2010), adjustment (Hill-Briggs & Gemmell, 2007), quality of life (Hill-Briggs & Gemmell, 2007; Wang, Sereika, Styn, & Burke, 2013), well-being (Elliott et al., 2001), and decreased depression and distress (Glasgow et al., 2007; Hill-Briggs & Gemmell, 2007), thus attenuating the issues associated with these diseases.

Given these findings, the influence of problem-solving ability in individuals with CD should be investigated. This is highlighted by the fact that individuals with CD also face many situations that they find difficult due to their dietary constraints that impact quality of life. In a survey conducted by Lee and Newman (2003), individuals with CD reported that a restrictive gluten free diet caused numerous life difficulties; these involve

dining out, attending social functions, and traveling, with such difficulties resulting in distress. The impact of these difficulties may be reduced or weakened by having efficient problem-solving abilities. Building upon this concept, and suggesting another reason why the aforementioned variable is important to examine, is that a form of therapy has been developed with this exact goal of improving problem solving ability in mind. This therapy is termed problem-solving therapy (PST), and has already been shown to have a positive effect on individuals with diabetes/obesity.

Problem-solving therapy. Problem-solving therapy is a form of psychotherapy which aims to teach individuals the skills necessary to manage life stressors effectively (e.g., financial difficulties, work issues, or chronic illness) (American Psychological Association [APA], n.d.). Specifically, PST helps individuals adopt a positive problem-solving orientation (APA, n.d.). With such an orientation individuals become more cognizant of those stressors which trigger negative emotions and become aware of how to manage such emotions (APA, n.d.). Moreover, individuals become more accepting/hopeful about their own problem-solving abilities, become more optimistic that problems can be solved, yet also accept the fact that certain problems are unsolvable, and realize that effective problem-solving requires time and effort (APA, n.d.). In addition to this, PST teaches individuals the steps necessary for appropriate problem solving (e.g., 1) identify, define, and understand the problem, 2) establish goals, 3) generate possible solutions, etc.) (APA, n.d.).

A large body of evidence demonstrates PST to be an effective form of treatment for a wide range of issues, including chronic illness (APA, n.d.). In the specific case of diabetes and obesity, a meta-analysis conducted by Grey and Berry (2004), looked at

coping skills training that utilized problem solving therapy in individuals with obesity seeking treatment; they found that such training was associated with improved quality of life and self-care management in children, adolescent, and adult participants. In a similar study, the investigators Grey, Boland, Davidson, Li, and Tamborlane (2000), when examining diabetes, compared a group receiving coping skills training that incorporated problem solving therapy with a group receiving intensive diabetes management (individuals here were closely medically followed). The group receiving coping skills training/problem solving therapy had greater quality of life and health. As demonstrated by these findings, PST is effective in helping individuals with chronic issues and strict dietary regimens learn how to better manage the difficulties they face and improve their well-being. In this regard, one may postulate that the same will hold true for CD.

Hedonic Eating

From the literature containing studies that investigate eating, an interesting concept known as hedonic eating, has been uncovered in recent years. Traditionally, it was believed that appetite and eating were solely maintained/controlled by the homeostatic processes of hunger and satiety. According to this original model, individuals become hungry once their energy reserves are low and they require an intake of calories. From this perspective, eating serves solely as a regulatory process, which ceases once satiety or fullness is achieved. This cycle is repeated once energy is again required (Beck, 2010; Lowe & Butryn, 2007).

However, with the obesity epidemic, this model falls short because it does not fully explain the reason why many individuals eat more than they need, and during times when it is not required. As a result, researchers have postulated the theory that hedonic

or pleasure driven eating may play a role (Beck, 2010; Lowe & Butryn, 2007; Sass, 2012). In other words, it seems that some individuals eat to live, while others live to eat. This increased shift toward hedonic eating within society may be related to numerous factors that have arisen over the last few decades; namely, an increase in availability of palatable (e.g., tasty) foods, and certain cultural/environmental factors (Lowe & Butryn, 2007; Rozin, Fischler, Shields, & Masson, 2006). In particular, it has been found that currently within the United States there is a preference towards greater food choices, and larger portion sizes (Rozin et al., 2006).

Although these external factors may have laid the foundation for the development of hedonic eating, certain physiological factors appear to maintain or perpetuate it. In particular, numerous neuroimaging studies have been done with individuals classified as hedonic eaters. These studies have shown that, within this group, eating palatable foods triggers the release of certain hormones that increase appetite, as well as opioid peptides that result in enjoyable feelings (Lowe & Butryn, 2007). Similarly, when such individuals eat tasty foods there is an increase in activity in areas of the brain related to cravings, reward and pleasure (Beck, 2010). In fact, this pattern of brain activity is similar to that seen in individuals with other hedonically driven disorders, such as substance use and gambling disorders (Lowe & Butryn, 2007).

In addition to these biological factors, certain psychological/behavioral factors also appear to play a role in perpetuating this eating pattern. In this regard, the cognitive-behavioral model provides a useful framework for understanding the behavior of such individuals. According to cognitive theory, one's thoughts, feelings, and behaviors are interrelated. Therefore, emotional/behavioral reactions do not arise from situations

themselves; instead, they result from individuals' perceptions and interpretations of the event. It is these interpretations that affect the thoughts, feelings, and behaviors of an individual. Important within cognitive theory is the idea of schema. Schemas are belief structures that individuals develop to help interpret information and make sense of the world. It is these schemas that determine how one perceives and evaluates an event. Moreover, behavioral theory is a conceptual framework guided by the principles and knowledge obtained from learning theories. In this regard, it assumes that all behavior is the result of one's learned experiences.

Using this theoretical structure, the cognitive-behavioral model postulates that hedonic eating is a learned behavior, resulting from operant conditioning. Operant conditioning is based on the premise that behaviors followed by a pleasurable outcome are more likely to be repeated, but behaviors followed by negative outcomes are less likely to recur. Because eating of palatable foods triggers pleasurable feelings, individuals learn to equate eating with enjoyment, increasing the likelihood that it will continue. Consequently, this learning leads to the development of particular beliefs related to food (e.g., "food will make me happy," "I will always get pleasure from food," etc.), which influence one's thoughts and emotions concerning eating. These factors (both behavioral and cognitive) lead to certain outcomes. In particular, the presence of certain food related stimuli may trigger particular urges or cognitions. Individuals may also be more inclined to turn to food as a source of entertainment or enjoyment or possibly even as a coping strategy to deal with stressful or unpleasant situations. This hypothesis put forth by the cognitive-behavioral model is supported by evidence showing that hedonic eaters, similar to individuals with other hedonically driven disorders, are

susceptible to various triggers (e.g., seeing food, talking about food, smelling food, etc.), and have thoughts and feelings which influence their eating habits (Lowe & Butryn, 2007).

Given the widespread nature of the hedonic eating phenomenon, it is reasonable to assume that many individuals with CD can be classified as hedonic eaters. As a result, based on the restrictive nature of the gluten-free diet, it may be found that diminished access to pleasurable foods within this group affects quality of life, making this a relevant variable for examination. This factor is also worthwhile to investigate because therapeutic options may be available that can possibly modify individuals relationship to food. Specifically, research that has been done with other hedonically driven disorders has identified cognitive-behavioral therapy as an effective form of treatment.

Cognitive-behavioral therapy. Cognitive-behavioral therapy (CBT) for hedonically driven disorders incorporates a number of components or techniques. For one, a functional analysis is usually done to determine what antecedents elicit the behavior, and what consequences maintain it (Petry et al., 2006; McHugh, Hearon, & Otto, 2010). By having this information, one can begin to understand the purpose of the behavior, and thus learn how to identify and cope with potential triggers (e.g., through problem solving techniques, relaxation training, utilizing social supports, etc.) and determine those adaptive behaviors that may serve as substitutes by providing a similar reinforcing consequence.

In addition to this behavioral piece, exploration of one's cognitions is also done to uncover maladaptive beliefs/perceptions about their behaviors that the individual holds (Sylvain, Ladoceur, & Boisevert, 1997; Petry et al., 2006). Through this exploration, the

therapist is able to help the individual challenge, and thus become more aware of, their erroneous appraisals. As a result of such work, the individual is eventually able to generate more logical/realistic thoughts/beliefs towards their behavior, thus leading to behavior change.

Within literature concerned with the substance use/gambling disorders, much research has become available demonstrating the efficacy of CBT in reducing maladaptive behavioral patterns. In a study conducted by Sylvain and colleagues (1997), the authors, investigating pathological gambling, randomly assigned participants either to a CBT treatment group or to a waitlist control group. Data were collected at baseline, posttreatment, and at 6- and 12-month follow-ups. From this data the authors were able to show that individuals receiving CBT demonstrated significant gains, as compared with those in the control group, with such change maintained throughout follow-up.

In another investigation carried out by McHugh et al. (2010), the authors extensively reviewed studies examining the effects of CBT on substance use disorders. From this review, the authors concluded that CBT was consistently shown to be both efficacious and effective in treating individuals with substance use issues. As these findings suggest, CBT appears to be a successful resource in treating various hedonically driven disorders. Furthermore, given the numerous similarities between hedonic eating and such disorders (i.e., substance use/gambling disorders), these findings may be generalizable, meaning that such treatment will also prove useful for such eaters. However, controlled studies are needed to confirm this.

Summary and Research Question

As reflected in the literature, social-problem solving ability, hedonic eating, and quality of life have been shown to be related in different populations (e.g., diabetes mellitus and obesity). Based on this, the aim of the current study was to answer the following research question: Are social-problem solving ability, hedonic eating, and characteristics of having CD predictive of quality of life in a sample of persons with CD on a gluten free diet?

Chapter 3: Hypotheses

The present study examined the relationship between social-problem solving ability/eating habits and quality of life in individuals with CD on a gluten free diet. Based on these factors, as well as with information gleaned from research conducted with similar disease states, the following hypotheses were created:

H1) Age of diagnosis, current symptomatology (as defined by the Celiac Disease Symptom Questionnaire-Gastrointestinal Symptoms scale), degree of adherence to a gluten-free diet (as measured by the Dietary Compliance Scale), presence of hedonic eating (as measured by the Power of Food Scale- Total Score), and whether one possesses a Positive Problem Orientation, Negative Problem Orientation, Rational Problem Solving Style, Avoidance Style, or Impulsive/Careless Style (as measured by the Social Problem Solving Inventory-Revised: Short Form), will predict one's psychological quality of life (as measured by the World Health Organization Quality of Life-BREF questionnaire- Psychological health domain) in individuals with CD on a gluten-free diet.;

H2) Age of diagnosis, current symptomatology (as defined by the Celiac Disease Symptom Questionnaire-Gastrointestinal Symptoms scale), degree of adherence to a gluten-free diet (as measured by the Dietary Compliance Scale), presence of hedonic eating (as measured by the Power of Food Scale-Total Score), and whether one possesses a Positive Problem Orientation, Negative Problem Orientation, Rational Problem Solving Style, Avoidance Style, or Impulsive/Careless Style (as measured by the Social Problem Solving Inventory-Revised: Short Form), will predict one's quality of life as it relates to his or her social relationships (as measured by the World Health Organization Quality of

Life-BREF questionnaire- Social relationships domain) in individuals with CD on a gluten free diet; and

H3) Scores on the Social Problem Solving Inventory-Revised: Short Form, the Power of Food Scale, and the World Health Organization Quality of Life-BREF questionnaire- Social Relationships and Psychological Health domain are expected to be comparable with the norm scores provided for persons with other chronic illnesses (i.e., diabetes mellitus and treatment seeking individuals with obesity). This was determined by comparing the means of the current study sample with those of scores provided in the literature. If the current sample's means were within one standard deviation of the scores provided, this indicated that persons with Celiac disease presented similarly to those with other chronic disease states.

Chapter 4: Methodology

Overview

Given the increasing prevalence of individuals diagnosed with CD, and the restrictive nature of the treatment diet, it is important to identify variables related to quality of life that can be modified within a clinical setting. This study investigated the relationship between social-problem solving ability/eating motivation and quality of life in individuals with CD on a gluten free diet.

Design

The current study was a cross-sectional observational design as it examined the relationship between social problem solving ability/eating motivation and perceived quality of life in a subset of individuals with CD at a particular point in time. These relationships were assessed by having participants complete measures related to these dimensions.

Participants

Prospective participants were individuals with CD currently on a gluten free diet. To determine sample size estimation, a statistical power analysis was performed. With a medium effect size of $d = .15$, and an $\alpha = .05$ and power = $.80$, the projected sample size needed for this study was 114 participants.

Recruitment

Participants were recruited in one of several ways. In one method, Facebook, Twitter, Craigslist, or user group advertisements related to this study were posted on

pages or message boards pertaining to CD and CD support. In addition, an email was sent to the Celiac Support Association and the American Celiac Disease Alliance to obtain permission to send out a mass email to members requesting their participation within this study, or to post a call for research participants on their websites. Furthermore, all potential participants were asked to share information about this study with as many other individuals as possible who have CD and who adhere to a gluten free diet, thus utilizing a snowball sampling method.

Inclusion and exclusion criteria

In order to participate in this study, individuals had to be 18 years of age or older and provide a self-report of having a diagnosis of CD, as made by a physician. In addition, potential participants had to self-report that they were currently attempting a gluten free diet. Individuals were also required to complete all measures included in the evaluation packet. Failure to meet any of these requirements resulted in exclusion from the study. Packets with missing data were evaluated on a case-by-case basis for usefulness to the study. In particular, packets were used for each specific analysis if the necessary measure(s) were complete. Furthermore, potential participants whose diagnosis of CD had been made within a year were also excluded.

Measures

Within this study three measures were used to assess the dimensions of social problem solving ability, eating motivation, and quality of life. Specifically, these measures included: the Social Problem Solving Inventory-Revised: Short Form (SPSI-R:S), the Power of Food Scale (PFS), and the World Health Organization Quality of Life-

BREF questionnaire. In addition to these measures, participants were also asked to complete an eligibility questionnaire to determine whether or not inclusion criteria had been met, a survey gathering personal information (e.g., gender, age, level of education, ethnicity, age at diagnosis, etc.), and two brief questionnaires assessing dietary compliance and current symptomatology. A questionnaire assessing body image (the Eating Disorders Examination Questionnaire; EDE-Q) was also included. This data were collected for future research purposes because body image has been shown to be related to quality of life within the CD population (Arigo, Anskis, & Smyth, 2011).

Dietary Compliance Scale. The dietary compliance scale was adopted from Casellas, Vivancos, and Malagelada (2006), and contains 5-questions evaluating the dietary behaviors of individuals with CD on a gluten-free diet (e.g., *Sometimes I forget about my diet*; and *When I feel well I sometimes discontinue my diet*). Each question is answered using a binary (yes/no) scale. For the purposes of this study, all “No” responses were given a value of 1, and all “Yes” responses were given a value of 0. One item was reverse scored (“I never forget about my diet”). Following completion, participant’s responses were tallied, with higher scores indicating greater dietary compliance.

Celiac Disease Symptom Questionnaire. The Celiac Disease Symptom Questionnaire (CDSQ) was developed by Hauser, Gold, Stallmach, Caspary, and Stein (2007), and consists of 29-items assessing various physical and emotional symptoms (e.g., *Have you had trouble with nausea*; and *Have you felt generally happy*) of individuals with CD within a 2-week period. Items are divided into 4 symptom domains: gastrointestinal symptoms, disease-related worries, and emotional and social problems

(Hauser et al., 2007). Items are answered on a 7-point Likert-scale, ranging from: (1) *All of the time* to (7) *None*. Responses are aggregated following completion, with higher total and subscale scores indicating lower symptom frequency (Hauser et al., 2007). Psychometrically, the CDSQ has been found to have test-retest reliability correlations which range from .45 to .89 (Hauser et al., 2007). Moreover, the Chronbach α for each subscale has been demonstrated to range from .80 to .91 (Hauser et al., 2007). For the purposes of this current study, only items assessing physical/gastrointestinal symptomatology (7 total) were utilized to gather information of this domain.

Social Problem Solving Inventory-Revised: Short Form. The SPSI-R:S is a 25-item Likert-type questionnaire developed by D’Zurilla, Nezu, and Maydeu-Olivares in 2007 to assess one’s social problem solving abilities. (PsychCorp, 2014). It is appropriate for individuals ages 13 and above, and has been empirically shown to have adequate internal consistency ($\alpha = .90$), test-retest reliability ($r = .91$), and convergent validity when compared with other established measures of problem solving, such as the Problem Solving Inventory (.82) (PsychCorp, 2014; D’Zurilla et al., 2004; Hawkins, Sofronoff, & Sheffield, 2008). The SPSI-R:S is based on the model of social problem solving put forth by D’Zurilla and colleagues (D’Zurilla et al., 2004). It consists of five major scales that correspond to the five dimensions within the D’Zurilla et al model (D’Zurilla et al., 2004). Specifically, these include: a Positive Problem Orientation (PPO) scale, a Negative Problem Orientation (NPO) scale, a Rational Problem Solving (RPS) scale, an Impulsivity/Carelessness Style (ICS) scale, and an Avoidance Style (AS) scale (D’Zurilla et al., 2004). Based on this measure, individuals are classified as “good” problem solvers if they have high PPO and RPS scores and low NPO, ICS, and AS

scores, and are classified as “poor” problem solvers if they have low PPO and RPS scores and high NPO, ICS, and AS scores (D’Zurilla et al., 2004).

The Power of Food Scale. The PFS is a brief-questionnaire designed to assess one’s relationship to food and eating. This instrument was recently created by Dr. Michael Lowe and consists of 15 statements which measure the psychological impact of food, based on three dimensions/domains (the availability of food; the presence of food; the taste of food) (Weight Watchers Research Department, n.d.; Lowe et al., 2009). Examples of PFS statements include: *If I see or smell a food I like, I get a powerful urge to have some; It seems like I have food on my mind a lot, and I think I enjoy eating a lot more than most other people* (Lowe et al., 2009). After reading each statement, participants indicate the extent to which they agree using a 5-point Likert scale, which ranges from: *(1) don’t agree at all* to *(5) strongly agree* (Lowe et al., 2009). Following administration, participants’ responses are added and then averaged for each domain, and a total score is calculated, based on the collective mean of each dimension. The higher an individual’s total score is, the greater the likelihood that he or she has a hedonic relationship to food. Research on the PFS is still in its early stages; however, studies that have been done indicate that it has adequate psychometric properties, such as test-retest reliability ($r = .77$), and convergent validity, when compared with other established measures of emotional eating (e.g., The Three Factor Eating Questionnaire-Disinhibition subscale, $r = .61$; the Dutch Behavior Eating Questionnaire-Emotional Eating subscale, $r = .54$) (Foreman et al., 2007; Lowe et al., 2009).

World Health Organization Quality of Life-BREF. The WHOQOL-BREF is a 26-item self-report measure (appropriate for individuals 18 and older) developed by the World Health Organization in 1991 to assess one's perceived quality of life in the context of numerous dimensions (Rehabilitation Measures Database, 2013; WHO, 2014). Specifically, the WHOQOL-BREF measures an individual's perceived well-being/quality of life within the domains of physical health, psychological health, social relationships, and environment (Rehabilitation Measures Database, 2013; WHO, 2014). Two items are also examined separately, one asks about overall perception of quality of life, and the other about overall perception of physical health (Rehabilitation Measures Database, 2013; WHO, 2014). Individuals respond to each item/question on 5-point Likert scale (Rehabilitation Measures Database, 2013; WHO, 2014). Higher scores within each domain indicate higher quality of life regarding that specific dimension (Rehabilitation Measures Database, 2013; WHO, 2014). Psychometrically, each of the 4 domains on the WHOQOL-BREF has been shown to have adequate internal consistency (e.g., across all domains Cronbach's α ranges from .66 to .80), and convergent validity when compared with the WHOQOL-100 (Trompenaars, Masthoff, Heck, Hodiament, & Vries, 2005). The WHOQOL-100 offers a more comprehensive assessment of quality of life and has established psychometric properties (Trompenaars et al., 2005). In comparisons between these two measures, correlations range from .88 to .96 for each of the corresponding domains (Trompenaars et al., 2005).

Eating Disorder Examination Questionnaire. The EDE-Q is a 29-item measure which assesses, within a 28 day time frame, the frequency of particular thoughts and behaviors related to eating and body image. Participants are asked to rate each item

along a 6-point Likert scale, which ranges from “No days”/”Not at all” to “Every Day”/”Moderately.” Items are scored along 4 subscales, which are: Restraint, Eating Concern, Shape Concern, and Weight Concern. Psychometrically, each of these subscales has been shown to have adequate internal consistency (Restraint, $\alpha = .85$; Shape Concern, $\alpha = .92$; Weight Concern, $\alpha = .89$; Eating Concern, $\alpha = .81$), and test-retest reliability (Restraint, $r = .81$; Shape Concern, $r = .94$; Weight Concern, $r = .92$; Eating Concern, $r = .82$) (Luce & Crowther, 1999).

Procedure

Participants were recruited through Facebook/Twitter/Craigslist advertisements, message board postings, email, or other social media, in which the primary investigator asked individuals to take part in a study examining possible variables related to quality of life in individuals with CD on a gluten free diet. All participants were told that this study may help broaden the understanding of factors that impact the well-being of persons with CD. For individuals who agreed to participate, recruitment announcements included a link to SurveyMonkey for study completion. Moreover, all individuals were encouraged to send this link to as many other people as possible who have CD and adhere to a gluten free diet. Explanation of the study was provided in SurveyMonkey: the first question asked participants if they understood the risks and benefits of participation. The study was anonymous. Participants initially completed an eligibility questionnaire to ensure inclusion criteria had been fulfilled. Individuals who did not meet criteria were forwarded to a page notifying them that they did not meet the study requirements, and were thanked for their time/participation. Individuals who did meet criteria were allowed to complete the study questionnaires, which included a dietary compliance and current

symptomatology survey, the SPSI-R:S, the PFS, the WHOQOL-BREF, the EDE- Q, and a personal information questionnaire (completed in that order). Instructions for completing each measure were provided. Upon completion, participants were asked, “How did you learn about this study?” : different recruitment efforts were listed. They were then directed to email the investigator and provide a name and phone number to be entered into a raffle to win a \$100 gift card.

Statistical Analysis

Descriptive statistics (including means, medians, modes, and standard deviations) were utilized to describe the personal characteristics of the sample. Along with this, the following statistical analyses were conducted:

- 1. Hypothesis: age of diagnosis, current symptomatology (as defined by the Celiac Disease Symptom Questionnaire-Gastrointestinal Symptoms scale), degree of adherence to a gluten-free diet (as measured by the Dietary Compliance Scale), presence of hedonic eating (as measured by the Power of Food Scale- Total Score), and whether one possesses a Positive Problem Orientation, Negative Problem Orientation, Rational Problem Solving Style, Avoidance Style, or Impulsive/Careless Style (as measured by the Social Problem Solving Inventory-Revised: Short Form), will predict one’s psychological quality of life (as measured by the World Health Organization Quality of Life-BREF questionnaire- Psychological health domain) in individuals with CD on a gluten-free diet.
 - A forward linear regression was used to assess the relationship between the predictor variables and the outcome variable. In addition, all assumptions were met for conducting this analysis.

· 2. Hypothesis: age of diagnosis, current symptomatology (as defined by the Celiac Disease Symptom Questionnaire-Gastrointestinal Symptoms scale), degree of adherence to a gluten-free diet (as measured by the Dietary Compliance Scale), presence of hedonic eating (as measured by the Power of Food Scale-Total Score), and whether one possesses a Positive Problem Orientation, Negative Problem Orientation, Rational Problem Solving Style, Avoidance Style, or Impulsive/Careless Style (as measured by the Social Problem Solving Inventory-Revised: Short Form), will predict one's quality of life as it relates to his or her social relationships (as measured by the World Health Organization Quality of Life-BREF questionnaire- Social relationships domain) in individuals with CD on a gluten free diet.

○ A forward linear regression was used to assess the relationship between the predictor variables and the outcome variable. In addition, all assumptions were met for conducting this analysis.

3. Hypothesis: scores on the Social Problem Solving Inventory-Revised: Short Form, the Power of Food Scale, and the World Health Organization Quality of Life-BREF questionnaire-Social Relationships and Psychological Health domain are expected to be comparable with the norm scores provided for persons with other chronic illnesses (i.e., diabetes mellitus and treatment seeking individuals with obesity). This was determined by comparing the means of the current study sample with that of the scores provided in the literature. If the current sample's means were within one standard deviation of the scores provided, this indicated that persons with Celiac disease presented similarly to those with other chronic disease states.

Chapter 5: Results

Participants

In order to investigate the relationship between problem solving ability/relationship to food and perceived quality of life in individuals with CD who are on a gluten free diet, a group of volunteer participants (who have CD and are on a gluten free diet) were recruited through online social media. The initial participant “seeds” for the snowball sample came from such social networking sites. The snowball collection method was initiated by posting the study via A Survey Monkey Internet hyperlink to potential seed participants on social media. The study was posted online for approximately 10 months. After closing the study, 198 individuals had opened the survey link. Of the 198 respondents, 40 did not meet inclusion criteria and 72 did not complete the study in its entirety or omitted items. Subsequently, there were 86 participants who completed the study in its entirety. As a result, the optimal number of participants required ($n = 114$) was not met, and the study was underpowered. This may have led to increased risk that a Type I error was committed. Recruitment was ended before the optimal sample size was met due to the specified timeline within which the study had to be completed. Nevertheless, packets with missing data were evaluated to determine their usefulness to the study. Consequently, the data from 95 participants were utilized for the investigation of the first and second hypotheses. Regarding the third hypothesis, the scores from 106 individuals who completed the SPSI-R:S; 99 individuals who completed the Power of Food Scale and 95 individuals who completed the WHOQOL-BREF were used for comparative analysis.

An analysis of the demographic characteristics could be performed only for those individuals who completed the entire study. This was due to the fact that the demographic questionnaire was included at the end of the study. As a result, if participants withdrew prior to completing all measures, demographic information could not be collected. Of the 86 individuals who completed all questionnaires, 77 were female (89.5%) and 9 were male (10.5%). The mean age of the sample was 41, and the mean age of reported diagnosis of CD was 34. Additional demographic information is provided in Table 1.

Table 1.

Demographic Information

<u>Educational Attainment</u>	<u>n</u>	<u>Valid Percent</u>
High school diploma or equivalent	5	5.8
Some college	19	22.1
Associate's degree	7	8.1
Bachelor's degree	30	34.9
Master's degree	13	15.1
Professional degree	8	9.3
Doctorate degree	4	4.7
<u>Ethnicity</u>	<u>n</u>	<u>Valid Percent</u>
American Indian or Alaska Native	2	2.3
Asian	1	1.2
White/Caucasian	83	96.5
<u>Household Income</u>	<u>n</u>	<u>Valid Percent</u>
\$10,000 to \$19,999	7	8.1
\$20,000 to \$29,999	4	4.7
\$30,000 to \$39,999	9	10.5
\$40,000 to \$49,999	4	4.7
\$50,000 to \$59,999	7	8.1

\$60,000 to \$69,999	5	5.8
\$70,000 to \$79,999	8	9.3
\$80,000 to \$89,999	2	2.3
\$90,000 to \$99,999	7	8.1
\$100,000 to \$149,999	9	10.5
\$150,000 or more	17	19.8
N/A	7	8.1

<u>Employment Status</u>	<u>n</u>	<u>Valid Percent</u>
Employed for wages	41	47.7
Employed on a part time basis	6	7.0
Self-employed	11	12.8
Out of work and looking for work	1	1.2
Out of work but not currently looking for work	1	1.2
Homemaker	5	5.8
Student	10	11.6
Retired	7	8.1
Unable to work	4	4.7

<u>Marital Status</u>	<u>n</u>	<u>Valid Percent</u>
Married	50	58.1
Widowed	3	3.5
Divorced	6	7.0
Separated	3	3.5
Never married	24	27.9

<u>Number of children</u>	<u>n</u>	<u>Valid Percent</u>
0	37	43.5
1	7	8.2
2	25	29.4
3	9	10.6

4	7	8.2
<u>Are you a vegetarian?</u>	<u>n</u>	<u>Valid Percent</u>
Yes	2	2.3
No	84	97.7
<u>Religious Affiliation</u>	<u>n</u>	<u>Valid Percent</u>
Christian	44	51.2
Jewish	3	3.5
Other affiliation	6	7.0
Unaffiliated	33	38.4
<u>Do you live in the United States?</u>	<u>n</u>	<u>Valid Percent</u>
Yes	37	43.0
No	49	57.0
<u>Country of residence</u>	<u>n</u>	<u>Valid Percent</u>
Australia	1	.5
Canada	43	21.7
England	1	.5
United Kingdom	2	1
N/A	1	1
<u>Do you live in or near an urban/major metropolitan area?</u>	<u>n</u>	<u>Valid Percent</u>
Yes	72	83.7
No	14	16.3
<u>Do you have other diagnosed medical conditions?</u>	<u>n</u>	<u>Valid Percent</u>
Yes	43	50.0
No	43	50.0
<u>Do you have any diagnosed mental health conditions?</u>	<u>n</u>	<u>Valid Percent</u>
Yes	14	16.3
No	72	83.7

<u>Specific mental health conditions reported</u>	<u>n</u>	<u>Valid Percent</u>
Anxiety disorders	4	2.0
Depressive disorders	4	2.0
Comorbid anxiety and depression	3	1.5
Comorbid depression and Posttraumatic stress disorder	1	.5
Anorexia Nervosa	1	.5
Thyroid deficiency	1	.5
<u>How did you learn about this study?</u>	<u>n</u>	<u>Valid Percent</u>
Facebook	77	92.8
Craigslist	1	1.2
Email	3	3.6
Word of mouth	2	2.4

Descriptive Statistics of Administered Measures

Scores for each of the administered measures were calculated. The average total Dietary Compliance Scale score ranged from 5.00 to 10.00 (N = 142; M = 6.15; SD = .61). In evaluating the Celiac Disease Symptom Questionnaire, scores ranged from 13.00 to 46.00 (N = 123; M = 32.75; SD = 7.92). For the SPSI-R:S, total and domain specific standard scores were tabulated and are presented in Table 2. To interpret the standard scores for this measure, scores ranging from 55 or lower are within the “Extremely Below Norm Group,” 56-70 are in the “Very Much Below Norm Group Average” range, 71-85 are in the “Below Norm Group Average” range, 86-114 are in the “Norm Group Average” range, 130-144 are in the “Very Much Above Norm Group Average” range, and 145 and above are in the “Extremely Above Norm Group Average” range. (D’Zurilla

et al., 2002). Participants' average standard scores across all subscales were in the Norm Group Average range.

Table 2.

SPSI-R Short Form Scoring Means, Standard Deviations, and Ranges

	N	Min	Max	X	SD
SPSI-R:S Total Standard	106	68.00	127.00	100.7170	12.8321
PPO Standard Score	106	66.00	125.00	100.1038	14.4486
NPO Standard Score	106	74.00	145.00	98.6415	15.5610
RPS Standard Score	106	68.00	136.00	98.7547	14.3963
ICS Standard Score	106	77.00	154.00	95.8585	14.3298
AS Standard Score	106	78.00	132.00	95.5566	11.7044

Regarding the Power of Food Scale, total scores ranged from 1.00 to 5.00 (N = 99; M = 2.4; SD = .95). Scores also ranged from 1.00 to 5.00 for each of the subscales comprising this measure, including the Availability of Food scale (N = 99; M = 2.24; SD = 1.08), the Presence of Food scale (N = 99; M = 2.34; SD = 1.18), and the Taste of Food scale (N = 99; M = 2.67; SD = .91). Concerning the WHOQOL-BREF, domain scores were computed and are presented in Table 3. Domain raw scores were converted to transformed scores on a scale of 0-100. Higher scores indicate higher quality of life.

Table 3.

WHOQOL-BREF Scoring Means, Standard Deviations, and Ranges

	N	Min	Max	X	SD
Physical Health Domain	95	31.00	81.00	54.4421	10.9036
Psychological Domain	95	19.00	81.00	62.6421	12.3529
Social Relationships Domain	95	.00	100.00	69.0526	21.1189
Environment Domain	95	13.00	100.00	76.4000	17.2185

Hypothesis I

In order to test whether age of diagnosis, current symptomatology, degree of adherence to a gluten-free diet, presence of hedonic eating, and whether one’s problem solving orientation and style predict one’s psychological quality of life, a forward linear regression was conducted. The results are presented in Tables 4, 5, and 6.

Table 4.

Regression model summary for the independent variables and psychological quality of life (N = 79)

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	R Square Change	Durbin-Watson
1 (NPO Standard Score)	.423	.179	.169	11.6686	.179	1.898
2 (NPO Standard Score, Celiac Disease Sx Questionnaire)	.514	.265	.245	11.1165	.086	1.898
3 (NPO Standard Score, Celiac Disease Sx Questionnaire, PPO Standard Score)	.554	.306	.279	10.8682	.042	1.898

Table 5.

Regression Analysis for the independent variables and psychological quality of life (N = 79)

	Sum of Squares	Df	Mean Square	F	Sig.
<u>Model 1 (NPO Standard Score)</u>					
Regression	2288.891	1	2288.891	16.811	.000
Residual	10483.970	77	136.155		
Total	12772.861	78			
<u>Model 2 (NPO Standard Score; Celiac Disease Sx Questionnaire)</u>					
Regression	3381.028	2	1690.514	13.680	.000
Residual	9391.832	76	123.577		
Total	12772.861	78			
<u>Model 3 (NPO Standard Score; Celiac Disease Sx Questionnaire; PPO Standard Score)</u>					
Regression	3914.090	3	1304.697	11.046	.000
Residual	8858.770	75	118.117		
Total	12772.861	78			

Table 6.

Multiple regression analysis summary for the independent variables and psychological quality of life (N = 79)

	B	Standard Error	β	t	P
<u>Model 1</u>					
Constant	96.095	8.379		11.469	.000
NPO Standard Score	-.349	.085	-.423	-4.100	*.000
<u>Model 2</u>					
Constant	77.269	10.189		7.583	.000
NPO Standard Score	-.312	.082	-.379	-3.807	*.000
Celiac Disease Sx Questionnaire	.465	.156	.296	2.973	*.004
<u>Model 3</u>					
Constant	42.242	19.264		2.193	.031
NPO Standard Score	-.194	.098	-.235	-1.987	.051
Celiac Disease Sx Questionnaire	.495	.153	.315	3.226	*.002
PPO Standard Score	.222	.104	.249	2.124	*.037

* $p < .05$

Through data analysis, it was found that the NPO standard score, gastrointestinal symptoms domain score (from the Celiac Disease Symptom Questionnaire), and Positive Problem Orientation standard score were predictive of the Psychological Health domain score, $F(3,75) = 11.046, p < .000$. An adjusted R^2 value of .279 was found, indicating that

27.9% of the variance on the Psychological Health Domain score can be explained by the combined effects of the NPO standard score, PPO standard score, and the gastrointestinal symptoms domain score. Moreover, a negative association was identified between the NPO standard score, gastrointestinal symptoms domain score and the Psychological Health domain score. A positive association was identified between the PPO standard score and the Psychological Health domain score. From this data, the following regression equation can be formulated: Scores on the Psychological Health Domain = $42.242 + -.194$ scores on the NPO scale + $.495$ scores on the gastrointestinal symptoms domain + $.222$ scores on the PPO scale.

Hypothesis II

In order to test whether age of diagnosis, current symptomatology, degree of adherence to a gluten-free diet, presence of hedonic eating, and whether one's problem solving orientation and style predict one's quality of life with regard to social relationships, a forward linear regression was conducted. The results are presented in Tables 7, 8, and 9.

Table 7.

Regression model summary for the independent variables and social relationships quality of life (N = 79)

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	R Square Change	Durbin-Watson
1 (Celiac Disease Sx Questionnaire)	.359	.129	.117	20.7464	.129	2.108
2 (Celiac Disease Sx Questionnaire, NPO Standard Score)	.424	.180	.158	20.2613	.051	4.731

Table 8.

Regression Analysis for the independent variables and social relationships quality of life (N = 79)

	Sum of Squares	Df	Mean Square	F	Sig.
<u>Model 1 (Celiac Disease Sx Questionnaire)</u>					
Regression	4892.238	1	4892.238	11.366	.001
Residual	33141.940	77	430.415		
Total	38034.177	78			
<u>Model 2 (Celiac Disease Sx Questionnaire, NPO Standard Score)</u>					
Regression	6834.589	2	3417.295	8.324	.001
Residual	31199.588	76	410.521		
Total	38034.177	78			

Table 9.

Multiple regression analysis summary for the independent variables and social relationships quality of life (N = 79)

	B	Standard Error	β	t	P
<u>Model 1</u>					
Constant	35.920	9.754		3.683	.000
Celiac Disease Sx Questionnaire	.972	.288	.359	3.371	*.001
<u>Model 2</u>					
Constant	70.598	18.571		3.801	.000
Celiac Disease Sx Questionnaire	.879	.285	.324	3.086	*.003
NPO Standard Score	-.325	.149	-.229	-2.175	*.033

* $p < .05$

Analysis revealed that both the gastrointestinal symptoms domains score and the NPO standard score were predictive of the Social Relationships domain score, $F(2,76) = 8.324, p < .001$. An adjusted R^2 value of .158 was found, indicating that 15.8% of the variance on the Social Relationships domain score can be explained by the combined effects of the gastrointestinal symptoms domain score and the NPO standard score. Moreover, a negative association was identified between the gastrointestinal symptoms domain score, the NPO standard score and the Social Relationships domain score. From this data, the following regression equation can be formulated: Scores on the Social Relationships Domain = $70.598 + .879$ scores on the gastrointestinal symptoms domain + $-.325$ scores on the NPO scale.

Hypothesis III

In order to compare participants' scores on the Social Problem Solving Inventory-Revised: Short Form, the Power of Food Scale, and the World Health Organization Quality of Life-BREF questionnaire (Social Relationships & Psychological Health domains) with other individuals with chronic illnesses (i.e., diabetes mellitus and treatment seeking individuals with obesity), the current sample was compared to other published estimates.

In a study conducted by Skevington and McCrate (2012), individuals across 27 health conditions were assessed, utilizing the WHOQOL-BREF. Published findings were used for comparison purposes regarding participants in the present study. Pertaining to the Psychological Health domain, current participants mean scores ($M = 62.64$; $SD = 12.3529$) were comparable (i.e., within one standard deviation) with the mean scores for individuals with irritable bowel disorder ($M = 61.12$; $SD = 17.11$). Participants' mean scores were also comparable, albeit lower, than those obtained for individuals with diabetes ($M = 67.66$; $SD = 16.10$). Moreover, participants scores were higher, but still comparable, with scores reported for individuals with irritable bowel syndrome ($M = 54.90$; $SD = 17.83$) and Crohn's disease ($M = 56.99$; $SD = 19.42$).

Participants' mean scores on the Social Relationship domain ($M = 69.05$; $SD = 21.1189$) were comparable with the reported scores for individuals with diabetes ($M = 70.12$; $SD = 19.66$) and irritable bowel disorder ($M = 68.13$; $SD = 24.28$). In addition, participants scores were comparable with, although higher, than scores obtained for individuals with irritable bowel syndrome ($M = 59.33$; $SD = 22.51$) and Crohn's disease ($M = 58.51$; $SD = 25.07$).

Participants' scores on the Power of Food Scale were compared with data published by Cappelleri et al. (2009). In their study, Cappelleri et al (2009) examined the structure of the Power of Food Scale by assessing a diverse group of obese and non-obese individuals involved either in a clinical trial for a weight management drug or in a web-based survey. Current participants' mean scores on the Power of Food Scale ($M = 2.4$) were found to be generally comparable with the scores obtained for obese individuals with and without diabetes involved in the clinical study ($M = 1.95$; $M = 2.57$), and with obese individuals without diabetes involved in the web-based survey ($M = 2.04$).

With regard to the Social Problem Solving Inventory-Revised, Short Form, published findings from a study conducted by Hill-Briggs et al. (2006) were used for comparison purposes. The researchers in this study, utilizing the SPSI-R:S, investigated the relationship between problem solving styles and AIC levels in a group of urban African American individuals with type 2 diabetes. As is shown in Table 10, the mean scores across each domain on the SPSI-R:S, including total score, were similar and within one standard deviation for participants in the present study and those in the Hill-Briggs et al. study.

Table 10

Comparison of Mean Standard Scores on the SPSI-R:S Between Participants in the Current Study and Hill-Briggs et al. Study

	<u>Present Study</u>		<u>Hill-Briggs et al.</u>	
	X	SD	X	SD
Positive problem orientation	100	14	102	16
Negative problem orientation	98	15	97	17
Rational problem-solving style	98	14	103	16
Impulsive/careless style	95	14	98	17
Avoidant style	95	11	98	15
Total SPSI-R:S	100	12	104	13

Chapter 6: Discussion

Celiac disease is a gastrointestinal disorder that has increased in prevalence and awareness over the last few years. With such increased awareness, greater research has been conducted examining factors impacting the quality of life of individuals with this disease. Although such research has been beneficial in uncovering countless variables related to quality of life within this population, many of the variables which have been identified (e.g., gender, age, presence of comorbid illness, etc.) cannot be modified within a clinical setting due to their fixed nature. In light of this fact, and to help improve the quality of life of this group, the current study aimed to increase the understanding of factors which may be amenable to treatment. In particular, the relationship between problem-solving ability/eating motivation and quality of life in individuals with CD who are currently on a gluten free diet was examined.

The results of this study indicate that psychological quality of life for individuals with CD on a gluten free diet is influenced by one's problem solving orientation (i.e., negative vs. positive problem orientation) and the presence of gastrointestinal symptoms. In particular, the presence of a negative problem orientation and gastrointestinal symptoms is negatively associated with psychological quality of life, and the presence of a positive problem orientation is positively associated with psychological QOL. These findings thus demonstrate that for individuals with CD on a gluten free diet, psychological well-being is related to one's perception regarding his or her ability to manage obstacles and challenges, and to his or her experience of uncomfortable physical symptoms.

The results of this study further indicate that perceived quality of life in regard to social relationships is influenced by the presence of a negative problem orientation and gastrointestinal symptoms, with a negative association identified for both variables in relation to social QOL. Thus, the perceived nature of one's social quality of life is negatively affected by one's belief that he or she cannot manage the problems in his or her life, and the presence of distressing physical symptoms associated with CD.

Findings from this study did not demonstrate an association between relationship to food (as measured by the Power of Food scale) and psychological quality of life and quality of life regarding social relationships. A possible hypothesis for the reason why this occurred may relate to current societal factors. In particular, the prevalence and incidence of CD has increased in recent years (Ludvigsson et al., 2013). In addition, the gluten-free diet has entered main stream culture, and millions of Americans adhere to this diet even though they do not have CD (Gaesser & Angadim 2012; Pietzak, 2012). As a result, the marketing for gluten-free food has significantly expanded into a multi-billion dollar business (Gaesser & Angadim 2012; Pietzak, 2012). With such expansion, the dining and grocery options for individuals with CD has become easier. Thus, for individuals with CD who are classified as hedonic eaters, attempting a gluten free diet may not necessarily mean having to give up favored, highly palatable foods, leading to limited distress.

Last, participants scores on the Power of Food Scale, SPSI-R:S, and WHOQOL-BREF were found to be comparable (i.e., within one SD) with the scores obtained for individuals with other chronic illnesses similar to CD (i.e., diabetes, obesity, Crohn's disease, irritable bowel syndrome, irritable bowel disorder). Nevertheless, it is important

to note that, with regard to the WHOQOL-BREF, although scores were comparable, individuals with CD scored lower on the Psychological Health domain, when compared with individuals with diabetes, and scored higher, when compared with individuals with irritable bowel syndrome. Moreover, participant's scores on the Social Relationship domain of the WHOQOL-BREF were higher, but still comparable, with individuals with irritable bowel syndrome and Crohn's disease. Nonetheless, these findings indicate that persons with Celiac disease, for the most part, present similarly to those with other chronic disease states.

Implications of Findings

Overall, this study helps to improve understanding of variables that influence the quality of life of individuals with CD who are on a gluten free diet, which may be modified within a treatment setting. Such findings can help increase providers (i.e., physicians, mental health professionals, and other allied health professionals) awareness of factors which impact the quality of life of their patients with CD, leading to proper assessment and treatment plan development. Along with this, there are a number of possible interventions available which may prove useful in addressing the correlated variables.

Developed in the early 1970s, problem-solving therapy is an intervention approach, based on the model of social problem solving put forth by D'Zurilla, Nezu, and Maydeu-Olivares (D'Zurilla et al., 2004). Problem-solving therapy is an empirically validated form of treatment, which has been shown to be effective across various groups and conditions including chronic illness, such as diabetes and obesity (i.e., treatment seeking individuals with obesity) (D'Zurilla & Nezu, 2010). The aim of this treatment

approach is to teach individuals the skills necessary for effective problem solving. This includes fostering a problem solving orientation, whereby an individual's belief in his or her ability to solve obstacles/challenges strengthens (D'Zurilla & Nezu, 2010). As described by D'Zurilla and Nezu (2010), problem-solving therapy is composed of 14 modules. Module 1 involves establishment of the therapeutic relationship and providing education regarding problem-solving therapy. The goal of module 2 is assessment, through formal (i.e., SPSI-R) or through informal (i.e., clinical interview) means, regarding the individual's problem-solving strengths and weaknesses, and current life stressors. Module 3 focuses on identifying obstacles to effective problem solving. For modules 4 through 8, the focus is on fostering a positive problem orientation (i.e., through improving sense of self-efficacy, ability to recognize problems, ability to view problems as challenges, ability to use and control one's emotions, and the ability to take time to think through problems). Modules 9 through 14 entail enhancing one's problem solving skills (i.e., by fostering individuals ability to define problems and set realistic goals, generating alternative solutions to problems faced, conducting a cost-benefit analysis on alternative solutions, effectively implement and monitor a selected solution, and generalize skills learned to various areas of one's life).

A specific problem area which an individual with CD may face, demonstrating the potential benefits of problem-solving therapy, relates to the challenge of going to locales or events where access to gluten free food may be limited. For individuals with a negative problem orientation, such challenges may seem insurmountable and lead to distress, avoidance, and affected quality of life (as demonstrated in this study). Through use of the principles of problem-solving therapy, treatment would focus on increasing a

sense of self-efficacy and altering cognitions related to how problems and one's problem solving abilities are perceived. Moreover, an individual would be taught effective and adaptive skills to derive solutions to such a situation. Thus, such a treatment modality may prove useful in helping to improve the quality of life of individuals with CD who are on a gluten free diet.

In addition, a number of behaviorally-based intervention approaches are available, which have been shown to be beneficial for individuals suffering from gastrointestinal issues. Specifically, mindfulness and cognitive-behavioral therapy have been shown to be effective in reducing symptom severity in individuals with irritable bowel syndrome (IBS) (Aucoin, Lalone-Parir, & Cooley, 2014; Mahvi-Shirazi, Fathy-Ashtiani, Rasoolzade-Tabatabaei, & Amini, 2012; Li, Xiong, Zhang, Yu, & Chen, 2014; Hutton, 2005). IBS is a gastrointestinal disorder that is known to have an underlying emotional component. In particular, individuals with IBS are likely to have coexisting depression or anxiety (regarding their symptoms and the effects of their symptoms), which may impact somatic presentation (Li et al., 2014). The treatment model for CBT in individuals with IBS involves several components, including educating patients regarding the cognitive model, identifying the associations between one's cognitions, emotions, and IBS symptoms, and stress management techniques (i.e., relaxation techniques).

Mindfulness-based therapy (MBT) is a form of treatment which incorporates meditation to promote nonjudgmental awareness of the present (Aucoin et al., 2014). In particular, MBT aims to increase awareness of one's cognitions, emotions, and sensations without reacting to the negative components of these experiences (Aucoin et al., 2014). For individuals with IBS, such decreased reactivity to cognitions, emotions, and

sensations has been found to lead to decreased symptom severity (Aucoin et al., 2014). In reference to individuals with CD, it is possible that symptom presentation is impacted or influenced by misappraisal of symptoms/particular cognitions and underlying anxiety and depression. If this is the case, CBT and MBT may prove beneficial. However, further research is needed to elucidate possible contributing factors to symptom presentation in individuals with CD.

Limitations

Despite the benefits of this study, several limitations should be considered. First, given the fact that participants were recruited primarily through online means, with the vast majority recruited through Facebook, there is the possibility of selection bias. Specifically, individuals with CD who are engaged in online forums (e.g., Facebook pages, blogs, organizations, etc.) may have characteristics that are different from those who do not. Such individuals may have greater acceptance of their disease state, and larger access to computers, leading to increased knowledge and awareness of CD. In addition, such individuals may strongly identify with the CD population, and could possibly come from a socioeconomic status that is higher than that of individuals who do not engage in such activities. Therefore, the generalizability of this study is affected and may not be representative of the CD population at large.

The specific demographic characteristics of the study sample may also impact the generalizability of findings. In particular, the majority of participants in this study were Caucasian, women, and reported being employed, married, and having had some form of post-high school education and/or living in or a near major metropolitan area. The finding that most participants were Caucasian and were female correlates with published findings

demonstrating that CD is more prominent among Caucasians and females (Rubio-Tapia, Ludvigsson, Brantner, Murray, & Everhart, 2012; Gujral, Freeman, & Thomson, 2012). In this regard, the current sample is similar to the CD population at large, in terms of gender and ethnicity. Nevertheless, it cannot be ascertained if the study's findings are generalizable to individuals with CD who live in different geographic regions, who are males, and who have other, diverse demographic characteristics.

In addition, as the determination of a CD diagnosis (which was required for participation) depended solely on participants' self-reports, there was the possibility of dishonesty among individuals. In particular, persons who did not have CD may have attempted to participate in this study for the purpose of obtaining the gift card that was offered as an incentive, or for other potential reasons. Such a possibility affects the generalizability and validity of this study. Expanding on this self-report issue, participants' response styles on the numerous measures administered may have resulted in endorsements not truly reflective of the various dimensions assessed (e.g., degree of adherence to a gluten free diet, quality of life, problem solving ability, etc.), resulting in invalid findings. Moreover, because demographic information was able to be obtained only from participants who completed the study in its entirety, it cannot be determined if there were differences between individuals who completed vs. did not complete all measures.

Last, it is important to note that the optimal number of participants needed for this study ($n = 114$), as identified through power analysis, was not achieved because only 86 participants completed all measures. Therefore, there was an increased risk that a Type I error was committed. In this regard, it is possible that the identified relationship between

problem solving orientation/ presence of gastrointestinal symptoms and one's perceived quality of life (i.e., psychological quality of life and social quality of life) was a false-positive.

Future Directions

Future research should attempt to replicate this study with a larger sample size, to correct for the increased risk of Type I error committed in this study and potentially, to corroborate findings. This study should also be replicated with individuals recruited from within the community (e.g., clinics, hospitals, primary care settings, etc.). It would be important to compare such findings with those derived from this study in order to determine if there are corroborations or discrepancies between the populations sampled (e.g., individuals recruited through online vs. non-online means). Moreover, it may be warranted to replicate this study with a male population, with diverse ethnic groups, and/or with a population living in more decidedly rural areas to determine the generalizability of findings to groups with different demographic characteristics.

In addition, because problem-solving orientation and presence of gastrointestinal symptoms were found to be associated with individuals' perceived quality of life, future research should examine these variables more closely. In particular, research should help identify whether or not psychological factors (i.e., cognitions, emotional state) influence physical symptom presentation in individuals with CD. Along with this, research should examine the effectiveness of treatment protocols that have been found effective with other, similar chronic illnesses, in addressing the variables identified in this study. As an example, controlled studies examining the efficacy of problem-solving therapy, CBT, and MBT for improving quality among individuals with CD may be appropriate.

Because physicians are likely to be the main points of contact for individuals with CD, further investigation is warranted regarding how to implement effective assessment of the identified moderating variables within a medical setting to facilitate proper referral. Such research should also focus on determining the helpfulness of assessment and referral on individual's well-being and quality of life.

Response shift is an additional factor that may relate to perceived quality of life for individuals with CD. Response shift pertains to an individual's psychological adjustment to his or her chronic illness, through modification of one's expectations (Felgoise, Zaccheo, Duff, & Simmons, 2015). In particular, quality of life has often been conceptualized as resulting from a comparison of one's expectations with reality (Felgoise et al., 2015). For individuals with CD adhering to a gluten free diet, the early stages of being diagnosed and the beginning of such a diet may result in a discrepancy between one's expectations and reality. In particular, when an individual is initially diagnosed with CD, he or she is suddenly confronted with the reality of having to adhere to a strict diet for the rest of his or her life and making subsequent personal and social readjustments. This reality may not match with expectations he or she had for the perceived future, thus leading to impacted quality of life. However, over time individuals may begin to align expectations with reality, leading to improved quality of life. As such, this presents an opportunity for further study.

Overall, because the prevalence of CD is expected to grow in the coming years, further research investigating issues related to quality of life and treatment implications is vital if these individuals are to be provided with the best care possible and have the opportunity to maximize their well-being.

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Appendix A

Eligibility Questionnaire

- | | | |
|--|---|---|
| 1. Are you 18 years of age or older? | Y | N |
| 2. Do you have a diagnosis of Celiac Disease as made by a physician? | Y | N |
| 3. Was your diagnosis of Celiac Disease made less than a year ago? | Y | N |
| 4. Are you currently attempting a gluten-free diet? | Y | N |

Appendix B

Personal Information Questionnaire

1. Gender-

- Male
- Female

2. Age- _____

3. Highest level of education (What is the highest degree or level of schooling you have completed?)

- No schooling completed
- Some schooling, but did not complete high school
- High school graduate - high school diploma or the equivalent (for example: GED)
- Some college
- Associate degree (for example: AA, AS)
- Bachelor's degree (for example: BA, AB, BS)
- Master's degree (for example: MA, MS, MEng, MEd, MSW, MBA)
- Professional degree (for example: MD, DDS, DVM, LLB, JD)
- Doctorate degree (for example: PhD, EdD)

4. Ethnicity-

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White/Caucasian

5. At what age were you diagnosed with Celiac Disease? _____

6. Total household income-

- \$10,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 to \$79,999
- \$80,000 to \$89,999
- \$90,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 or more
- N/A

7. Employment Status-

- Employed for wages
- Employed on a part-time basis
- Self-employed
- Out of work and looking for work
- Out of work but not currently looking for work
- A homemaker
- A student
- Retired

- Unable to work

8. Marital Status-

- Now married
- Widowed
- Divorced
- Separated
- Never married

9. Number of children-

- 0
- 1
- 2
- 3
- 4
- ≥ 5

10. Are you a vegetarian?

- Yes
- No

11. Religious affiliation-

- Christian
- Jewish
- Muslim
- Other affiliation
- Unaffiliated

12. Do you live in the United States?

- Yes
- No

13. If you answered “No” to question 12, what is your country of residence? (Please specify) _____

14. Do you live in or near an urban/major metropolitan area?

- Yes
- No

15. Do you have other diagnosed medical conditions (i.e., diabetes, obesity, chronic disease, cancer, etc.)?

- Yes
- No

16. If you answered “Yes” to question 15 please specify your other medical condition(s): _____

17. Do you have any diagnosed mental health condition?

- Yes
- No

18. If you answered “Yes” to question 17 please specify your diagnosis:
