12-2018

Self-Compassion and Physical Health-Related Quality of Life in Cancer: Mediating Effects of Control Beliefs and Treatment Adherence

Morgan Treaster
East Tennessee State University

Self-Compassion and Physical Health-Related Quality of Life in Cancer: Mediating Effects of Control Beliefs and Treatment Adherence

---

A thesis

presented to

the faculty of the Department of Psychology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Masters of Arts in Psychology

---

by

Morgan Kate Treaster

December 2018

Jameson K. Hirsch, Ph.D., Chair

Diana Morelen, Ph.D.

Julia Dodd, Ph.D.

Keywords: Self-Compassion, Control Beliefs, Treatment Adherence, Physical Health-Related Quality of Life, Cancer

ABSTRACT

Self-Compassion and Physical Health-Related Quality of Life in Cancer: Mediating Effects of Control Beliefs and Treatment Adherence

by

Morgan Kate Treaster

Among the 14 million persons living in the United States with current or remitted cancer, poor physical health-related quality of life (HRQL) is a significant concern. However, self-compassion (i.e., common humanity, mindfulness, self-kindness) may be a protective factor, either directly or indirectly, by allowing for a sense of empowerment and control over illness, and in turn, facilitating engagement in treatment and positive perceptions of health. Serial mediation analyses among persons living with current (n = 67) or remitted (n = 168) cancer lend support for a positive, direct association between self-compassion and physical HRQL, as well as indirect effects via internal perceived control and, to a lesser degree, treatment adherence. Mixed findings, especially among cancer patients, highlight limitations of resiliency traits while also supporting the notion that self-compassion interventions (e.g., Mindful Self-Compassion Training) may have positive implications for health-related control beliefs, behaviors, and quality of life in the cancer population.

ACKNOWLEDGEMENTS

As I reflect upon my experiences of writing a master's thesis, I find myself in awe of the ways in which I have developed on a personal, intellectual, and professional level. With the completion of this milestone project on my journey to a doctoral degree, I have developed a renewed interest and passion for research advancements in health psychology, with a translation of those findings to my clinical work with chronically ill persons across medical settings.

I am beyond grateful for the unconditional love and support of so many individuals. First, I would like to thank my advisor and committee chair, Dr. Jameson Hirsch. Your mentorship has encouraged me to branch out from my comfort zone on a personal and research level, while also strengthening my critical thinking abilities via your thought-provoking questions and interpersonal feedback on projects. I would also like to thank my other committee members, Dr. Diana Morelen and Dr. Julia Dodd, for your devotion of time and unwavering words of encouragement. I am also thankful to have a strong support network of friends and family back home in Pennsylvania. To my best friend, Brittany, thank you for listening to my school tangents late at night, always giving me a reason to laugh in the midst of my stress, and your motivational speeches for the last six years of my academic career. I also want to thank all those who have constantly extended their support via cards, text messages, care packages, or in-person visits, including Gary and Vicki Varner, Rick and Brenda Varner, and the Phillips family. Finally, thank you Mom and Dad for the countless sacrifices you have made over the years in the form of time and money, as well as always placing the needs of us children above your own. Thank you for always believing in me and instilling within me values of courage, perseverance, and independence, all of which have been indispensable in the completion of my thesis and will no doubt remain imperative to my future academic and career endeavors.

TABLE OF CONTENTS

Page

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER 1

INTRODUCTION

By the year 2024, approximately 19 million persons in the United States (U.S.) will be living with a history of cancer, making it one of the most prevalent chronic illnesses in the country (DeSantis et al., 2014). Symptomatically, cancer survivors, and individuals currently undergoing treatment, frequently report poor physical HRQL, including deleterious physiological changes and declines in the functioning of bodily systems, making it difficult to complete daily activities of living (e.g., cooking, cleaning; Hewitt, Rowland, & Yancik, 2003; Stein, Syrjala, & Andrykowski, 2008). Yet, despite such difficulties, not all individuals report poor physical HRQL during their cancer experience or recovery, perhaps due to the presence of individual-level protective characteristics.

One potential protective factor, self-compassion, is comprised of the elements of common humanity, mindfulness, and self-kindness, and is associated with better physical health outcomes (Neff, 2003). This effect may occur directly, as self-compassion encourages a sense of connectedness with others in similar situations, may help to decrease risk for negative emotional responses to illness-related challenges, and increase the probability of positive thoughts and feelings toward the self during a health crisis (Sirois, Kitner, & Hirsch, 2015; Sirois & Rowse, 2016; Terry & Leary, 2011). Self-compassion may also be associated with perceptions of better physical HRQL indirectly, via its impact on cognitive, emotional and behavioral processes, including the development and maintenance of control beliefs related to illness and engagement in adaptive health behaviors.

Control beliefs, or the extent to which individuals perceive control over their illness and general health, is one potential mediating variable of this linkage. By recognizing that others are

currently facing similar illness-related challenges (e.g., cancer diagnosis and treatment), attending to both positive and negative emotions related to the illness experience, and directing kind thoughts or actions toward the self, individuals may perceive greater perceptions of control and efficacy regarding their illness and its treatment (Barnard & Curry, 2011; Neff, Rude, & Kirkpatrick, 2007; Reyes, 2012). In turn, acting in accordance with those beliefs of control, patients may more-readily engage in proactive health behaviors (Pertl et al., 2010); for instance, treatment adherence, another potential mediating variable, may be viewed as a potential mechanism of change, whereby the patient can exercise control over their illness (Atkins & Fallowfield, 2006) and, in turn, may be more likely to experience better perceptions of well-being and physical HRQL (Denois et al., 2011).

This is the focus of our current study, which is intended to contribute to the existing literature focused on the interrelations of these variables, within the cancer population. In the context of chronic illness, HRQL may be influenced by many cognitive, emotional and behavioral factors, including ability to engage in self-compassion, sense of perceived control, and adherence to treatment recommendations, respectively. In the following sections, we provide a review of the extant literature on these variables, and their interrelations, across disease populations. Yet, to our knowledge, no previous research has examined the serial relations between our proposed variables, nor among persons living with a past or present cancer diagnosis, as we do in the current study.

Cancer: Overview and Epidemiology

Cancer is a chronic disease characterized by the uncontrollable growth and spread of abnormal cells, and the site of development (e.g., breast, prostate, lung) indicates the type of cancer (American Cancer Society [ACS], 2016). Cancer patients report a variety of symptoms

related to their illness. For instance, many report experiences of "chemo brain" which refers to disruptions in memory, attention, and mental processing speed (Siegel et al., 2012). Chronic fatigue is another common problem, reported by up to 70% of cancer patients, especially when undergoing chemotherapy or radiation (Dimeo, 2001). Others report bone, joint, and soft tissue problems including bone fractures, atrophy, and deformity as well as osteoporosis and osteopenia (Ganz, 2006; Siegel et al., 2012). Impaired cardiovascular functioning (e.g., accelerated atherosclerosis, congestive heart failure) is yet another commonly cited complaint (American Association of Clinical Oncology [ASCO], 2017), as are disruptions to the endocrine system (e.g., hormone deficiencies, infertility), especially when treatment of cancer requires the removal of reproductive organs (Marijnen et al., 2005; Siegel et al., 2012). The gastrointestinal system may also be adversely affected (e.g., nausea, digestive problems), leading to changes in eating habits and weight gains or losses (Fodeh et al., 2013). Related to the bodily processing of nutrients, some persons living with cancer also report disruptions to kidney and bowel functioning (Marijnen et al., 2005; Miller et al., 2005). Finally, impaired immune functioning, including low blood cell counts, is a concern among cancer patients, as it increases risk for the development of additional acute and chronic conditions during treatment and the years following a cancer-free diagnosis (Ganz, 2006; Stein et al., 2008).

Treatment of cancer and related symptoms varies relative to the type or stage of cancer as well as individual preferences, and some treatment options may be more desirable or effective than others (DeSantis et al., 2014). Despite this variation, there are several common treatments utilized by cancer patients to rid the body of cancer cells (ACS, 2017). Chemotherapy is a medication that can be administered in many ways (e.g., oral, intravenous, injection), and it is designed to stop the growth of rapidly multiplying cancer cells, though it may kill healthy cells

as well. On the other hand, targeted drug therapy attacks the parts of cancer cells that make them different from healthy ones, and the targeted parts of the cells vary across cancer types (e.g., epidermal growth factor receptor in colorectal cancer; BRAF gene in melanoma). Radiation therapy, which uses high external or internal beam radiation, is another treatment technique, with several types of radiation treatments available, such as three-dimensional conformal radiation therapy (3D-CRT) or brachytherapy. Other individuals rely on immunotherapy which involves strengthening the body's natural immune system, allowing it to recognize and destroy the cancer cells. Individuals may take an oral drug (e.g., immune checkpoint inhibitors, monoclonal antibodies), or may undergo a moderate surgical procedure such as t-cell therapy. Finally, more invasive surgical procedures may be necessary, such as a modified radical mastectomy for breast cancer or radical prostatectomy for prostate cancer. In addition to illness-based symptoms, cancer patients and survivors report a multitude of immediate (e.g., nausea, anemia) and delayed onset (e.g., bone atrophy, memory loss) treatment-related side effects, which may exacerbate existing symptoms and lead to poor health across the lifespan (Stein et al., 2008).

Epidemiology: Rates of Cancer, Death, and Survival

Cancer has a significant impact on physical health and well-being and, in recent years, the number of individuals living with cancer has risen steadily. Globally, cancer prevalence rates increased nearly 50% between 2003 and 2013 (Crocetti et al., 2013). East Asia has the highest five-year prevalence rate, equating to nearly seven million persons, and North America has the second highest rate, with an estimated four million individuals (Bray, Ren, Masuyer, & Ferlay, 2013). In the U.S., nearly 38.5% of individuals will receive a cancer diagnosis at some point in their lifetime (National Cancer Institute [NCI], 2017). Diagnostic estimates for 2017, for

instance, indicated that 1,688,780 new cases would appear, and that 70% of those cases would occur in persons between 55 and 84 years old (NCI, 2017).

Incidence rates for specific types of cancer vary, based on individual, sociocultural and environmental factors. Breast cancer, however, is the most common diagnosis globally, followed by prostate and colorectal cancers, and these subtypes account for over two-fifths of diagnosable cancers (Bray et al., 2013). In the U.S., specifically, incidence rates are highest for breast cancer among women, and prostate cancer in men (Jemal et al., 2005). For both men and women, lung and bronchus cancers are the second most commonly diagnosed, followed by colon and rectal cancers (Jemal et al., 2005).

Upon examination of demographic variables, sex differences also emerge. In the U.S., lifetime risk for cancer is 42% for men, compared to 38% for women (ACS, 2016). Additionally, breast cancer represents more than 40% of all diagnosed forms of cancer in women, followed by uterine corpus (8%) and rectal cancers (8%; Crocetti et al., 2013; DeSantis et al., 2014). For males, the top three cancer types include prostate (43%), colorectal (9%), and melanoma (8%; DeSantis et al., 2014). Age differences in the rate of new diagnoses have also been reported. In 2010, among persons 50 – 64 years old, there were 804.8 new cancer diagnoses, per 100,000 individuals, relative to 152.3 new diagnoses among persons 20 – 49 years old (Jane, Singh, King, Wilson, & Ryerson, 2014). Median ages for diagnosis range from 51 (thyroid cancer) to 73 (bladder cancer) years old, and it has been reported that 86% of newly diagnosed cancer patients are 50 years or older, highlighting the heightened cancer risk associated with aging (ACS, 2016; DeSantis et al., 2014). Finally, there are racial and ethnic variations in cancer diagnoses; for men, overall cancer diagnoses are highest among Blacks, followed by Whites, Latinos, Asian/Pacific Islanders, and American Indian/Alaska Natives and, for women, overall incidence rates are

highest among Whites, followed by Blacks, Latinas, Asian/Pacific Islanders, and American Indian/Alaska Natives (Centers for Disease Control and Prevention [CDC], 2016b).

Given such disparities, and rising overall prevalence rates, it is not surprising that cancer is the second most common cause of death in the U.S. In 2016, an estimated 595,690 Americans died from cancer, equating to approximately 1,630 deaths per day (ACS, 2016) and, in 2017, it was estimated that there would be 600,920 cancer-related deaths, with 72 as a median age of death (NCI, 2017). For men, the leading types of cancer that cause death are lung and bronchus, prostate, and colorectal cancer, and the findings are similar for women, with the exception that breast cancer replaces prostate cancer as the leading contributor to mortality (CDC, 2016a; Siegel, Ma, Zou, & Jemal, 2014).

Significant advancements have been made, however, in terms of early detection and treatment, leading to improvements in cancer survival rates and a growing number of individuals living with a cancer history (de Moor et al., 2013). As of January 1, 2014, an estimated 14 million persons in the U.S. had a cancer history, which is a three-fold increase relative to 1975, and this number is projected to increase to nearly 19 million persons over the next decade (DeSantis et al., 2014; de Moor et al., 2013). According to the NCI (2014), five-year survival rates for the top twelve types of cancer are 89.7% (breast-females only), 18.3% (lung and bronchus), 98.6% (prostate-males only), 64.9% (colon and rectum), 91.7% (melanoma), 77.3% (bladder), 71% (non-Hodgkin lymphoma), 74.1% (kidney and renal), 60.6% (leukemia), 81.3% (endometrial-females only), 98.2% (thyroid), and 8.2% (pancreas), and these rates are reflected in the type of cancer history endorsed by survivors (Gilbert, Miller, Hollenbeck, Montie, & Wei, 2008). Additionally, individuals are living much longer despite a cancer history; 64% of individuals have survived five or more years, which is a 37% increase since 1975, and 40% have

survived 10 or more years (de Moor et al., 2013). As such, there are more persons than ever before living with a cancer history in the U.S., and greater attention has been given to survivorship care in the literature, including maintenance of general health, coping with late and long-term treatment-related side effects, and enhancement of HRQL (Gilbert et al., 2008).

Physical Health-Related Quality of Life (HRQL)

HRQL refers to the subjective assessment of well-being across multiple life domains, including physical, mental, emotional, and social functioning (Revicki et al., 2000; Wilson & Cleary, 1995). In the general population, HRQL encompasses factors including the presence of positive emotions and moods (e.g., happiness), the absence of negative emotions (e.g., anxiety), financial stability, life satisfaction, meaningful social relationships, and engagement in fulfilling life activities (CDC, 2016c). For individuals living with a chronic illness, assessments of HRQL are often influenced by the perceived impact of disease and treatment, across life domains (Revicki et al., 2000). Physical HRQL encompasses the frequency, severity, and types of illness symptoms (e.g., pain, fatigue) as well as the extent to which those symptoms may impact one's daily physical functioning (e.g., walking) or interfere with activities of daily living (e.g., bathing). Often, this domain overlaps with social functioning, as physical symptoms may interfere with one's ability to engage in activities with friends or family. The domains of mental and emotional health are often intertwined as well, and they provide an indication of the extent to which individuals believe they can control their thoughts (e.g., perceived control, decision-making) and feelings (e.g., sadness, worry, excitement) across various types of situations, including health-related experiences.

As a construct, HRQL goes beyond biological or physiological indicators of health and well-being (e.g., bloodwork), by accounting for individual-level factors, such as patient values

(e.g., family, outdoor hobbies) and preferences (e.g., treatment plan), which may influence perceptions of specific symptoms or the disease experience, as a whole (Cella & Stone, 2015; Wilson & Clearly, 1995). In fact, subjective HRQL assessments have emerged as more powerful predictors of morbidity and mortality relative to objective measures of well-being and, thus, assessment of such internal factors, including a person's unique illness experiences and interpretations, may help to better understand their perceived health status, well-being, and overall adjustment to a chronic illness (Cella & Stone, 2015).

Applied to individuals living with a past or present cancer diagnosis, HRQL often focuses on how disease symptoms and adverse treatment effects deleteriously impact daily physical functioning, mental health, and participation in the social sphere (e.g., public places, recreational activities with friends and family; Cella & Stone, 2015). In the current study, we focus specifically on physical HRQL, given its prevalence in, and importance to, the cancer population. As an example, cancer survivors (N = 4,878), ranging from less than two years to more than twenty years since their cancer diagnosis, reported poorer physical health and disability later in life, at a rate two to five times worse than the general population (Hewitt et al., 2003). In another study of cancer patients (n = 1,822), compared to individuals with no history of cancer (n = 24,804), 25% of cancer patients reported poor physical HRQL compared to a control group (10%), and predictors of poor HRQL included younger age, lower socioeconomic status, and a greater number of non-cancer physical comorbidities (e.g., diabetes, hypertension, arthritis; Weaver et al., 2012), which are also a consequence of cancer survivorship (Keating, Nørredam, Landrum, Huskamp, & Meara, 2005). Similarly, in a sample of older (65+ years old) male prostate cancer survivors (n = 445), as compared to non-cancer controls, individuals with a cancer history reported worse overall general health, in addition to the presence of illness

symptoms such as muscle weakness or weight gain (Reeve et al., 2012). Finally, among samples of female breast cancer patients, physical HRQL was lower in a subgroup of patients who reported less engagement in physical activities or regular exercise, illustrating a potential linkage between HRQL and activities requiring physical exertion (Alfano et al., 2007; Kendall, Mague-Giangreco, Carpeter, Ganz, & Bernstein, 2005).

Indeed, for many individuals living with a cancer history, disease symptoms and treatment-related side effects may be associated with physical performance limitations or restrictions across various life domains, including self-care (e.g., bathing), home management (e.g., cleaning), leisure roles (e.g., going to the movies), and employment (Ness, Wall, Oakes, Robison, Gurney, 2006). For example, in a study of long-term cancer survivors (N = 968), participants reported an increased number of days spent out of daily roles (e.g., housework, employment) following their diagnosis (Eakin et al., 2006). Other functional limitations have been reported among individuals living with a history of gastrointestinal-related cancers or cancer of the head or neck, including difficulties associated with eating, dressing, walking, bathing, and toileting (Fodeh et al., 2013). Pain may also contribute to functionality; for instance, in a sample of nurses living with a history of breast cancer, participants reported a loss of physical role functioning due to chronic pain (Kroenke et al., 2004). Finally, the interrelation between aging and cancer history is important for understanding functional limitations. Among older male prostate cancer survivors, age 65 years and older (n = 445), cancer history, and receipt of hormone or radiation therapy, was associated with a greater number of physical role limitations relative to non-cancer controls (Reeve et al., 2012).

Given the subjective nature of HRQL assessment, findings from the extant literature are likely influenced by an array of individual-level factors. Yet, such intra-personal factors are often

overlooked, or unaccounted for, in HRQL studies. In our current study, we examined several individual-level factors that might influence perceived physical HRQL in persons with cancer, beginning with a discussion of the potential effects of self-compassion on health and well-being.

Self-Compassion

Self-compassion, which is a personal and adaptive cognitive-emotional-behavioral resource, has emerged in recent research as a robust contributor to adaptive health behaviors and physical well-being, including in the context of chronic illness, broadly, and cancer, specifically (Gillanders, Sinclair, MacLean, & Jardine, 2015; Sirois & Rowse, 2016).

Rooted in Buddhist tradition, self-compassion emerges during or following an instance of suffering, which can exist in many forms including distressing events (e.g., diagnosis with chronic illness), deleterious physical functioning (e.g., pain, impairment), or negative emotional reactions (e.g., guilt, fear, perceived loss of control; Reyes, 2012). Self-compassion is comprised of three elements, including common humanity, mindfulness, and self-kindness, which are not mutually exclusive but, rather, interact with one another to facilitate a self-compassionate frame of mind during times of hardship (Germer & Neff, 2013).

Specifically, the element of *common humanity* encourages individuals to acknowledge that suffering, failure, and perceived inadequacies are part of the human condition (Neff, 2003). Common humanity allows the self to be fully human, which necessitates acceptance of personal imperfections and limitations (Barnard & Curry, 2011), including illness and impairment. Acceptance of a sense of common humanity involves acknowledging the interconnectedness and equality of everyone in society (Barnard & Curry, 2011; Neff, 2003), and is in sharp opposition to feelings of isolation or the notion that struggles and failures are something experienced only by the self (Germer & Neff, 2013). Thus, common humanity provides individuals with a sense of

belonging and comfort during times when tangible or emotional support is needed the most (Reyes, 2012).

Mindfulness involves awareness, attention, and acceptance of the present moment, including thoughts, feelings, behaviors, and the environment, as a whole (Barnard & Curry, 2011; Neff, 2003). Mindfulness is the opposite of overidentification, which involves tunnel vision and focusing strictly on negative emotions, feelings, or behaviors, including a magnification of failures and rumination on weaknesses or limitations (Barnard & Curry, 2011). Mindfulness is also contrary to intentional avoidance or the suppression of painful thoughts and emotions; rather than ignoring negative feelings and allowing them to intensify with the passage of time, individuals are encouraged to openly acknowledge and process them, in the moment, thereby facilitating movement toward more-adaptive cognitive-emotional responses (Barnard & Curry, 2011; Germer & Neff, 2013). By recognizing the impermanence of all emotions and situations, as well as acknowledging that others have experienced similar feelings in equivalent circumstances (i.e., common humanity), it is possible to move forward from instances of suffering (Reyes, 2012).

Lastly, there is *self-kindness*, defined as the extension of warmth, care, and understanding toward the self during times of suffering, failure, or perceived inadequacy (Germer & Neff, 2013; Reyes, 2012). Self-kindness is the opposite of self-judgment; individuals must let go of regrets, disappointments, and thoughts about the way things "could have been," instead choosing to acknowledge problems and shortcomings without assuming personal guilt or punishing the self (Germer & Neff, 2013; Reyes, 2012). By extending gentleness and patience toward the self, while also being mindful and recognizing common humanity, individuals are more likely to experience positive overall well-being and health (Neff, 2003).

Self-Compassion and Overall Well-Being

Indeed, in past research, self-compassion has demonstrated positive associations with healthy emotional states, including happiness, positive affect, and life satisfaction (Neff et al., 2007), and it has been linked to cognitive factors such as an optimistic state of mind (Neff et al., 2007). Furthermore, self-compassion has been linked to agreeableness and extraversion, both of which may be particularly adaptive in the context of chronic illness by encouraging social connectedness (i.e., social support of friends and family) or compliance with a healthcare provider's recommendations (e.g., regular exercise; Neff et al., 2007). Individuals higher in self-compassion also tend to utilize problem-focused coping strategies when faced with stressful situations (e.g., diagnosis of a chronic illness), such as cognitive reframing (e.g., finding benefits of diagnosis) or seeking out social support and external resources that may increase likelihood of better adjustment (Neff, 2003; Sirois & Rowse, 2016).

On the other hand, in both the general population and clinical samples, a negative relation exists between self-compassion and neuroticism, depression, anxiety, and psychological distress (Neff, 2003; Neff et al., 2007). Negative emotions or cognitions may interfere with one's ability to cope in proactive ways and, indeed, persons low in self-compassion tend to engage in maladaptive coping strategies such as self-blame, escape-avoidance coping, and cognitive-behavioral disengagement from stressors (Sirois & Rowse, 2016). Individuals may try to ignore symptoms, or even their overall diagnosis and, in other cases, may direct harsh thoughts toward the self (e.g., self-blame for the disease), as ways of coping with their distress. Although such responses may alleviate negative feelings temporarily, such coping strategies are often detrimental to long-term adjustment to illness or the recovery process.

Given its implications for, and associations with, adaptive cognitive, emotional and behavioral processes, self-compassion may be viewed as a coping resource, held in reserve, that emerges and may be accessed during times of distress. To the extent that individuals with chronic illness can draw upon and engage in self-compassion, they may be more likely to experience better physical HRQL.

Self-Compassion in the Context of Chronic Illness

Individuals living with a chronic illness, including cancer, may draw upon self-compassion broadly, but also its specific sub-components, at many stages of the disease process. By recognizing that others have been similarly diagnosed and also face illness-related challenges (e.g., the common humanity of symptoms, treatment side effects), individuals are less likely to feel alone in their suffering and, consequently, may experience better emotional responses to their illness and may respond to their illness in more proactive ways, such as seeking out the support of others (e.g., online or in-person support groups) in the pursuit of health-related goals (e.g., remission, improved HRQL; Sirois, Molnar, & Hirsch, 2015; Terry & Leary, 2011). In the context of illness, the component of mindfulness may help temper negative emotional responses to relapses or treatment-related frustrations (e.g., functional impairment, goal thwarting), which may or may not be under one's control, thereby increasing probability of a balanced and objective view of the illness experience (Sirois & Rowse, 2016). Mindfulness activities associated with an altered perspective or emotional experience include progressive muscle relaxation, deep breathing exercises, or nature walks, as each of these activities helps to physiologically calm the entire body and promote clearer thought processes.

The final component of self-compassion, kindness toward the self, may help to counteract negative, illness-based views, such as attributing the cause of illness to one's personal behaviors

(e.g., smoking), criticizing the self for a failure to adhere to treatment recommendations, or self-critique regarding functional limitations (Terry & Leary, 2011). Examples include mentally or verbally repeating statements of positive self-talk (e.g., "I am doing the best I can right now") or partaking in self-care activities (e.g., spa day). Such actions are sharply opposed to thoughts or feelings one may have about the self, and as such, may help to shift how an individual treats the self in the context of a chronic illness.

For persons living with potentially chronic conditions, such as cancer, engagement in one or more of these self-compassion exercises may be particularly useful when faced with an illness diagnosis and, further, the ability to partake in such exercises may increase probability of improvements in perceived HRQL. Regarding mechanism of action, self-compassion may have a direct effect on HRQL, but it is also possible that other cognitive, emotional, or behavioral processes could play an indirect role in the linkage of these variables. Given the aforementioned positive associations of self-compassion in relation to psychological and emotional well-being, we will now discuss the existing literature documenting the association of self-compassion to health, health behaviors and HRQL among persons living with chronic conditions, including individuals with a past or present cancer diagnosis.

Direct effects of self-compassion on physical HRQL. In both the general population and clinical samples, self-compassion appears to have a direct, positive association with health. For example, in a sample of individuals with a variety of medical conditions, greater self-compassion was associated with less perceived impact of disease across life domains, including performance at home, work, or school, enjoyment of social activities, and interpersonal relationships (Terry, Leary, Mehta, & Henderson, 2013). In another study, of persons living *without* chronic conditions, self-compassion was, nonetheless, associated with fewer

physiological symptoms that are often indicative of a pending health problem or illness (e.g., fatigue, pain; Dunne, Sheffield, & Chilcot, 2016).

Similar beneficial patterns of associations exist between self-compassion and health outcomes, in persons with chronic illness. For example, among persons living with Celiac disease, self-compassion was a significant predictor of HRQL; individuals higher in self-compassion reported fewer illness-related physical limitations in completing activities of daily living (e.g., eating with coworkers, extended travel; Dowd & Jung, 2017). In another study, of obese patients living with chronic musculoskeletal pain, self-compassion was related to less functional impairment (Wren et al., 2012). Finally, in a sample of persons living with multiple types of cancer (N = 106), self-compassion was predictive of better physical (e.g., pain, energy levels, nausea) and functional (e.g., housework, employment, sleep, leisure activities) well-being (Gillanders et al., 2015).

These studies illustrate basic positive associations between perceptions of HRQL and self-compassion. Yet, self-compassion, in isolation, may not directly lead to better HRQL; rather, other mechanisms may be involved in the relationship of self-compassion and physical HRQL among persons living with chronic health conditions.

Indirect effects of self-compassion on physical HRQL. Several linking mechanisms between self-compassion and HRQL have been proposed, including cognitive, emotional, motivational and behavioral factors. To begin, self-compassion has been linked to changes in thought processes or cognitions. As one example, among persons living with chronic pain, self-compassion was associated with fewer catastrophic responses to physical symptoms (e.g., thoughts of never-ending pain, beliefs of not being able to live in chronic pain any longer), better psychological adjustment, and lower scores for pain-related disability (Wren et al., 2012).

Self-compassion has also been associated with physical HRQL via its contributions to better emotional health. In the context of high self-compassion, individuals living in chronic pain were less likely to report negative affect, including feelings of irritability, distress, shame, guilt, and fear, and in turn, lower levels of pain-related disability (Wren et al., 2012). A treatment study further illustrated how self-compassion may reduce risk for psychological distress and increase probability of better HRQL; intervention-induced self-compassion was associated with physiological changes, including a decrease in stress-related inflammation, lower sympathetic nervous system reactivity, and improved parasympathetic nervous system reactivity (Homan & Sirois, 2017; Sirois & Rowse, 2016). Finally, in terms of emotional processes, self-compassion may reduce risk for illness-related anxiety and depression, as illustrated in studies of breast cancer patients and persons with disordered eating patterns (Kelly, Vimalakanthan, & Carter, 2014; Przezdziecki et al., 2013).

Motivation to set and attain goals, including the volitional behaviors often needed to achieve goals, may also be subject to the influence of self-compassion. Broadly, self-compassion may steer individuals away from avoidant coping styles in favor of problem-focused (e.g., goal setting, use of instrumental social support) or active emotional coping (e.g., acceptance, positive reframing), as demonstrated in a study of cancer patients (Gillanders et al., 2015). More specifically, self-compassion may be predictive of greater intrinsic motivation, as well as proactive and goal-oriented behaviors, focused on improvement of well-being, health, or illness. For example, among those with chronic illness, self-compassion was predictive of higher motivation for self-kindness (e.g., “I think I should do something nice for myself”) and a proactive health focus characterized by a perceived ability to actively combat or control one’s health (e.g., “If I notice something about my health that I don’t like, I work to fix it”) which, in

turn, were linked to better HRQL (Terry et al., 2013). In another study of young women who self-reported engagement in regular exercise, self-compassion was related to a greater intrinsic, rather than extrinsic, desire to exercise, suggesting the potential role of self-compassion in the encouragement and facilitation of adaptive health-related behaviors (Magnus, Kowalski, & McHugh, 2010). Importantly, this same pattern exists for disease samples; for example, in persons living with HIV, self-compassion was predictive of engagement in proactive health activities, including fewer risky sexual behaviors, higher rates of treatment adherence, a greater tendency to seek medical-related information, and higher utilization of the health care system (Brion, Leary, & Drabkin, 2014; Rose et al., 2014). Such behaviors may be reflective of a perceived sense of control, and the belief one has about personal ability to alter health status through engagement in proactive and adaptive health-related activities.

Finally, self-compassion may have a positive relation to proactive health behaviors by increasing the likelihood that one perceives self-efficacy and confidence in the pursuit of health-related goals, perhaps via enhanced emotion regulation and self-kindness during treatment efforts. For example, among Celiac disease patients, self-regulatory efficacy emerged as a significant mediator in the relations between self-compassion and dietary adherence and physical HRQL (Dowd & Jung, 2017). Similar findings emerged in a study of undergraduate students with disordered eating patterns; self-compassion was associated with greater perceived ability to monitor and regulate food intake, even when given unlimited access to candy (Adams & Leary, 2007). This pattern of effects suggests that, across studies, belief in personal control and efficacy, may be predictive of engagement in activities likely to have a positive effect on current and future health functioning and perceptions of health. It can be conceptualized, therefore, that self-compassion, via its positive association with emotion regulation, volitional behavior, and self-

competency, may provide chronically ill persons with a sense of control over their disease, treatment, and general well-being (Dowd & Jung, 2017; Gillanders et al., 2015; Wren et al., 2012).

Control Beliefs

The concept of "controllability" is rooted in Julian Rotter's social learning theory, which states that events or behaviors can be predicted by knowledge of how one views the situation, including the degree to which it is under one's own influence, assessment of capability to resolve the situation, and outcome expectancies for resolution-oriented behaviors (De Valack & Vinck, 1996; Wallston, 1992). In the context of chronic illness, control beliefs may influence how an individual conceptualizes, understands, and responds to a disease diagnosis and treatment (Scharloo et al., 1998). Furthermore, individuals may perceive varying levels of control over their symptoms, general health, or personal ability to complete treatment requirements.

As one example, persons living with a chronic illness may perceive *internal control* over their illness, which refers to the belief that one has the power or ability to control their health, their disease, or specific aspects of the illness experience (e.g., symptoms; treatment regimens; Wallston, 2001; O'Hea et al., 2005). On the other hand, *external control* refers to the belief that health is beyond one's personal level of control, and that external factors (e.g., doctors, fate, chance, divine being) are responsible for the course of disease or health in general (De Valck & Vinck, 1996; Wallston, 2001).

Perceived internal and external control are often influenced by prior experiences of positive or negative reinforcement associated with a behavior which, in turn, inform one's views regarding what will happen in the future when engaging in similar behaviors (i.e., outcome expectancies; Wallston, 1992). Therefore, individuals high in perceived internal control may

recognize that many health-related outcomes (e.g., pain, fatigue) are dependent on present choices and actions (e.g., medication adherence, regular exercise), perhaps due to prior problem-solving successes and an awareness of the linkage between present behaviors and future health status (Ranchor et al., 2010). As well, past health-related successes (e.g., weathered a previous illness) that inform appraisal of current stressors as manageable (e.g., long-term cancer treatment), may enhance sense of control and ability to cope with a current health crisis (Carver et al., 2000).

It may be that, individuals with strong perceptions of external control have not experienced such efficacious success related to past health behaviors and, thus, may believe that personal actions and subsequent health outcomes are unrelated or that health goals are unattainable (Wallston, 2002). Individuals who believe health is beyond their personal control may also have a history of disempowering experiences, in which they felt threatened by stressors they were unable to resolve, resulting in a lack of self-confidence and failure to believe that their actions, including health behaviors, will be successful (Faller, Schilling, & Lang, 1995; Norton et al., 2005). Thus, individuals with an external, rather than internal, sense of control, may perceive current stressors as more difficult to manage and, in turn, may display passivity when attempting to cope with a chronic health condition.

Broadly, individuals attribute health outcomes, both good and bad, to factors either within or outside their personal locus of control, and the adaptiveness of their attributions and perceived sense of control varies across situations. Internal control is adaptive, in the event a specific "good" health outcome can, indeed, be attributed to personal actions, such as the linkage of smoking cessation and a decreased risk for lung cancer, or between treatment adherence and subsequent cancer remission (Carver et al., 2000; De Valck & Vinck, 1996). However, it can

also be maladaptive to assume personal responsibility for situations that cannot be realistically changed or controlled through human actions (e.g., non-responsiveness to chemotherapy regimen), which may then lead to negative emotions, such as disappointment or distress.

Similarly, the adaptability of external control varies across situations and individuals (De Valck & Vinck, 1996; White, Lehman, Hemphill, Mandel, & Lehman, 2006); for instance, it may be beneficial to believe "bad" health is controlled by external factors (e.g., biology, chance), when personal health behaviors, past and present, are not linked to the course of disease, thereby avoiding distress. Yet, this strategy can also be maladaptive if individuals deflect responsibility or personal control over a health outcome, whether good or bad, that can be attributed to their actions, thereby depriving themselves of self-efficacy or credit for the exertion of control, on the one hand, or accountability, on the other. Pragmatically, relinquishing control to external factors may be maladaptive if one continues to engage in an unhealthy behavior (e.g., smoking) or takes a passive approach to treatment, such as noncompliance with a medical provider's recommendations. Despite potential benefits and harms associated with each broad type of control, both theory and research suggest that an internal locus of control, whereby an individual feels able to make autonomous decisions and enact health behaviors competently, may have more positive associations and outcomes in the context of chronic illness and HRQL (Carver et al., 2000; Ranchor et al., 2010).

Control Beliefs and Physical HRQL

Theories of controllability have been tested empirically, with regard to physical HRQL. Broadly speaking, in the general population, an internal locus of control is related to greater engagement in preventative health behaviors, including routine yearly physicals, higher rates of self-administered breast exams, attempts to cut down on the use of alcohol and cigarettes,

dieting, voluntary exercise, and lower utilization of tanning beds by young adults (Laffrey & Isenberg, 2003; Pertl et al., 2010; Sangeeta & Rana, 2015). Importantly, internal control is associated with knowledge-seeking about existing health conditions (e.g., asking a doctor, researching symptoms), geared toward understanding one's risk for disease and how to best manage health proactively (Laffrey & Isenberg, 2003).

Similar patterns exist in samples of persons with chronic health conditions. For instance, in a sample of persons with diverse chronic illnesses (e.g., rheumatoid arthritis, chronic obstructive pulmonary disease, psoriasis), a weakened sense of control (e.g., passive coping, belief in a long illness duration) was associated with poor social and physical functioning, and self-reported role limitations (Scharloo et al., 1998), whereas a greater sense of control (e.g., active coping, belief in controllability/curability of disease) was predictive of better functioning.

Controllability of disease is also important in cancer-focused research. For example, among persons living with breast cancer, high perceived control over physical symptoms was the strongest predictor of physical HRQL (Beckjord, Glinder, Langrock, & Compas, 2009). Similarly, in a sample of male colorectal cancer patients, high perceived control was associated with better self-management of disease (e.g., redressing surgical wounds without assistance), better self-reported physical HRQL, and less severe perceptions of functional impairment (Kidd, Hubbard, O'Carroll, & Kearney, 2009), whereas those with low perceptions on internal control were more likely to report fatalistic beliefs regarding their health, such as the idea that treatment-related side effects were uncontrollable and doubt about the efficacy of self-care efforts. Finally, in a study of middle-aged females living with late-stage cancer, perceived mastery over one's illness, and optimism, were negatively related to pain severity and fatigue, and those with a greater sense of mastery were more likely to accept, and therefore transcend, their cancer

diagnosis and treatment, and were also more likely to utilize adaptive coping strategies, including active planning (Kurtz, Kurtz, Given, & Given, 2008).

Overall, the existing literature indicates that sense of control may be situational, may develop from past success/failure experiences and, importantly, that it has a robust association with health functioning. Yet, in cases where an individual's sense of perceived control is lacking, or is maladaptively related to HRQL, it may be possible to offset such consequences. Given the positive association of self-compassion and cognitive-emotional functioning, it may also be possible to utilize self-compassion strategies to increase the probability that one experiences a sense of perceived control, with positive implications for HRQL.

Control Beliefs, Physical HRQL, and the Role of Self-Compassion

Among persons living with a chronic illness, such as cancer, the ability to engage in one or more elements of self-compassion may be predictive of greater perceptions of internal control and have a positive relationship with HRQL. For instance, self-kindness may have a positive association in several ways. Among individuals who acknowledge their personal contribution to the current illness diagnosis or experience (i.e., internal control), the extension of warmth and empathy towards the self for past health-related indiscretions or current treatment difficulties may reduce likelihood of self-critique and be predictive of greater motivation to engage in proactive health behaviors (Neff, 2003). For persons who perceive little internal control over their illness, the encouragement of actions in congruence with self-kindness (e.g., exercise) could help to increase conscientiousness of small albeit important ways in which they can exert some kind of control over their health or general well-being, regardless of whether or not they still believe health is largely determined by external factors (Neff et al., 2007).

Furthermore, the self-compassion element of mindfulness may be useful in helping individuals attain and maintain an appropriate level of perceived control over their illness, as mindfulness encourages acceptance and awareness of the present moment, promoting a balanced view of emotions or situations rather than placing too much emphasis on any given part of the experience (Barnard & Curry, 2011; Neff, 2003). For instance, mindfulness may lower the likelihood that one holds an implausible degree of perceived control (e.g., "I do not get sick" or "It will not happen to me"), which could be associated with ignorance of current health warning signs or neglect of preventive or interventive treatment, and subsequent health consequences (Ranchor et al., 2010). Additionally, mindfulness may be useful for persons who perceive a complete loss or absence of control over their health, by grounding them in the present moment, restoring emotional balance, and helping them to identify health-related actions that may enable them to take control over their illness and experience better health outcomes (Brown, Byrant, Brown, Bøi, & Judd, 2016; Gillanders et al., 2015; L'Estrange, Timulak, Kinsella, D'Alton, 2016).

Finally, within a health-promotion framework, acknowledging that others have also made similar unhealthy decisions in the past (e.g., smoking, lack of exercise), and recognizing that mistakes and poor decision-making regarding health are often a shared experience of the human condition (i.e., common humanity), may help to lower the probability of health-related self-criticality and can promote "ownership" of disease, facilitating personal control (Barnard & Curry, 2011). A sense of connectedness with others could also be predictive of greater perceptions of control, if individuals feel as though others can provide them with resources (e.g., health-related information) or assistance during the treatment process (e.g., transportation, emotional support; Wells, Gulbas, Sanders-Thompson, Shon, & Kreuter, 2014).

Overall, our review of the literature suggests that the ability to engage in self-compassion may be predictive of a greater perceived sense of internal control - by promoting the development of a common humanity perspective of illness, increasing attentiveness to the present moment and controllable elements of the illness experience, and by encouraging individuals to be kind to the self in the face of illness (Barnard & Curry, 2011; Neff et al., 2007; Reyes, 2012). Such perceptions of control and personal responsibility for health, including engagement in proactive health-related behaviors, appear to be important for maintaining acceptable quality of life during illness, and even for remission of disease (Beckjord et al., 2009; Kidd et al., 2009; Laffrey & Isenberg, 2003). One factor often affected by perceptions of control that is directly associated with HRQL and which, thus, may be positively influenced by self-compassion, is treatment adherence, a patient-centered factor that is crucial for improvements in health and HRQL.

Treatment Adherence

One of the most controllable, and potentially malleable, aspects of health promotion and the illness experience, is adherence to the recommendations of healthcare providers; yet, rates of non-adherence and its negative health consequences are high (Bender et al., 2014; Patridge, Avorn, Wang, & Winer, 2002; Puts et al., 2014). The World Health Organization (WHO) defines treatment adherence as "the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" (WHO, 2003, p. 3).

Among chronically ill persons living in developed countries, the average rate of treatment adherence is 50%, and nonadherence rates vary relative to the type of condition or treatment (WHO, 2003); for instance, a 50% - 70% nonadherence rate has been identified for longer-term

conditions or those requiring significant lifestyle changes (e.g., diabetes; Dimatteo, Hays, & Sherbourne,1992; Martin, Williams, Haskard, & DiMatteo, 2005). Such high rates of nonadherence may be due to the complexity of the regimen itself, or the time and effort required to fully comply with a provider's recommendations. Among individuals taking more than 13 pills daily, adherence rates may be as low as 20%, as it is difficult to keep track of dosages and scheduling (Martin et al., 2005). Furthermore, the inconvenience of general lifestyle changes, and time required to engage in health promotion activities, may be a deterrent to adherence (DiMatteo et al., 1992).

Such barriers to adherence, especially for lifestyle modifications, have important implications for the cancer population, given the potential burden imposed by many guidelines put forth by the WHO: 1.) Accumulate a minimum of 150 minutes of moderate-to-strenuous exercise or 60 minutes of strenuous exercise per week; 2.) Consume at least five servings of fruits and vegetables each day; and, 3.) Avoid smoking (WHO, 2003). For a variety of reasons (e.g., time, effort, motivation), rates of nonadherence to these guidelines, for cancer patients, are estimated to be 70% (exercise), 48% - 74% (diet), and 20% - 24% (smoking; Blanchard, Courneya, & Stein, 2008). Findings from other cancer-focused studies indicate that 60% of cancer patients do not take pain medications as prescribed, 23% do not keep appointments for chemotherapy, and 16% - 33% withdraw from the recommended treatment (Denois et al., 2011; Spiegel, 1997). Taken together, these findings indicate treatment nonadherence is a significant public health concern, at both the preventive and interventive levels.

Treatment Adherence and Physical HRQL

What is more concerning, perhaps, are the high rates of medical consequences, including mortality, that occur because of nonadherence; for instance, in the U.S., an estimated 125,000

treatment adherence-related deaths occur each year (Martin et al., 2005). In general, a failure to comply with treatment recommendations increases risk for the development of other chronic health conditions (e.g., diabetes, high cholesterol), reduces disease-free time, and increases risk for premature mortality (Bender et al., 2014; Martin et al., 2005; Patridge et al., 2002; Puts et al., 2014; WHO, 2003). Additionally, treatment nonadherence is associated with an increased number of physician visits and hospitalizations, and a greater number of days spent in the hospital upon initial admission or readmission (Bender et al., 2014; Patridge et al., 2002). Finally, it is noteworthy that treatment nonadherence may lead to the mistaken assumption of a patient's deteriorating clinical condition, and physicians may advocate for dose reductions or cessation of therapy, ultimately causing more harm, than good, to physical health and life expectancy (Bender et al., 2014; Patridge et al., 2002).

Above and beyond the association between treatment adherence and objective measures of health, individuals who engage in higher rates of treatment adherence also report better HRQL. For example, higher rates of compliance to prescribed medications were associated with better physical HRQL, fewer disease-related complications, and lower severity of symptoms, across several samples of Type I and Type II diabetes patients (Broadbent, Donkin, & Stroh, 2011; Perwitasari & Urbayatun, 2016). In a sample of older adults with hypertension (N = 2,180), nonadherence to medication was associated with more perceptions of bodily pain, role limitations, and worse physical functioning (Holt, Muntner, Joyce, Webber, & Krousel-Wood, 2010), and in a sample of persons living with self-reported knee and/or hip osteoarthritis pain, HRQL was directly linked to rates of treatment compliance (Conaghan, Serpell, McSkimming, Junor, & Dickerson, 2016).

Pertinent to our current study, some previous research has focused specifically on the adherence-HRQL linkage in the cancer population. Among women diagnosed with breast cancer (*N* = 219), compliance to the American Cancer Society treatment recommendations, including maintaining a healthy diet and weight, and engaging in regular physical activity, was associated with better HRQL (Song, Hwang, Moon, Noh, & Lee, 2015). In another sample, of women with metastatic breast cancer (*N* = 181), there was an overall treatment nonadherence rate of 33%, with higher rates of noncompliance for hormone therapy (37.9%) and oral chemotherapeutic agents (36.8%; DiBonaventura, Copher, Basurto, Faria, & Lorenzo, 2014), which in turn was predictive of worse functional well-being, as indicated by lower scores on the Functional Assessment of Cancer Therapy. Finally, in a large-scale study of women with a variety of cancer diagnoses (*N* = 2,193), there were significant differences in physical functioning and role limitations, relative to rates of adherence for lifestyle recommendations pertaining to diet, exercise, and body mass index (Inoue-Choi, Lazovich, Prizment, & Robien, 2013), with the authors positing that regular physical activity or dietary balance may have led to better cardiopulmonary functioning, greater muscle strength, and a lowering of body mass index and, in turn, to perceptions of better physical health.

In sum, treatment adherence appears to have implications for HRQL among persons with a chronic illness; yet, rates of nonadherence remain high for many persons living with chronic conditions, including cancer. Numerous factors, both external and internal in nature, are believed to influence rates of adherence in the context of chronic illness, and the degree to which such factors can be changed to promote better adherence and HRQL varies considerably.

Factors Influencing Treatment Adherence

Treatment adherence may be influenced by *social structural factors,* which are external in nature, meaning they are primarily outside of one's locus of control and, thus, largely unchangeable. For instance, clinic convenience (e.g., location, hours, scheduling), waiting times, and length of doctors' appointments are significant predictors of treatment adherence (Denois et al., 2011; Patridge et al., 2002; Puts et al., 2014; WHO, 2003), as are the interpersonal styles of doctors and patient trust in healthcare providers (Hays et al., 1994; Martin et al., 2005; Patridge et al., 2002; Paice, Toy, & Shott, 1998; Theofilou & Panagiotaki, 2012). The quality of interpersonal relationships with friends and family, as well as the availability of social support (e.g., tangible, emotion-informational, affectionate, positive social interactions), has also been linked to improved rates of adherence, as well as greater perceived control over illness, enhanced self-esteem, and a reduction in negative attitudes toward treatment (Magai, Consedine, Neugut, & Hershman, 2007; Patridge et al., 2002; Sherbourne, Hays, Ordway, DiMatteo, & Kravitz, 1992; Theofilou & Panagiotaki, 2012).

Treatment adherence may also be influenced by *condition-related factors,* which may also be quite difficult, or impossible, to change, including the stage of disease, level of disability or impairment, the presence or absence of symptoms at any given time, and the duration or perceived severity of those symptoms (Bender et al., 2014; Patridge et al., 2002; Puts et al., 2014; Theofilou & Panagiotaki, 2012; WHO, 2003). *Treatment characteristics* for different conditions may also influence rates of adherence, with lower rates of adherence for complex regimens or those which incur immediate or long-term risks (e.g., side effects) that seem to outweigh the benefits associated with compliance (Bender et al., 2014; Fink, Gurqitz, Rakowski, Guadagnoli, & Silliman, 2004; Patridge et al., 2002).

Moving away from the effects of external variables on treatment adherence, many *patient-related factors* have also been linked to rates of compliance. In terms of demographic variables, age differences have been identified, with some research suggesting lower rates of adherence among older chronically ill persons (Denois et al., 2011; Dimatteo et al., 1992; Patridge et al., 2002; Theofilou & Panagiotaki, 2012; WHO, 2003), whereas other research suggests that adherence is most problematic among younger individuals (Atkins & Fallowfield, 2006; Sherbourne et al., 1992). Lower socioeconomic status is also linked to lower adherence, and furthermore, social class is often associated with race/ethnicity, perhaps explaining the lower rates of adherence found among minority groups (Bender et al., 2014; Puts et al., 2014; Theofilou & Panagiotaki, 2012).

Of the aforementioned factors correlated with treatment adherence, most are outside the scope of personal control and, therefore, cannot be altered to promote higher rates of compliance. Other contributors to adherence, such as intrapersonal characteristics, are thought to be more susceptible to change. For example, the intertwined and dynamic nature of psychosocial variables, including psychopathological and cognitive-emotional (e.g., motivation levels, goal-setting) factors, impacts treatment adherence and HRQL (Brion et al., 2014; Magai et al., 2007; Martin et al., 2005; Terry et al., 2013; Theofilou & Panagiotaki, 2012), offering many points for intervention. In terms of psychopathology, mental health problems, including anxiety and depression, have been shown to negatively impact treatment adherence (Magai et al., 2007; Theofilou & Panagiotaki, 2012). Hypervigilance may promote engagement in targeted health behaviors (e.g., lab work, medical appointments), yet the physiological symptoms of anxiety (e.g., rapidly beating heart) may be exacerbated by treatment for an existing chronic illness (e.g., cancer) or increase risk for comorbid health conditions (e.g., heart attack), further complicating

the treatment regimen as a whole and influencing rates of adherence. Additionally, low energy levels and motivation characteristic of depression may limit engagement in treatment-related behaviors, and as well, depression may contribute to negative feelings about one's life, efficacy of treatment, and one's disease.

Beyond psychopathological factors, common cognitive-emotional variables believed to contribute to lower rates of treatment adherence include fear (e.g., pain of mammogram, treatment-related side effect), embarrassment related to treatment side effects (e.g., hair loss, weight gain), or feelings of ineptness or inadequacy related to functional limitations (Magai et al., 2007). As mentioned in a previous section, perceptions of control over general health or specific symptoms/illness, are also associated with treatment adherence (Atkins & Fallowfield, 2006). For example, in a sample of female African American persons living with diabetes, low internal perceived control, coupled with high chance control, was associated with poor rates of treatment adherence (O'Hea et al., 2005). Yet, it is possible to change an individual's control beliefs, which has implications for increasing likelihood of treatment adherence. As one example, higher perceived internal control, enhanced health-related self-efficacy, and higher rates of treatment adherence were reported by advanced localized gastrointestinal cancer patients (N = 61) who completed a training program in relaxation and exercise regimens (Cheville et al., 2015).

Perceived control is one of the few predictors of treatment adherence that can be altered at the level of the individual; thus, it is important to identify positive and malleable predictors of perceived control among persons living with chronic illnesses. Engagement in self-compassion may be a widely accessible mechanism through which individuals can develop an enhanced

sense of perceived control and, as a result, be more likely to engage in treatment, with resultant positive implications for HRQL.

Treatment Adherence, Control Beliefs, and the Role of Self-Compassion

The different elements of self-compassion may be drawn upon to increase the likelihood that one experiences greater perceptions of internal control, as suggested by previous research. As an example, the positive associations of common humanity were evident in a qualitative study of female African American breast cancer survivors who participated in a cancer support group (Wells et al., 2014). The women reported that participation in the support group enhanced their perceived sense of control over their illness, and improved rates of proactive health behaviors and treatment adherence, and these effects were attributed to the emotional (e.g., listening ear) and instrumental (e.g., health information, transportation) support provided by group members, ultimately making them feel as though they were not alone in their suffering.

In addition to the positive effects of actual and symbolic connectedness with others (i.e., common humanity), mindfulness may also be predictive of greater control and treatment adherence. For instance, mindfulness activities (e.g., deep breathing, guided muscle relaxation) emphasize self-regulation and control over different body parts or physiological processes which, in turn, contribute to the restoration of emotional balance and generalize to greater feelings of control over the present moment or, more broadly, the illness experience (Germer & Neff, 2013). As an example, in a study of individuals living with heart disease and diabetes, mindfulness-based activities were associated with improvements in selective and executive functioning, decreasing the probability of medication nonadherence (Salmoirago-Blotcher & Carey, 2017). Other mindfulness activities, such as weekly participation in full body scans (i.e., purposeful attention to sensations in different body parts), may be used to further iterate the benefits of

treatment adherence and control over health, as such activities may draw attention to improvements in physiological sensations (e.g., pain) over the course of time, and individuals may attribute such changes to participation in treatment regimens (Hardison & Roll, 2016).

Finally, existing research highlights the importance of self-kindness, as it relates to perceived control and health behaviors. For example, in a sample of persons living with head or neck cancer (N = 55), a high level of self-blame and low perceived control was associated with greater likelihood of continued smoking behaviors in the future (Christensen et al., 1999), whereas those with greater control were less likely to report fear of cancer recurrence. In this case, self-kindness may help one to move on from health-related infractions, allowing individuals to accept an appropriate amount of responsibility for their past health actions, thereby increasing likelihood of a perceived sense of control over their present and future health (Reyes, 2012). Furthermore, extending gentleness and patience toward the self as one partakes in new lifestyle changes (e.g., smoking cessation), may be important for decreasing risk of negative feelings (e.g., frustration), perceived inadequacy, or a loss of control related to personal actions (e.g., chain smoking; Neff, 2003). This ability to direct kindness toward the self, in conjunction with the development of a sense of common humanity and participation in mindfulness-based activities, may be associated with health promotion in the context of chronic illness, by increasing the probability of internal control beliefs, encouraging treatment adherence, and enhancing HRQL.

Statement of the Problem

Although the existing literature describes basic associations between the variables of interest in our study, no previous research has examined the interrelations between self-compassion, control beliefs, treatment adherence, and physical HRQL, in a single model, nor in a

sample of individuals with cancer. Given the oft-perceived uncontrollability of cancer, and the recognized health benefits of treatment adherence, it is clinically important to better understand cognitive-emotional and psychosocial characteristics, such as self-compassion and perceptions of personal control, that might contribute to HRQL, and which are therapeutically malleable. As such, in the current study, we examined the association between self-compassion and HRQL, and the potential serial mediating effects of control beliefs and treatment adherence, in a national sample of individuals with cancer.

Hypotheses

1. At the bivariate level, we hypothesized that (a) self-compassion would be positively related to treatment adherence, physical HRQL, and the general control, symptom control, and mastery/health self-efficacy subscales of the CBI, and negatively related to the chance control subscale; (b) general control, symptom control, and mastery/health self-efficacy would be positively related, and chance control would be negatively related, to treatment adherence and physical HRQL; (c) treatment adherence and physical HRQL would be positively related; (d) the CBI subscale of chance control would be negatively related to subscales of general control, symptom control, and mastery/health self-control; and (e) all other CBI subscales would be positively related to one another.
2. At the multivariate level, we hypothesized that the linkage between self-compassion and physical HRQL would be serially mediated by control beliefs (i.e., general, symptom, chance, mastery/health self-efficacy) and treatment adherence. Higher levels of self-compassion would be related to higher levels of general control, symptom control, and mastery/health self-efficacy, as well as lower levels of chance control and, in turn, to greater rates of treatment adherence and better physical HRQL.

CHAPTER 2

METHODS

Participants and Procedures

In our Institutional Review Board approved study, data was collected from 235 individuals living in the United States who self-reported being in remission from cancer or currently living with cancer. Participants were recruited through cancer-related state and national-level organizations, support groups, blogs, and social media websites. Using a secure server via Survey Monkey, all participants provided electronic informed consent prior to completion of online self-report measures. Participants did not receive compensation for their participation.

In our study, not all respondents answered every item in the demographics section. resulting in different sample sizes across demographic variables. Our sample was predominantly female (64.4%; *n* = 152), with 35.2% identifying as male (*n* = 83). The majority of participants identified as White (91.5%; *n* = 216), 2.1% as Hispanic or Latino/a (*n* = 5), 1.7% as Black or African American (*n* = 4), 1.7% as Multiracial (*n* = 4), .8% as American Indian or Alaska Native (*n* = 2), and .4% as Asian or Asian Indian (*n* = 1). Most participants were married (71.6%; *n* = 169), 13.1% were divorced (*n* = 31), 8.1% were single and never married (*n* = 19), 3.4% were widowed (*n* = 8), 1.3% were married according to common law (*n* = 3), and .4% were legally separated (*n* = 1). In terms of employment status, 39% were retired (*n* = 92), 32.6% were employed full time (*n* = 77), 10.6% received disability (*n* = 25), 8.9% were employed part time (*n* = 21), 3% were homemakers (*n* = 7), 1.7% were unemployed and not seeking paid employment, .8% were students (*n* = 2), and .4% were unemployed and seeking paid employment (*n* = 1). Nearly all participants reported having health insurance coverage (93.2%; *n*

= 220); specifically, 59.3% had private health insurance (*n* = 140) and 33.5% had public (i.e., government supplied) insurance.

Most of our participants reported being in remission from cancer (71.2%; *n* = 168). Among all respondents, prostate cancer was the most common current/former diagnosis (26.7%; *n* = 63) followed by breast (19.9%; *n* = 47), colorectal (16.1%; *n* = 38), skin (6.8%; *n* = 16), non-Hodgkin's lymphoma (4.7%; *n* = 11), cervical (3%; *n* = 7), leukemia (2.5%; *n* = 6), bladder (2.1%; *n* = 5), lung (2.1%; *n* = 5), endometrial (1.7%; *n* = 4), kidney (1.3%; *n* = 3), esophagus (0.8%; *n* = 2), thyroid (0.8%; *n* = 2), liver (0.4%; *n* = 1), and stomach (0.4%; *n* = 1) cancers. In terms of disease stage at the time of diagnosis, 21.2% reported stage four cancer (*n* = 50), 19.5% stage three cancer (*n* = 46), 19.1% stage two cancer (*n* = 45), and 15.7% stage one cancer (*n* = 37). The most common type of cancer treatment received was surgery (62.3%; *n* = 147), followed by chemotherapy (47.9%; *n* = 113), radiation therapy (41.9%; *n* = 99), pharmacotherapy (16.9%; *n* = 40), targeted therapy (9.7%; *n* = 23), blood product donation and transfusion (5.9%; *n* = 14), immunotherapy (4.7%; *n* = 11), stem cell transplantation (0.8%; *n* = 2), lasers (0.8%; *n* = 2), and photodynamic therapy (0.4%; *n* = 1).

Measures

Self-Compassion Scale – Short Form (SCS-SF)

Self-compassion was assessed using the Self-Compassion Scale – Short Form (SCS-SF; Raes, Pommier, Neff, & Gucht, 2011), a 12-item measure of common humanity (e.g., "I try to see my failings as part of the human condition"), self-kindness (e.g., "I try to be understanding and patient toward aspects of my personality I don't like"), and mindfulness (e.g., "When something painful happens, I try to take a balanced view of the situation"). Items are rated on a 5-point Likert scale ranging from 1 ("almost never") to 5 ("almost always"). Total scores range

from 12 – 60, and after reverse-scoring negatively worded items, an average score is calculated, with higher scores reflecting greater self-compassion.

The SCS-SF has demonstrated psychometric equivalency to the original 26-item version of the questionnaire (Raes et al., 2011), with correlations between corresponding subscales and total scores ranging from $r = .84$ to $r = .97$. Internal consistency (Cronbach's alpha [α]) has also been demonstrated. In samples of college students, α levels ranged from .67 (mindfulness subscale) to .93 (total score) on the original version of the scale, and α ranged from .54 (self-kindness subscale) to .87 (over-identification subscale and total score) on the brief version, with α values somewhat lower on SCS-SF (Raes et al., 2011). Good reliability (α = .89) and criterion validity (i.e., psychopathological symptoms, shame, Self-Compassion Scale) of the short form have been demonstrated in both university students and community members (Castilho, Pinto-Gouveia, & Duarate, 2015), as well as clinical samples, including persons with HIV (α = .82, .71; Brion et al., 2014; Rose et al., 2014), diabetes (α = .85; Ferrari, Cin, & Steele, 2017), and cancer (α = .74; Schellekens et al., 2017).

Control Beliefs Inventory (CBI)

The Control Beliefs Inventory (CBI) is a 26-item multidimensional scale designed to assess health-related control beliefs among adults with and without chronic health problems (Sirois, 2003a; Sirois, 2003b). The *general control* subscale assesses the extent to which individuals believe health is controllable through personal actions (e.g., "If I set my mind to it, I can improve my health"). The *chance control* subscale measures the extent to which individuals believe their health is controlled by random or chance events (e.g., "If I am lucky I will stay healthy"). The third subscale, *symptom control*, measures the extent to which individuals feel ongoing health issues and symptoms can be managed and controlled (e.g., "I can take control of

my health by managing my day-to-day symptoms"). Finally, the *mastery/health self-efficacy* subscale assesses the extent to which individuals feel confident and capable of doing what is necessary to control their health (e.g., "I am confident that I could deal with any unexpected health problems"). Items are rated on a 6-point Likert scale ranging from 1 ("strongly disagree") to 6 ("strongly agree"). Negatively worded items are reverse-scored. Total subscale scores range from 5 to 68, and an average score for each dimension is calculated, with higher scores indicative of greater perceived control.

Psychometric support has been established in community and clinical samples, including arthritis and inflammatory bowel disease (Sirois, 2003b). Cronbach's α values for the subscales ranged from acceptable to excellent across samples: general control (.86 - .91); chance control (.70 - .78); symptom control (.80 - .89); and, mastery/health self-efficacy (.82 - .86). In a sample of individuals with tinnitus, internal consistency for the general and symptom control subscales of the CBI were .84 and .85, respectively (Sirois, Davis, & Morgan, 2006). Criterion validity has also been established (Sirois, 2003b), with patterns of findings suggesting that CBI subscales do, indeed, assess the extent of perception that events are under personal control. For instance, the subscales of general control, symptom control, and mastery/health self-efficacy were significantly and positively correlated to the internal control subscale of the Multidimensional Health Locus of Control Scale (MHLC), and the chance control subscale was positively correlated to the chance subscale of the MHLC. Lastly, the subscales were correlated to other health-related variables in the expected directions. All subscales were positively related to the General Perceived Self-Efficacy Scale (i.e., coping efficacy). With the exception of chance control, all other subscales were positively related to the Brief COPE and Illness Cognitions

Questionnaire (i.e., adaptive coping) as well as higher ratings for perceived physical (i.e., Brief Health History Questionnaire) and mental (i.e., Multidimensional Well-being Measure) health.

Medical Outcomes Study General Treatment Adherence Scale (MOSGA)

The Medical Outcomes Study General Treatment Adherence Scale (MOSGA) was developed for use with individuals living with chronic health conditions, and is a 5-item general measure of individuals' tendencies to adhere to medical recommendations from their healthcare providers (Hays, 1994). Sample items include "I had a hard time doing what the doctor suggested I do" and "Generally speaking, how often during the past four weeks were you able to do what the doctor told you?" Participants are asked to reflect upon the truthfulness of each statement in relation to the self. Items are rated on a 6-point Likert scale ranging from 1 ("none of the time") to 6 ("all of the time"). Total scores range from 5 to 30. After reverse-scoring negatively worded items, an average score is calculated, with higher scores reflecting greater adherence to treatment.

Internal consistency of the MOSGA has been demonstrated in clinical samples. For example, among persons living with heart disease, diabetes, and/or hypertension (N = 2,181), the MOSGA had good internal consistency (α = .81; Hays, 1994). The MOSGA also had good reliability in a sample of individuals living with hypertension (α = 88; Hamilton, 2003) as well as cancer patients, including an α level of .80 at baseline and .89 at a six-week follow-up (Jerant, Franks, Tancredi, Saito, & Kravitz, 2011). Convergent validity has also been established across several studies. For diabetes patients, higher scores on the MOSGA were significantly associated with setting and achieving diabetic goals, per a healthcare provider's recommendations, including consumption of a low-fat diet, engagement in regular exercise, and taking medication (Dit, Baban, & Dumitrascu, 2012). Additionally, among persons living with a chronic heart

condition, the MOSGA was positively correlated to the Left Ventricular Device Patient Home Management Adherence Scale (r = .40; Casida, Wu, Harden, Chern, & Carie, 2015). Yet another study showed that for individuals with hypertension, scores on the MOSGA significantly correlated to other measures of treatment adherence (r = .25 - .34), including pill counts at routine doctors' appointments and the Medication Event Monitoring System, which is an electronic system that tracks the frequency, spacing, and timeliness of opening a pill bottle (Hamilton, 2003). Furthermore, the MOSGA has demonstrated significant correlations to other health-related variables. Scores on the MOSGA were positively related to perceived utility of the treatment and treatment adherence self-efficacy among individuals from an outpatient neurology clinic (Fuertes, Boylan, & Fontanella, 2009). It was also negatively correlated to disease duration for individuals with diabetes (Casida et al., 2015). Finally, in cancer patients specifically, higher treatment adherence was negatively related to pain severity as well as improved physical and mental HRQL (Jerant et al., 2011).

Short Form Health Survey (SF-12v2)

Physical HRQL, over the past four weeks, was measured using Version 2 of the Short Form-12 Health Survey (SF-12v2), which is a 12-item measure of perceived health status, with numerous subscales (Ware, Kosinski, & Keller, 1995). The physical functioning (HRQL-PF) subscale contains two items which assess the extent to which individuals experience physical limitations across various life domains (e.g., "moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf"), and participants respond on a 3-point Likert scale ranging from 1 ("yes, limited a lot") to 3 ("no, not limited at all"). Relatedly, perceived role limitations due to physical functioning (HRQL-RP) is a two-item subscale designed to estimate the extent to which individuals experience difficulties in the completion of

work-related activities due to illness-related symptoms or constraints (e.g., “were limited in the kind of work or other activities”). Participants respond on a 5-point Likert scale ranging from 1 (“all of the time”) to 5 (“none of the time”). Given our focus on physical HRQL among individuals living with a past or present history of cancer, we focused exclusively on participants’ responses for these two subscales.

However, the SF-12v2 contains additional related constructs, including bodily pain (HRQL-BP), which is a single item measure of the extent to which pain interferes with the completion of daily work activities. General health (HRQL-GH; 1 item) measures an individual’s perception of their overall health status, whereas vitality (HRQL-VT; 1 item) assesses energy levels. Social functioning (HRQL-SF; 1 item) estimates the degree to which health problems interfere with an individual’s ability to participate in social interactions or recreational activities. Role limitations due to emotional health (HRQL-EH), comprised of 2 items, assesses perceived limitations in the completion of activities due to emotional health problems. Finally, the mental health subscale (HRQL-MH; 2 items) measures fluctuations in mood (e.g., “felt downhearted and blue”). Score ranges vary, and higher scores are indicative of better HRQL in that domain.

In addition to the other subscales and single-item measures, the SF-12v2 also yields two composite scores: Physical Components Summary (HRQL-PCS) and Mental Components Summary (HRQL-MCS). Both composite scores are comprised of all items, with differential weight assigned to each single-item measure or subscale. HRQL-PCS assigns greater weight in scoring to physically-oriented items, including HRQL-PF, HRQL-RP, and HRQL-BP. For the HRQL-MCS, more weight is assigned to psychologically-oriented items including HRQL-VT, HRQL-SF, HRQL-EH, and HRQL-MH.

The SF-12v2 has demonstrated equivalency to a longer version of the questionnaire (SF-36v2). For example, in a sample of persons living with cervical or lumbosacral spinal disorders, correlations ranged from .88 - .95 for PCS and the correlation was .97 for MCS across subgroups of patients (Lee, Browell, & Jones, 2008). The single item measures and subscales were also correlated to one another across the long and brief versions of the questionnaire, ranging from .69 (HRQL-GH) to .99 (HRQL-EH). Construct validity of the SF-12v2 has also been demonstrated in clinical samples. For example, among renal transplant recipients, PCS was significantly related to the physical (r = .43) and fatigue (r = .42) subscales of the Kidney Transplant Questionnaire, and MCS was positively correlated to the emotional (r = .26) and fatigue subscales (r = .48; Chisholm-Burns, Erickson, Spivey, Gruessner, & Kaplan, 2011). In another study of individuals with chronic illness, the SF-12v2 was positively related to the EQ-5D, which is a five-dimensional European HRQL measure for the domains of mobility, self-care, engagement in usual activities, pain / discomfort, anxiety/depression, and general health. Correlations of these dimensions to PCS ranged from .24 (anxiety/depression) to .61 (pain), and correlations for MCS ranged from .21 (self-care) to .61 (anxiety/depression; Cheak-Zamora, Wyrwich, & McBride, 2009). Finally, in a cancer study, scores on the Bowel Function Index measure were significantly related to several SF-12v2 single-item measures and subscales including HRQL-PF (r = .21), HRQL-BP (r = .32), HRQL-SF (r = .38), HRQL-EH (r = .41), and HRQL-MH (r = .39; Wendel et al., 2014).

In addition to being valid, the SF-12v2 also appears to be a reliable measure of HRQL. Among individuals who received a renal transplant, internal consistency for the summary scores ranged from good (MCS α = .88) to excellent (PCS α= .92; Chisholm-Burns et al., 2011). Good internal consistency was also demonstrated in a sample of heart disease patients, with α values of

.87 (PCS) and .84 (MCS; De Smedt et al., 2012). Finally, internal consistency of the SF-12v2 has been demonstrated in the cancer population. In a sample of rectal cancer survivors, internal consistency of the SF-12v2 subscales varied, with α values of .77 (HRQL-PF), .86 (HRQL-RP), .75 (HRQL-EH), and .71 (HRQL-MH; Wendel et al., 2014). As well, reliability of the composite scores has been demonstrated in the cancer population, with α levels of .89 and .73 for PCS and MCS respectively (Bhandari & Payakachat, 2016).

Statistical Analyses

Covariates

Given the existence of well-established health disparities, and the influence of demographic and psychosocial variables on health behaviors and quality of life, numerous covariates were proposed for our analyses. For instance, in terms of demographic variables, biological sex is related to differences in levels of self-compassion, adherence to treatment recommendations, and health (Magai et al., 2007; Neff, 2003; Siegel et al., 2012), and age disparities have been identified for rates of treatment adherence and self-reported physical HRQL (Patridge et al., 2002; Reeve et al., 2012). Racial and ethnic differences also had to be accounted for given literature showing differences in terms of health-related beliefs of control, treatment adherence and HRQL (CDC, 2016b; O'Hea et al., 2005; WHO, 2003). As such, we covaried age, race/ethnicity and sex in all analyses.

Further, we accounted for the potential effects of disease characteristics and health-care related factors. As an example, cancer status (i.e., current diagnosis versus remission) or stage of disease (i.e., Stage 1, 2, 3, 4) may influence the extent to which individuals can engage in self-compassion, perceive control over their disease, or follow treatment recommendations (Bender et al., 2014; Przezdziecki et al.,2013; Ranchor et al., 2010). The availability and affordability of

different types of insurance (e.g., Medicaid, private) may influence perceived control and one's ability to engage in treatment, such as expensive medications or surgical procedures (Theofilou & Panagiotaki, 2012; Wallston, 2001). Because of these associations, we also covaried cancer status, cancer stage and insurance coverage, in all planned analyses.

All covariates that were non-significant across all models were removed from further analyses, in accordance with the principle of parsimony (McCullagh & Nelder, 1989). According to this principle, preference should be given to models containing the fewest possible assumptions and variables that also yields the best possible predictive or explanatory value. Simpler models also have greater generalizability in the social sciences. After nonsignificant covariates were removed, all hypothesized multivariate models were reanalyzed.

Bivariate Analyses

All analyses were conducted using the Statistical Package for the Social Sciences (SPSS), Version 24. We used Pearson's product-moment correlations to examine the associations between, and independence of, self-compassion, control beliefs, treatment adherence, and physical HRQL. A multicollinearity cutoff of $r > .80$ was used, which is a level that has been proposed in the social sciences to minimize risk of biased parameter estimates (Abu-Bader, 2011). Bivariate correlations were examined in the total sample and in subgroups of participants categorized by disease status (i.e., current diagnosis; remitted cancer).

Serial Multivariate Mediation Analyses

Model 6, from PROCESS macro for SPSS, Version 2.16, was used for multivariate mediation analyses (Hayes, 2013). We examined control beliefs (i.e., general, symptom, chance, mastery/health self-efficacy) as first order mediators, in separate models, and treatment adherence as a second order mediator of the relation between self-compassion and physical

HRQL (i.e., HRQL-PF and HRQL-RP subscales). As well, the proposed models were examined in the entire sample (i.e., persons with current diagnosis and those in cancer remission), followed by an examination of how the models worked in subgroups of participants relative to their disease status (i.e., current diagnosis vs. cancer remission). Preacher and Hayes' (2008) method only allows for a single dependent variable per model; therefore, eight independent models were constructed to examine the linkage of self-compassion, subscales of the CBI, treatment adherence, and physical HRQL. Thus, we conducted 24 total serial mediations. Sample sizes varied across models, as not all respondents answered every item on the measures utilized in the present study.

In serial mediation, several associations can be examined among the variables. A *specific indirect effect* is the effect of the DV on the IV through one or both mediators. In our study, the following specific indirect effects could have been observed: a_1b_1 = self-compassion related to physical HRQL through control beliefs; $a_1a_3b_2$ = self-compassion related to physical HRQL through control beliefs and treatment adherence; a_2b_2 = self-compassion related to physical HRQL through treatment adherence. The *total indirect effect* is the sum of all specific indirect effects, denoted as $a_{123}\,b_{12}$ in our study. Additionally, *c'* is used to indicate the direct effect of the IV, which is the effect of the IV on the DV after controlling for all other mediators. In our study, *c'* symbolized the relation between self-compassion and physical HRQL, accounting for the effects of control beliefs and treatment adherence. Finally, *c* represents the total effect of the IV on the DV, and it is calculated by adding *c'* and the total indirect effect. In our study, *c* represented the linkage of self-compassion and physical HRQL through the mediators of control beliefs and treatment adherence.

Serial mediation has several advantages over other methodological approaches in correlation and multiple regression (Preacher & Hayes, 2008). First, it is possible to determine the extent to which a specific mediator variable contributes to the relation between an independent and dependent variable relative to the presence or absence of other mediating variables in the model. Second, serial mediation reduces the likelihood of parameter bias due to omitted variables, as it is possible to account for the effects of potential confounding variables by including them in the model. Third, the PROCESS macro utilizes bootstrapping for serial mediation analyses, which is a resampling technique that involves taking a sample size of *n* cases, with replacement, from the original sample, and this process is repeated 10,000 times, per the recommendation of Preacher and Hayes (2008). This technique allows for an estimation of the indirect effect in each resampled data set, and it is used to estimate confidence intervals for the indirect effect. Additionally, bootstrapping provides an empirical approximation of the sampling distribution; therefore, this process does not impose an assumption of normality. Other advantages of bootstrapping include lower Type I error rates and higher power for the study. Sampling with replacement, especially for studies with smaller sample sizes, increases the likelihood that the empirical distribution of data will be closer to the actual distribution in the population. This allows for more accurate estimates, and in turn, the study also has higher power.

CHAPTER 3

RESULTS

Descriptive Statistics for Study Variables

Complete descriptive statistics for study variables can be found in Table 1, relative to cancer status (i.e., current diagnosis vs. remitted cancer). Independent samples *t*-tests revealed a statistically significant mean difference for insurance coverage and general control; persons with a current cancer diagnosis were less likely to have health insurance coverage or perceptions of general control over health relative to persons in remission from cancer. The two groups were not significantly different from one another for other study variables.

Table 1

Descriptive Statistics and T-tests for Study Variables by Cancer Status

Variable	Cancer Status						95% CI for Mean Difference		
	Current Diagnosis			Remitted Cancer					
	M	SD	n	M	SD	n		t	df
Insurance Coverage	1.12	.47	68	1.06	.36	162	[-.18, .05]	-1.09*	228
Self-Compassion	3.41	.74	55	3.52	.72	121	[-.13, .34]	.89	174
General Control	3.98	1.02	63	4.52	.83	135	[.27, .81]	3.97*	196
Symptom Control	4.11	.93	62	4.57	.79	134	[.21, .72]	3.63	194
Mastery/Efficacy	4.23	.85	62	4.68	.72	136	[.22, .68]	3.91	196
Chance Control	3.55	.89	62	3.51	.76	136	[-.28, .20]	-.34	196
Treatment Adherence	4.92	.76	54	4.99	.82	119	[-.19, .33]	.51	171
Physical Functioning	44.5	13.07	56	47.38	11.04	120	[-.87, 6.62]	1.52	174
Role Physical	24.35	3.93	56	25.96	3.92	121	[.35, 2.86]	2.53	175

Note: A significant mean difference for insurance and general control exists between persons with a current diagnosis and remitted cancer; those with a current diagnosis are less likely to have health insurance coverage or perceive general control over their health.
* $p < .05$

Bivariate Correlations

Total Cancer Sample

Pearson's product-moment correlational analyses were utilized to test the first hypothesis, which was largely supported (see Table 2). Self-compassion (SCS) was significantly positively related to general control (GC; $r = .27$, $p < .01$), symptom control (SC; $r = .29$, $p < .01$), mastery / health self-efficacy, (MHSE; $r = .50$, $p < .01$), treatment adherence (TxA; $r = .21$, $p < .01$),

physical functioning (PF; $r = .16$, $p < .05$), and role physical (RP; $r = .22$, $p < .01$). SCS was negatively related to chance control ($r = -.07$), but it did not reach statistical significance.

Additionally, TxA was positively related to GC ($r = .22$, $p < .01$), SC ($r = .19$, $p < .05$), and MHSE ($r = .45$, $p < .01$). TxA was also positively related to CC ($r = .02$), though it was a small and non-significant correlation.

In terms of other correlations for the HRQL variables, there was also a positive relation between PF and GC ($r = .31$, $p < .01$), SC ($r = .23$, $p < .01$), MHSE ($r = .23$, $p < .01$), TxA ($r = .17$, $p < .05$), and RP ($r = .47$, $p < .01$), as well as a negative relation to CC ($r = -.10$) that did not reach significance. Additionally, RP was positively ($p < .01$) related to GC ($r = .23$), SC ($r = .20$) and MHSE ($r = .27$). RP was correlated to CC ($r = -.04$) and TxA ($r = .13$) in the hypothesized directions, but neither relation was significant.

All control subscales were also related to one another in the expected directions. GC was positively ($p < .01$) related to SC ($r = .81$) and MHSE ($r = .56$), and negatively related to CC ($r = -.33$, $p < .01$). SC was also positively related to MHSE ($r = .54$, $p < .01$) and negatively related to CC ($r = -.26$, $p < .01$). There was also a non-significant, negative relation between MHSE and CC ($r = -.11$).

Finally, health insurance coverage, which emerged as the only significant covariate, was positively ($p < .01$) associated with SCS ($r = .25$), GC ($r = .24$), and SC ($r = .17$). Health insurance also had a positive, nonsignificant association to MHSE ($r = .09$) and RP ($r = .02$). There was a negative, nonsignificant association between health insurance coverage and CC ($r = -.06$), TxA ($r = -.06$), and PF ($r = -.02$).

Table 2

Means, Standard Deviations, and Bivariate Correlations of Study Variables in Total Cancer Sample

	Mean (SD)	Self-Compassion	General Control	Symptom Control	Mastery / Efficacy	Chance Control	Treatment Adherence	Physical Functioning	Role – Physical
Insurance	---	.25**	.24**	.17*	.09	-.06	-.06	-.02	.02
Self-Compassion	3.48 (.73)	---	.27**	.29**	.50**	-.07	.21**	.16*	.22**
General Control	4.35 (.93)	---	---	.81**	.56**	-.33**	.22**	.31**	.23**
Symptom Control	4.43 (.86)	---	---	---	.54**	-.26**	.19*	.23**	.20**
Mastery / Efficacy	4.54 (.79)	---	---	---	---	-.11	.45**	.23**	.27**
Chance Control	3.52 (.80)	---	---	---	---	---	.02	-.10	-.04
Treatment Adherence	4.97 (.80)	---	---	---	---	---	---	.17*	.13
Physical Functioning	46.46 (11.7)	---	---	---	---	---	---	---	.47**
Role – Physical	25.45 (3.99)	---	---	---	---	---	---	---	---

Note: SD = Standard Deviation; Self-Compassion = Self-Compassion Scale – Short Form; General Control, Symptom Control, Mastery/Efficacy, and Chance Control = Control Beliefs Inventory; Treatment Adherence = Medical Outcomes Study General Treatment Adherence Scale; Physical Functioning and Role – Physical = Short Form Health Survey, Version 2 – Physical Functioning and Role Physical subscales. * = $p < .05$; ** = $p < .01$

Remitted Cancer

Among persons in remission from cancer, bivariate correlations between study variables were largely consistent with those in the total sample, in terms of directionality and significance of associations. Health insurance coverage had a positive association ($p < .01$) with SCS ($r = .30$), GC ($r = .31$), and SC ($r = .25$). Additionally, SCS was significantly (ranging from $p < .001$ to $p < .05$) and positively related to GC ($r = .26$), SC ($r = .29$), MHSE ($r = .53$), TxA ($r = .25$), PF ($r = .20$) and RP ($r = .29$). The internal control belief subscale of GC was positively ($p < .01$) associated with SC ($r = .81$), MHSE ($r = .49$), and PF ($r = .32$), and it had a negative correlation to CC ($r = -.43$, $p < .01$). SC was positively associated ($p < .01$) with MHSE ($r = .44$) and PF ($r = .25$), and negatively to CC ($r = -.28$, $p < .01$). Additionally, MHSE ($p < .01$) was positively related to TxA ($r = .41$), PF ($r = .31$), and RP ($r = .33$). Positive correlations were also observed between TxA and PF ($r = .25$, $p < .01$) and the two physical HRQL measures ($r = .45$, $p < .01$).

Contrary to findings in the total cancer sample, neither GC nor SC were significantly related to TxA or RP, although these correlations remained positive in directionality. Finally, as compared to our total sample, a negative correlation emerged as significant between CC and PF ($r = -.26$, $p < .01$), in our sample of persons in remission (See Table 3).

Current Cancer Diagnosis

In our sample of persons with cancer, many associations that were significant in our total sample, became non-significant. Specifically, health insurance coverage no longer had a significant positive association with SCS, GC, or SC, and SCS no longer had an association with treatment adherence or our physical HRQL measures. Some of the correlations for control beliefs also fell out of significance, including the associations between GC and our measures of PF, RP, and CC, and between the SC subscale and measures of TxA, PF, and RP. Additionally, MHSE

was no longer significantly related to PF or RP and, similarly, TxA and PF were no longer correlated.

Some variables, however, did remain significantly associated. SCS continued to have a positive association to GC ($r = .27$, $p < .05$), SC ($r = .27$, $p < .05$), and MHSE ($r = .44$, $p < .01$). There was also a positive correlation between GC and our measures of SC ($r = .77$), MHSE ($r = .57$), and TxA ($r = .37$), and between MHSE and TxA ($r = .54$, $p < .01$). Finally, the physical HRQL subscales ($r = .49$, $p < .01$) remained correlated among our respondents with cancer (See Table 3).

Table 3

Bivariate Correlations of Study Variables in Subgroups of Participants

	Insurance	Self-Compassion	General Control	Symptom Control	Mastery / Efficacy	Chance Control	Treatment Adherence	Physical Functioning	Role – Physical
Insurance	---	.30**	.31**	.25**	.10	-.03	-.06	-.07	-.05
Self-Compassion	.13	---	.26**	.29**	.53**	.01	.25**	.20*	.29**
General Control	.12	.27*	---	.81**	.49**	-.43**	.14	.32**	.17
Symptom Control	.01	.27*	.77**	---	.44**	-.28**	.18	.25**	.17
Mastery / Efficacy	.04	.44**	.57**	.59**	---	-.09	.41**	.31**	.33**
Chance Control	-.13	-.21	-.18	-.24	-.11	---	-.02	-.26**	-.06
Treatment Adherence	-.05	.12	.37**	.20	.54**	.09	---	.25**	.17
Physical Functioning	.07	.09	.26	.15	.06	.14	-.01	---	.45**
Role – Physical	.19	.02	.23	.15	.07	-.02	.04	.49**	---

Note: Correlations for persons in cancer remission are listed in the shaded boxes located above the diagonal. Correlations for persons living with a current cancer diagnosis are listed below the diagonal. SD = Standard Deviation; Self-Compassion = Self-Compassion Scale – Short Form; General Control, Symptom Control, Mastery/Efficacy, and Chance Control = Control Beliefs Inventory; Treatment Adherence = Medical Outcomes Study General Treatment Adherence Scale; Physical Functioning and Role – Physical = Short Form Health Survey, Version 2 – Physical Functioning and Role Physical subscales. * = $p < .05$; ** = $p < .01$

Serial Mediation Results

Proposed serial mediation models were examined in the total sample and in subgroups according to disease status, including participants with a current diagnosis and those in cancer remission. Of all covariates proposed for inclusion in the present study, health insurance (i.e., "Do you have health insurance?") was the only covariate which emerged as significant in the initial analyses. As such, all other covariates were removed from the proposed models. The analyses were performed again, the results of which are presented below.

Total Cancer Sample

Physical functioning (HRQL-PF). In the general control model, a significant total effect was observed (c = 3.25, SE = 1.28, p = .01, *95% CI* = .72 to 5.78). The direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., general control, treatment adherence) were added to the model (c' = 1.9, SE = 1.27, p = .14, *95% CI* = -.60 to 4.4), indicating mediation. A specific indirect effect was observed through general control (a_1b_1 = 1.02, *95% CI* = .19 to 2.23). Approximately 4% of the indirect effect variance was accounted for by our model (R^2 = .04, p = .04). In the symptom control model, a significant total effect was observed (c = 3.21, SE = 1.28, p = .01, *95% CI* = .69 to 5.74). The direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., symptom control, treatment adherence) were added to the model (c' = 1.89, SE = 1.31, p = .15, *95% CI* = -.70 to 4.49), indicating mediation. A specific indirect effect was also observed through symptom control (a_1b_1 = .81, *95% CI* = .14 to 1.95). Approximately 4% of the indirect effect variance was accounted for by our model (R^2 = .04, p = .04). In the mastery / health-related self-efficacy model, a significant total effect was observed (c = 3.14, SE = 1.25, p = .01, *95% CI* = .67 to 5.6). The direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., mastery / health-related

self-efficacy, treatment adherence) were added to the model (*c'* = 1.65, *SE* = 1.41, *p* = .24, *95% CI* = -1.13 to 4.44), indicating mediation. No specific indirect effects were observed. Approximately 4% of the indirect effect variance was accounted for by our model (R^2 = .04, *p* = .04). In the chance control model, a significant total effect was observed (*c* = 3.03, *SE* = 1.26, *p* = .02, *95% CI* = .54 to 5.53). The direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., chance control, treatment adherence) were added to the model (*c'* = 2.38, *SE* = 1.29, *p* = .07, *95% CI* = -.16 to 4.93), indicating mediation. Additionally, a specific indirect pathway was observed through treatment adherence (a_2b_2 = .59, *95% CI* = .02 to 1.69). Approximately 4% of the indirect effect variance was accounted for by our model (R^2 = .04, *p* = .06). See Table 4 and Figure 1.

Table 4

Total Cancer Sample – Specific Indirect Effects between Self-Compassion and Physical Functioning for Serial Mediation Utilizing Control Beliefs and Treatment Adherence

			95% CI	
	Effect	*b*	Lower	Upper
General Control	*ab*	1.35	.31	2.81
	a_1b_1	1.02	.19	2.23
	$a_1a_3b_2$	.05	-.01	.31
	a_2b_2	.28	-.14	1.17
	R^2	.04*		
Symptom Control	*ab*	1.32	.31	2.78
	a_1b_1	.81	.14	1.95
	$a_1a_3b_2$	.07	-.01	.34
	a_2b_2	.45	-.06	1.43
	R^2	.04*		
Mastery / Efficacy	*ab*	1.48	-.00	3.22
	a_1b_1	1.12	-.35	2.89
	$a_1a_3b_2$	.29	-.17	.98
	a_2b_2	.08	-.13	.80
	R^2	.04*		
Chance Control	*ab*	.65	-.03	1.84
	a_1b_1	.07	-.19	.68
	$a_1a_3b_2$	-.002	-.08	.02
	a_2b_2	.59	.02	1.69
	R^2	.04		

Note. a and *b* represent unstandardized regression coefficients: a_1 = direct effect of self-compassion on control beliefs; a_2 = direct effect of self-compassion on treatment adherence; a_3 = direct effect of control beliefs on treatment adherence; b_1 = direct effect of control beliefs on physical functioning; b_2 = direct effect of treatment adherence on physical functioning; *ab* = Total Indirect Effect; a_1b_1 = specific indirect effect through control beliefs; $a_1a_3b_1$ = specific indirect effect through control beliefs and treatment adherence; a_2b_2 = specific indirect effect through treatment adherence. R^2 = total indirect effect variance accounted for by the model. CI = 95% confidence interval; 10,000 bootstrap samples; health insurance coverage used as a covariate.
$p < .05$

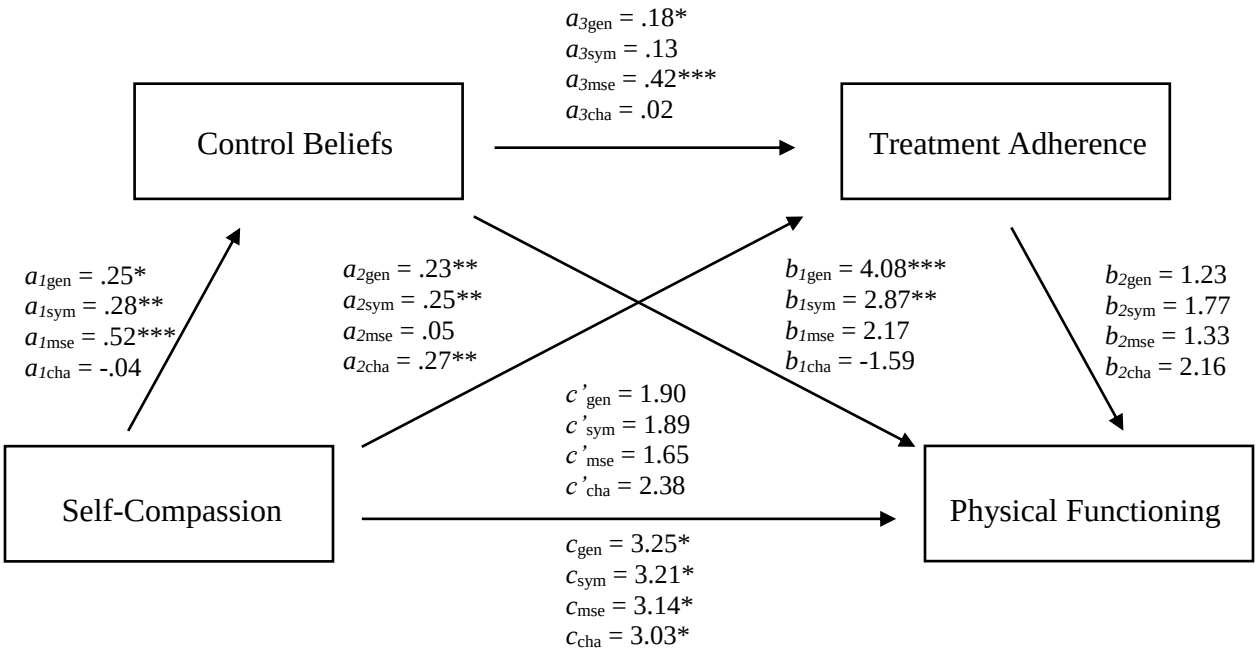

Figure 1. Total cancer sample – serial indirect effects model for physical functioning abilities. Serial indirect effects model for self-compassion, control beliefs, treatment adherence, and physical functioning in the total cancer sample. a_1b_1 = specific indirect effect (self-compassion related to physical functioning through control beliefs); $a_1a_3b_2$ = specific indirect effect (self-compassion related to physical functioning through control beliefs and treatment adherence); a_2b_2 = specific indirect effect (self-compassion related to physical functioning through treatment adherence); $a_{123}\,b_{12}$ = total indirect effect (self-compassion related to physical functioning via control beliefs and treatment adherence); *c* = total effect (self-compassion related to physical functioning); *c*' = indirect effect (self-compassion related to physical functioning accounting for control beliefs and treatment adherence).
* $p < .05$; ** $p < .01$; *** $p < .001$

Role physical (HRQL-RP). In the general control model, a significant total effect was observed (*c* = 1.04, *SE* = .44, *p* = .02, *95% CI* = .18 to 1.91). The direct effect of self-compassion on HRQL-RP was nonsignificant when mediators (i.e., general control, treatment adherence) were added to the model (*c'* = .70, *SE* = .45, *p* = .12, *95% CI* = -.18 to 1.59), indicating mediation. Additionally, a specific indirect pathway was observed through general control (a_1b_1 = .21, *95% CI* = .02 to .57). Approximately 3% of indirect effect variance was accounted for by our model (R^2 = .03, *p* = .06). In the symptom control model, a significant total effect was

observed (*c* = 1.05, *SE* = .44, *p* = .02, *95% CI* = .18 to 1.91). The direct effect of self-compassion on HRQL-RP was nonsignificant when mediators (i.e., symptom control, treatment adherence) were added to the model (*c'* = .68, *SE* = .46, *p* = .14, *95% CI* = -.22 to 1.59), indicating mediation. A specific indirect pathway was observed through symptom control (a_1b_1 = .20, *95% CI* = .003 to .54). Approximately 3% of indirect effect variance was accounted for by our model (R^2 = .03, *p* = .06). In the mastery model, a significant total effect was observed (*c* = 1.15, *SE* = .43, *p* = .01, *95% CI* = .30 to 2). The direct effect of self-compassion on HRQL-RP was nonsignificant when mediators (i.e., mastery control, treatment adherence) were added to the model (*c'* = .54, *SE* = .49, *p* = .27, *95% CI* = -.42 to 1.5), indicating mediation. A specific indirect effect was observed through mastery control (a_1b_1 = .53, *95% CI* = .05 to 1.15). Approximately 4% of indirect effect variance was accounted for by our model (R^2 = .04, *p* = .03). Finally, in the chance control model, a significant total effect (*c* = 1.13, *SE* = .43, *p* = .01, *95% CI* = .28 to 1.99) was observed and the direct effect reduced in significance when mediators (i.e., chance control, treatment adherence) were added to the model (*c'* = .95, *SE* = .45, *p* = .03, *95% CI* = .07 to 1.83). No significant specific indirect effects were found. Approximately 4% of indirect effect variance was accounted for by our model (R^2 = .04, *p* = .03). See Table 5 and Figure 2.

Table 5

Total Cancer Sample – Specific Indirect Effects between Self-compassion and Role - Physical for Serial Mediation Utilizing Control Beliefs and Treatment Adherence

			95% CI	
	Effect	*b*	Lower	Upper
General Control	*ab*	.34	.06	.73
	a_1b_1	.21	.02	.57
	$a_1a_3b_2$	.02	-.01	.11
	a_2b_2	.10	-.06	.41
	R^2	.04		
Symptom Control	*ab*	.36	.06	.78
	a_1b_1	.20	.003	.54
	$a_1a_3b_2$	.02	-.003	.11
	a_2b_2	.15	-.04	.49
	R^2	.04		
Mastery / Efficacy	*ab*	.61	.17	1.14
	a_1b_1	.53	.05	1.15
	$a_1a_3b_2$	.06	-.12	.28
	a_2b_2	.02	-.05	.23
	R^2	.04*		
Chance Control	*ab*	.18	-.03	.55
	a_1b_1	.01	-.04	.14
	$a_1a_3b_2$	-.0004	-.03	.01
	a_2b_2	.18	-.02	.52
	R^2	.04*		

Note. a and *b* represent unstandardized regression coefficients: a_1 = direct effect of self-compassion on control beliefs; a_2 = direct effect of self-compassion on treatment adherence; a_3 = direct effect of control beliefs on treatment adherence; b_1 = direct effect of control beliefs on role – physical; b_2 = direct effect of treatment adherence on role – physical; *ab* = Total Indirect Effect; a_1b_1 = specific indirect effect through control beliefs; $a_1a_3b_1$ = specific indirect effect through control beliefs and treatment adherence; a_2b_2 = specific indirect effect through treatment adherence; R^2 = total indirect effect variance accounted for by the model. CI = 95% confidence interval; 10,000 bootstrap samples; health insurance coverage used as a covariate.
* $p < .05$

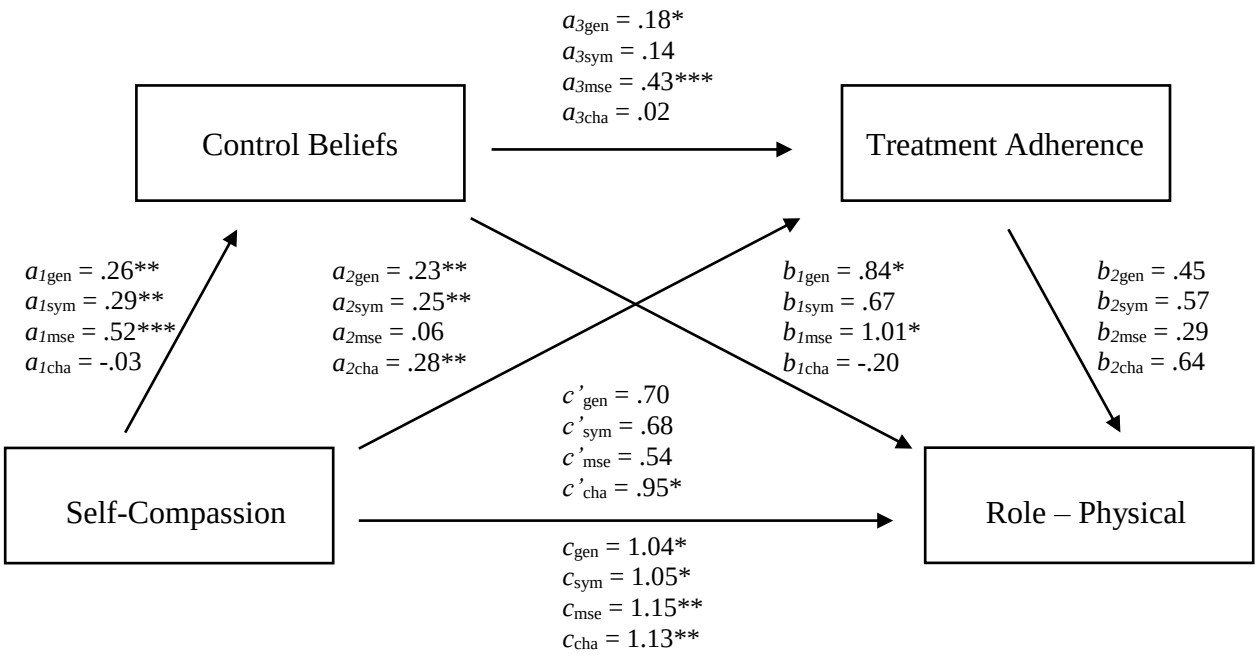

Figure 2. Total cancer sample – serial indirect effects model for physical role limitations. Serial indirect effects model for self-compassion, control beliefs, treatment adherence, and role – physical in the total cancer sample. a_1b_1 = specific indirect effect (self-compassion related to role – physical through control beliefs); $a_1a_3b_2$ = specific indirect effect (self-compassion related to role – physical through control beliefs and treatment adherence); a_2b_2 = specific indirect effect (self-compassion related to role – physical through treatment adherence); $a_{123}\,b_{12}$ = total indirect effect (self-compassion related to role – physical via control beliefs and treatment adherence); *c* = total effect (self-compassion related to role – physical); *c*' = indirect effect (self-compassion related to role – physical accounting for control beliefs and treatment adherence).
* $p < .05$; ** $p < .01$; *** $p < .001$

Sample of Persons with Active Cancer Diagnosis

Physical functioning (HRQL-PF). Across all proposed serial mediation models, neither the total effects nor the direct effects were significant. Significant specific indirect effects were not observed. See Table 6 and Figure 3.

Table 6

Persons with Active Cancer Diagnosis – Specific Indirect Effects between Self-compassion and Physical Functioning for Serial Mediation Utilizing Control Beliefs and Treatment Adherence

			95% CI	
	Effect	*b*	Lower	Upper
General Control	*ab*	.83	-1.25	3.62
	a_1b_1	.99	-.61	3.86
	$a_1a_3b_2$	-.09	-1.44	.18
	a_2b_2	-.07	-2.09	.48
	R^2	.01		
Symptom Control	*ab*	.56	-.93	3.32
	a_1b_1	.57	-.33	3.34
	$a_1a_3b_2$	-.003	-.41	.26
	a_2b_2	-.008	-1.39	.94
	R^2	.01		
Mastery / Efficacy	*ab*	.37	-1.76	3.75
	a_1b_1	.38	-1.80	3.79
	$a_1a_3b_2$	-.02	-1.24	1.13
	a_2b_2	.004	-.72	.86
	R^2	.02		
Chance Control	*ab*	-.30	-2.50	1.18
	a_1b_1	-.39	-2.60	.31
	$a_1a_3b_2$	-.01	-.51	.07
	a_2b_2	.10	-.74	2.05
	R^2	.01		

Note. a and *b* represent unstandardized regression coefficients: a_1 = direct effect of self-compassion on control beliefs; a_2 = direct effect of self-compassion on treatment adherence; a_3 = direct effect of control beliefs on treatment adherence; b_1 = direct effect of control beliefs on physical functioning; b_2 = direct effect of treatment adherence on physical functioning; *ab* = Total Indirect Effect; a_1b_1 = specific indirect effect through control beliefs; $a_1a_3b_1$ = specific indirect effect through control beliefs and treatment adherence; a_2b_2 = specific indirect effect through treatment adherence; R^2 = total indirect effect variance accounted for by the model. CI = 95% confidence interval; 10,000 bootstrap samples; health insurance coverage used as a covariate.

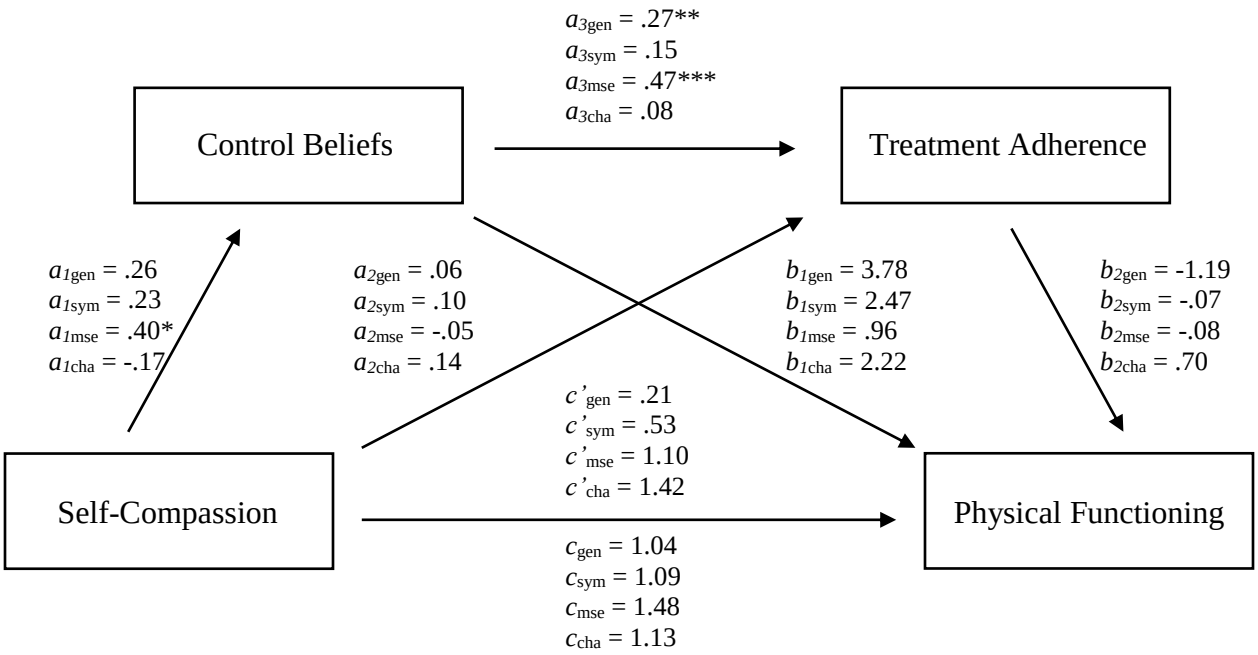

Figure 3. Persons with active cancer diagnosis – serial indirect effects model for physical functioning abilities. Serial indirect effects model for self-compassion, control beliefs, treatment adherence, and physical functioning in persons with an active cancer diagnosis. a_1b_1 = specific indirect effect (self-compassion related to physical functioning through control beliefs); $a_1a_3b_2$ = specific indirect effect (self-compassion related to physical functioning through control beliefs and treatment adherence); a_2b_2 = specific indirect effect (self-compassion related to physical functioning through treatment adherence); $a_{123}\,b_{12}$ = total indirect effect (self-compassion related to physical functioning via control beliefs and treatment adherence); c = total effect (self-compassion related to physical functioning); c' = indirect effect (self-compassion related to physical functioning accounting for control beliefs and treatment adherence).
* $p < .05$; ** $p < .01$; *** $p < .001$.

Role physical (HRQL-RP). Total and direct effects were nonsignificant across models, and no specific indirect pathways were observed. See Table 7 and Figure 4.

Table 7

Persons with Active Cancer Diagnosis – Specific Indirect Effects between Self-compassion and Role – Physical for Serial Mediation Utilizing Control Beliefs and Treatment Adherence

			95% CI	
	Effect	*b*	Lower	Upper
General Control	*ab*	.23	-.24	1.00
	a_1b_1	.16	-.14	1.04
	$a_1a_3b_2$	.04	-.06	.50
	a_2b_2	.03	-.20	.63
	R^2	.05		
Symptom Control	*ab*	.20	-.21	.94
	a_1b_1	.12	-.14	.81
	$a_1a_3b_2$	.02	-.02	.31
	a_2b_2	.06	-.15	.81
	R^2	.04		
Mastery / Efficacy	*ab*	.13	-.64	.84
	a_1b_1	.03	-.79	.79
	$a_1a_3b_2$	.14	-.16	.80
	a_2b_2	-.04	-.65	.18
	R^2	.05		
Chance Control	*ab*	.12	-.29	1.11
	a_1b_1	-.002	-.31	.34
	$a_1a_3b_2$	-.01	-.32	.02
	a_2b_2	.13	-.15	1.05
	R^2	.04		

Note. a and *b* represent unstandardized regression coefficients: a_1 = direct effect of self-compassion on control beliefs; a_2 = direct effect of self-compassion on treatment adherence; a_3 = direct effect of control beliefs on treatment adherence; b_1 = direct effect of control beliefs on role – physical; b_2 = direct effect of treatment adherence on role – physical; *ab* = Total Indirect Effect; a_1b_1 = specific indirect effect through control beliefs; $a_1a_3b_1$ = specific indirect effect through control beliefs and treatment adherence; a_2b_2 = specific indirect effect through treatment adherence; R^2 = total indirect effect variance accounted for by the model. CI = 95% confidence interval; 10,000 bootstrap samples; health insurance coverage used as a covariate.

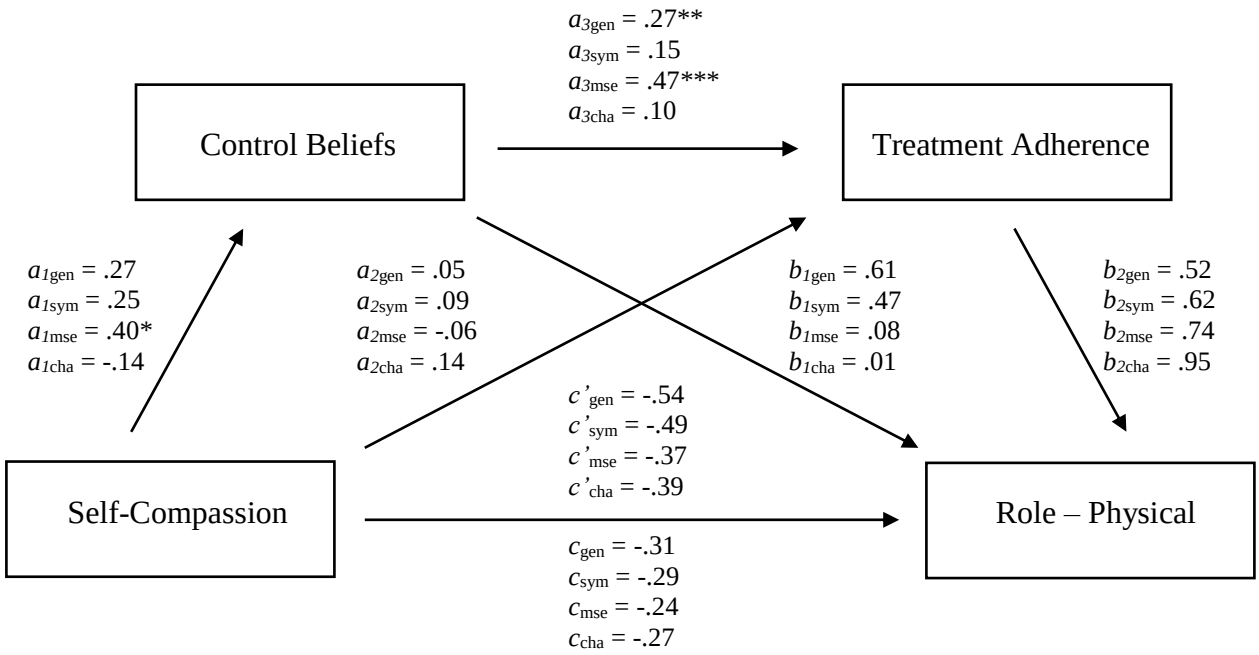

Figure 4. Persons with active cancer diagnosis – serial indirect effects model for physical role limitations. Serial indirect effects model for self-compassion, control beliefs, treatment adherence, and role – physical in persons with an active cancer diagnosis. a_1b_1 = specific indirect effect (self-compassion related to role – physical through control beliefs); $a_1a_3b_2$ = specific indirect effect (self-compassion related to role – physical through control beliefs and treatment adherence); a_2b_2 = specific indirect effect (self-compassion related to role – physical through treatment adherence); $a_{123}\,b_{12}$ = total indirect effect (self-compassion related to role – physical via control beliefs and treatment adherence); c = total effect (self-compassion related to role – physical); c' = indirect effect (self-compassion related to role – physical accounting for control beliefs and treatment adherence).
* $p < .05$; ** $p < .01$; *** $p < .001$

Persons in Remission from Cancer

Physical functioning (HRQL-PF). In the general control model, a significant total effect was observed (c = 4.4, *SE* = 1.47, p = .003, *95% CI* = 1.49 to 7.3). The direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., general control, treatment adherence) were added to the model (c' = 2.71, *SE* = 1.44, p = .06, *95% CI* = -.14 to 5.56), indicating mediation. A specific indirect pathway was observed through general control (a_1b_1 = 1.06, *95% CI* = .07 to 2.61). Approximately 8% of indirect effect variance was accounted for by

our model (R^2 = .08, *p* = .01). For the symptom control model, a significant total effect was observed (*c* = 4.3, *SE* = 1.46, *p* = .004, *95% CI* = 1.4 to 7.2), and the direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., symptom control, treatment adherence) were added to the model (*c'* = 2.6, *SE* = 1.51, *p* = .09, *95% CI* = -.39 to 5.6), indicating mediation. A specific indirect effect was observed through symptom control (a_1b_1 = .90, *95% CI* =.10 to 2.34). Approximately 8% of indirect effect variance was accounted for by the model (R^2 = .08, *p* = .01). In the mastery control model, a significant total effect was observed (*c* = 4.0, *SE* = 1.44, *p* = .01, *95% CI* = 1.15 to 6.85). The direct effect of self-compassion on HRQL-PF was nonsignificant when mediators (i.e., mastery control, treatment adherence) were added to the model (*c'* = 1.79, *SE* = 1.68, *p* = .29, *95% CI* = -1.55 to 5.12), indicating mediation. There were no significant specific indirect pathways, and approximately 7% of the indirect effect variance was accounted for by the model (R^2 = .07, *p* = .02). For the chance control model, a significant total effect was observed (*c* = 3.98, *SE* = 1.44, *p* = .01, *95% CI* = 1.13 to 6.83), and the direct effect of self-compassion on HRQL-PF reduced in significance when mediators (i.e., chance control, treatment adherence) were added to the model (*c'* = 3.27, *SE* = 1.43, *p* = .02, *95% CI* = .44 to 6.11). No specific indirect effects were identified, and approximately 7% of the indirect effect variance was accounted for by our model (R^2 = .07, *p* = .02). See Table 8 and Figure 5.

Table 8

Persons in Cancer Remission – Specific Indirect Effects between Self-compassion and Physical Functioning for Serial Mediation Utilizing Control Beliefs and Treatment Adherence

			95% CI	
	Effect	*b*	Lower	Upper
General Control	*ab*	1.69	.35	3.59
	a_1b_1	1.06	.07	2.61
	$a_1a_3b_2$	7.05	-.01	.36
	a_2b_2	.59	-.10	1.96
	R^2	.08**		
Symptom Control	*ab*	1.70	.43	3.72
	a_1b_1	.90	.10	2.34
	$a_1a_3b_2$	.08	-.02	.50
	a_2b_2	.72	-.04	2.15
	R^2	.08*		
Mastery / Efficacy	*ab*	2.22	.27	4.37
	a_1b_1	1.64	-.24	3.83
	$a_1a_3b_2$	.39	-.09	1.39
	a_2b_2	.19	-.16	1.31
	R^2	.07*		
Chance Control	*ab*	.70	-.58	2.26
	a_1b_1	-.05	-1.02	.83
	$a_1a_3b_2$	-.001	-.09	.05
	a_2b_2	.75	-.03	2.16
	R^2	.07*		

Note. a and *b* represent unstandardized regression coefficients: a_1 = direct effect of self-compassion on control beliefs; a_2 = direct effect of self-compassion on treatment adherence; a_3 = direct effect of control beliefs on treatment adherence; b_1 = direct effect of control beliefs on physical functioning; b_2 = direct effect of treatment adherence on physical functioning; *ab* = Total Indirect Effect; a_1b_1 = specific indirect effect through control beliefs; $a_1a_3b_1$ = specific indirect effect through control beliefs and treatment adherence; a_2b_2 = specific indirect effect through treatment adherence; R^2 = total indirect effect variance accounted for by the model. CI = 95% confidence interval; 10,000 bootstrap samples; health insurance coverage used as a covariate.

* $p < .05$; ** $p < .01$

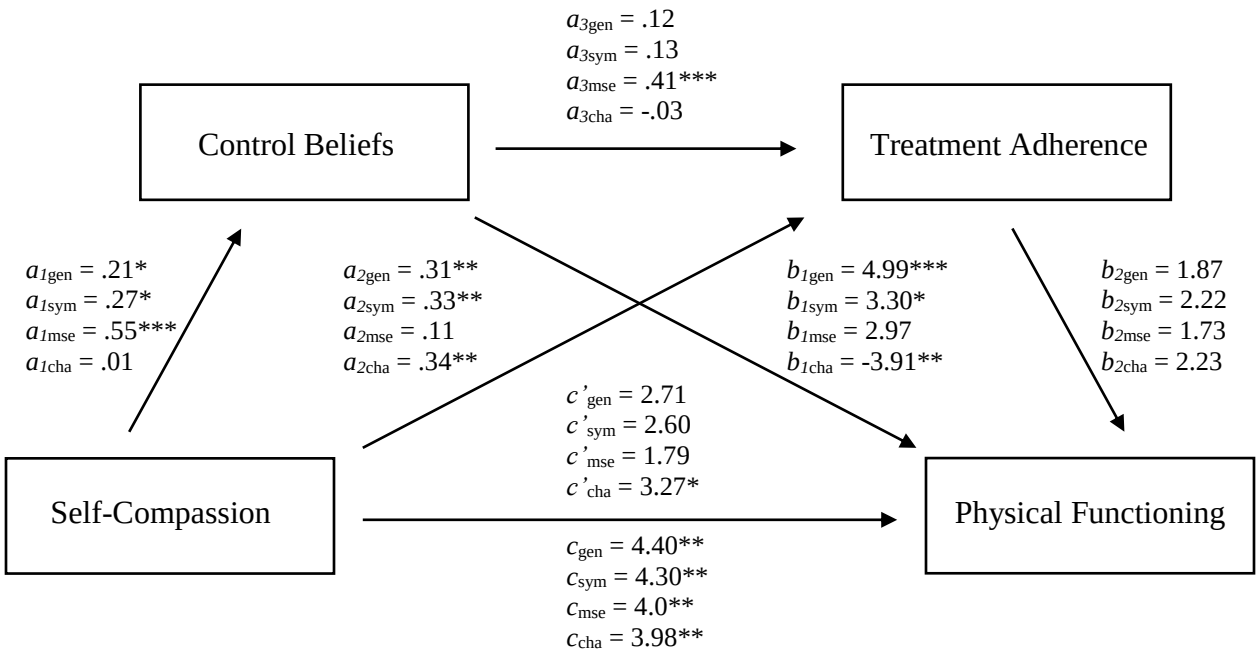

Figure 5. Persons in cancer remission – serial indirect effects model for physical functioning abilities. Serial indirect effects model for self-compassion, control beliefs, treatment adherence, and physical functioning among persons in remission from cancer. a_1b_1 = specific indirect effect (self-compassion related to physical functioning through control beliefs); $a_1a_3b_2$ = specific indirect effect (self-compassion related to physical functioning through control beliefs and treatment adherence); a_2b_2 = specific indirect effect (self-compassion related to physical functioning through treatment adherence); $a_{123}\,b_{12}$ = total indirect effect (self-compassion related to physical functioning via control beliefs and treatment adherence); *c* = total effect (self-compassion related to physical functioning); *c*' = indirect effect (self-compassion related to physical functioning accounting for control beliefs and treatment adherence).
* $p < .05$; ** $p < .01$; *** $p < .001$

Role physical (HRQL-RP). For the general control model, a significant total effect was observed (*c* = 1.71, *SE* = .51, *p* = .001, *95% CI* = .69 to 2.73), and the direct effect of self-compassion on HRQL-RP remained significant when mediators (i.e., general control, treatment adherence) were added to the model (*c'* = 1.4, *SE* = 2.6, *p* = .01, *95% CI* = .34 to 2.47). No specific indirect effects were observed, and approximately 10% of the indirect effect variance was accounted for by the current model (R^2 = .10, *p* = .004). In the symptom control model, the total effect was significant (*c* = 1.7, *SE* = .51, *p* = .001, *95% CI* = .68 to 2.72), and the direct effect was also significant when mediators (i.e., symptom control, treatment adherence) were

added (*c'* = 1.36, *SE* = .55, *p* = .02, *95% CI* = .27 to 2.45). No significant specific indirect effects were observed. Approximately 9% of indirect effect variance was accounted for by our model (R^2 = .09, *p* = .005). Mediation was observed in the mastery control model; there was a significant total effect (*c* = 1.81, *SE* = .50, *p* = .001, *95% CI* = .81 to 2.8), and the direct effect fell out of significance when mediators (i.e., mastery control, treatment adherence) were added to the model (*c'* = 1.1, *SE* = .60, *p* = .07, *95% CI* = -.08 to 2.27). The only significant specific indirect effect was through mastery control (a_1b_1 = .67, *95% CI* = .03 to 1.64). Approximately 11% of indirect effect variance was accounted for by our model (R^2 = .11, *p* = .002). Lastly, in the chance control model, a significant total effect was observed (*c* = 1.8, *SE* = .50, *p* = .001, *95% CI* = .80 to 2.8). The direct effect of self-compassion on HRQL-RP remained significant when mediators (i.e., chance control, treatment adherence) were added to the model (*c'* = 1.68, *SE* = .53, *p* = .002, *95% CI* = .63 to 2.73); thus, no specific indirect pathways were observed. Approximately 11% of the indirect effect variance was accounted for by the current model (R^2 = .11, *p* = .002). See Table 9 and Figure 6.

Table 9

Persons in Cancer Remission – Specific Indirect Effects between Self-compassion and Role – Physical for Serial Mediation Utilizing Control Beliefs and Treatment Adherence

			95% CI	
	Effect	*b*	Lower	Upper
General Control	*ab*	.30	-.08	.83
	a_1b_1	.20	-.002	.63
	$a_1a_3b_2$	.01	-.01	.10
	a_2b_2	.10	-.22	.50
	R^2	.10**		
Symptom Control	*ab*	.34	-.09	.93
	a_1b_1	.19	-.03	.65
	$a_1a_3b_2$	.02	-.01	.13
	a_2b_2	.14	-.19	.59
	R^2	.09**		
Mastery / Efficacy	*ab*	.71	.06	1.55
	a_1b_1	.67	.03	1.64
	$a_1a_3b_2$	.03	-.20	.30
	a_2b_2	.01	-.11	.28
	R^2	.11**		
Chance Control	*ab*	.12	-.23	.54
	a_1b_1	-.01	-.17	.10
	$a_1a_3b_2$	-.0002	-.02	.01
	a_2b_2	.13	-.20	.53
	R^2	.11**		

Note. a and *b* represent unstandardized regression coefficients: a_1 = direct effect of self-compassion on control beliefs; a_2 = direct effect of self-compassion on treatment adherence; a_3 = direct effect of control beliefs on treatment adherence; b_1 = direct effect of control beliefs on role – physical; b_2 = direct effect of treatment adherence on role – physical; *ab* = Total Indirect Effect; a_1b_1 = specific indirect effect through control beliefs; $a_1a_3b_1$ = specific indirect effect through control beliefs and treatment adherence; a_2b_2 = specific indirect effect through treatment adherence; R^2 = total indirect effect variance accounted for by the model. CI = 95% confidence interval; 10,000 bootstrap samples; health insurance coverage used as a covariate.
** $p < .01$

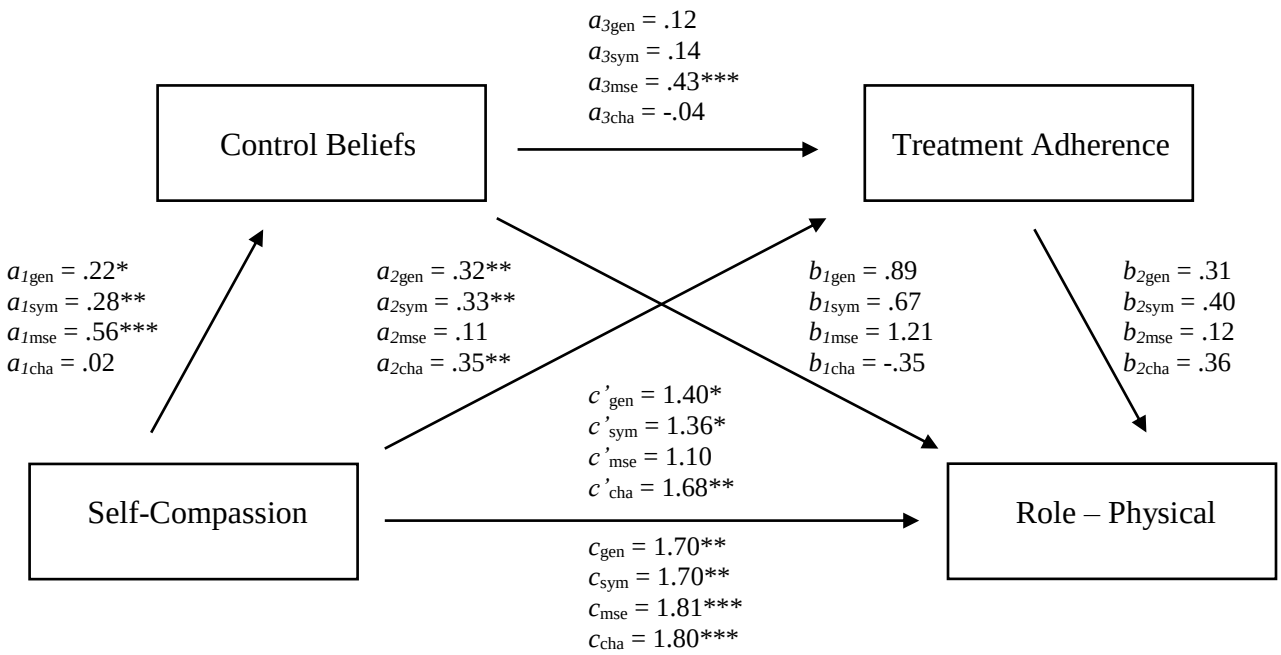

Figure 6. Persons in cancer remission – serial indirect effects model for physical role limitations. Serial indirect effects model for self-compassion, control beliefs, treatment adherence, and role – physical among persons in remission from cancer. a_1b_1 = specific indirect effect (self-compassion related to role – physical through control beliefs); $a_1a_3b_2$ = specific indirect effect (self-compassion related to role – physical through control beliefs and treatment adherence); a_2b_2 = specific indirect effect (self-compassion related to role – physical through treatment adherence); $a_{123}\,b_{12}$ = total indirect effect (self-compassion related to role – physical via control beliefs and treatment adherence); c = total effect (self-compassion related to role – physical); c' = indirect effect (self-compassion related to role – physical accounting for control beliefs and treatment adherence).
* $p < .05$; ** $p < .01$; *** $p < .001$

CHAPTER 4

DISCUSSION

Cancer is a global public health concern that adversely impacts health related quality of life throughout the diagnosis and treatment processes – an effect that often persists even after the remission of cancer. Yet, certain persons, due to individual-level factors such as self-compassion and perceptions of control, may be more likely to engage in adaptive health behaviors, such as treatment adherence, thereby manifesting better physical HRQL. We examined the association between self-compassion and physical HRQL and the mediating roles of perceived control and treatment adherence.

In bivariate analyses conducted in our full sample of persons with both current and remitted cancer, hypotheses were largely supported. Self-compassion was significantly, positively related to internal perceived control (i.e., general, symptom, mastery/health-related self-efficacy), treatment adherence, and physical HRQL (i.e., physical functioning, role-physical), and negatively related to chance control. Additionally, all types of internal control were positively related to treatment adherence and physical HRQL. Chance control, the only external control subscale, was significantly, negatively related to general and symptom control. Additionally, treatment adherence was positively associated with our physical functioning measure, and both physical HRQL subscales were positively associated.

In exploratory examination of bivariate associations across diagnostic subgroups, some differential findings in significance emerged, although variables were consistently related in hypothesized directions. Among persons in cancer remission, general and symptom control were no longer significantly related to treatment adherence or physical HRQL measures. Among persons with a current cancer diagnosis, health insurance coverage was no longer significantly

related to any other study variable. Further, the association between self-compassion and treatment adherence and physical HRQL fell out of significance; internal control beliefs were no longer related to chance control or physical HRQL; and, treatment adherence lacked a significant relation to physical HRQL.

In multivariate analyses, there was mixed support for our hypotheses. In our full sample, comprised of both persons with an active diagnosis and persons in cancer remission, some hypotheses were supported. For the association between self-compassion and HRQL related to physical functioning (HRQL-PF), significant indirect effects were observed through general and symptom control and, in a model utilizing the chance control subscale, a specific indirect pathway was observed through treatment adherence. When examining the relation between self-compassion and role limitations resulting from poor physical health (HRQL-RP), significant indirect effects were observed for the internal control subscales of general, symptom, and mastery/efficacy control. Overall, no serial mediation effects were observed in our full sample of persons with either a current or remitted cancer diagnosis.

We also examined our hypotheses across separate diagnostic categories, those with a current self-reported diagnosis of cancer, and those in self-reported remission from cancer. In a set of analyses using only persons reporting a current cancer diagnosis, no specific indirect effects or serial mediation was observed, contrary to hypotheses. In analyses using persons in remission from cancer, hypotheses were partially supported. In the relation between self-compassion and physical functioning, significant specific indirect effects were observed for general and symptom control, and for the outcome of role limitations due to physical health, the only significant specific indirect effect was for mastery/efficacy. Again, serial mediation was not observed.

Overall, our results suggest that self-compassion has a positive association with physical HRQL, perhaps due to its influence on perceptions of control over health and illness. Yet, as in our findings, self-compassion may not always be related to behavioral changes, such as treatment adherence, or overt improvements in functional and role limitations, warranting critical exploration of the ability of self-compassion to effect change in the context of symptoms, impairment and illness. In that regard, we found differential outcome patterns across diagnostic groups, suggesting that the positive relations between self-compassion, health behaviors, and physical functioning may be limited.

In the following sections, we discuss our findings in greater detail, including exploration of bivariate and multivariate results, and consider potential explanations for emergent patterns of indirect effects and a lack of significant serial mediation effects, as they occur across our cancer-active and cancer-remitted groups.

Bivariate Associations of Study Variables

In our total sample of persons living with a current cancer diagnosis or cancer remission, bivariate hypotheses were largely supported. Our findings contribute to the extant literature in this area, documenting associations between self-compassion, control beliefs, treatment adherence, and physical HRQL in the context of chronic illness (Barnard & Curry, 2011; Gillanders et al., 2015; Neff, 2003).

Total Cancer Sample

In our study, using the total sample, self-compassion was positively correlated to internal perceived control, treatment adherence, and physical HRQL. To the extent one can acknowledge the common humanity of illness, engage in mindfulness, and direct kindness toward the self, they may also experience perceived control over their health, thereby facilitating a higher

probability of adherence to treatment recommendations and perceptions of positive physical HRQL (Dimatteo et al., 1992; Cheville et al., 2015; Kidd et al., 2009; Kurtz et al., 2008). To begin, in previous research, a sense of connectedness, including to others who have battled cancer, is associated with greater perceived control over illness, and this may be due to the acquisition of new health information and suggestions for symptom management, thereby contributing to greater self-efficacy and sense of control over cancer (Adams, Mosher, Winger, Abonour, & Kroenke, 2018). Across chronic illness samples, including fibromyalgia, arthritis, and breast cancer, sense of control and empowerment has been linked to active involvement in treatment (e.g., asking questions, seeking new medications; van Uden-Kraan, Drossaert, Taal, Sevdel, & van de Laar, 2008) and better ratings of physical HRQL (Beckjord et al., 2009; Kurtz et al., 2008). Similar patterns were observed in our current study, which utilized a mixed sample of persons living with a variety of cancer subtypes and disease states, including those with a current diagnosis or remitted cancer.

Another subcomponent of self-compassion, the practice and process of mindfulness, may also be related to perceived control and better physical HRQL. For instance, some mindfulness activities involve training in exertion of physiological control over body systems (e.g., tensing and relaxation of muscles), with deliberate awareness of and attention to changes in cognitions, feelings, and sensations (Germer & Neff, 2013; Hardison & Roll, 2016). Such activities may allow individuals to learn some control over physiological symptoms, and previous studies indicate a beneficial relation between mindfulness and cancer-related symptoms (e.g., pain) and subjective ratings of physical health status (Matchin & Armer, 2007). Other mindfulness exercises encourage non-judgmental awareness of thoughts, feelings, and behaviors (Germer & Neff, 2013); in the context of cancer, this may help to decrease negative attitudes about

diagnosis, treatment, or prognosis, as it does during the experience of other chronic illnesses (Sirois, Molnar, & Hirsch, 2015). Altering cognitive-emotional processing in this manner may promote a sense of readiness and motivation to combat their diagnosis, rather than becoming overwhelmed by negative aspects of the illness experience (L'Estrange et al., 2016).

Being kind to the self, through positive self-talk and affirmations (e.g., "I will beat cancer"; "I am strong enough to complete treatment"), is the final component of self-compassion, and is associated with greater acceptance of positive and negative aspects of the illness experience as well as enhanced perceptions of internal control (L'Estrange et al., 2016). In turn, self-kindness may promote self-caring behaviors (e.g., healthy eating; attending chemotherapy sessions) and a belief in personal ability to succeed (Barnard & Curry, 2011; Neff, 2003), with beneficial implications for overall health and well-being.

Furthermore, to the extent that one is unable to develop a self-compassionate attitude and, thus, fail to foster a sense of internal control, the belief that disease prognosis and health outcomes are determined by luck or random environmental events may arise. This premise is supported by the negative correlation between self-compassion and chance control beliefs in our study; that is, less self-compassion is related to stronger belief in fate and less feelings of personal control. In the absence of a sense of common humanity, individuals may feel alone in their suffering and may lack the benefits (e.g., emotional and instrumental support) associated with social connectedness (Wells et al., 2014). With a loss of sense of personal control, persons with cancer may lose confidence in treatment and recovery, and may choose to leave their health to fate or chance rather than actively engaging in treatment. Such conciliatory approaches toward illness and treatment are related to worse perceptions of physical health status and lower likelihood of successful cancer treatment (Adams et al., 2018).

Other deficits in self-compassion may also be harmful; for example, in the absence of common humanity, or the perceived connectedness to others, it may be difficult to engage in illness-contextual mindfulness. When individuals feel alone in their suffering, they may experience "tunnel vision," focusing solely on negative thoughts (e.g., worries of death) and emotions (e.g., frustration about physical limitations; Barnard & Curry, 2011). This "downward spiral" of thoughts and emotions can be characterized by a perceived loss of control and difficulty processing negative emotions and, when such processes occur, adaptive health behaviors, such as treatment adherence, may be less likely to manifest (Atkins & Fallowfield, 2006; Terry & Leary, 2011), resulting in poorer health (Norton et al., 2005).

In addition to potential difficulties enacting mindfulness throughout the illness experience, persons with disease may also tend to engage in negative self-talk, such as criticism for illness-related functional limitations or self-blame for the diagnosis (Barnard & Curry, 2011). In response to perceived shortcomings and past failures (e.g., "I deserve this diagnosis because I did not go to the doctor on a regular basis"), self-efficacy may dwindle and patients may adopt a passive or adversarial approach to coping and treatment, including emergence of a perceived external locus of control (e.g., fate). Such changes in beliefs may manifest as self-punishment, for example, with resulting deliberate nonadherence to a provider's recommendations, and with negative implications for HRQL and disease outcomes (Atkins & Fallowfield, 2006; Malcarane, Compas, Epping-Jordan, & Howell, 1995). As with many chronic illnesses, a person may, indeed, be partially responsible for the development of cancer, due to poor self-care and maladaptive health behaviors in the past, and this tendency to be neglectful of one's health is in sharp opposition to the idea of self-kindness (Norton et al., 2005). Overall, our findings suggest

that persons who struggle to be self-compassionate during the illness experience, may also be more likely to hold external control beliefs and experience worse physical HRQL.

Our findings also extend evidence for examining types of perceived control as independent, yet associated, constructs (De Valck & Vinck, 1996; Wallston, 2001). Subscales representing an internal locus of control, including general, symptom, and mastery/efficacy control, were all significantly, positively related, and were all negatively related to chance control, which represents a form of external perceived control. Such results support a long history of research in this area and suggest that internal control can be focused on an array of health-related factors, including specific symptoms, HRQL and ability to successfully engage in health behaviors (Wallston, 1992), as well as causal attributions for diagnosis, treatment and related side effects, and perceived risk of cancer recurrence (Link, Robbins, Mancuso, & Charlson,2004). As such, our study helps to clarify the linkages between internal control, health-related cognitions, and health behaviors, particularly because differential findings were observed across subgroups of cancer patients and survivors.

As well, existing literature indicates greater adaptability and associated health benefits of internal control relative to external control, as supported by our current findings; that is, chance control was negatively related to other study variables including internal control, self-compassion. and physical HRQL. Previously, an internal locus of control has been associated with illness prevention and management, enhanced physical well-being, adaptation to stressful life events (e.g., medical diagnoses), and less psychological distress (Kurtz et al., 2008; Wallston, 1992). On the other hand, external control is related to a greater number of mental health problems, a helpless attitude toward illness management, disengagement from healthy

behaviors, and worse physical HRQL (Kidd et al., 2009; Norton et al., 2005; O'Hea et al., 2005; Ranchor et al., 2010).

Finally, regarding the role of health insurance coverage, patterns of findings were largely consistent with existing literature. To the extent individuals reported having access to health insurance, they were more likely to report the presence of individual-level resiliency traits, including self-compassion and internal control beliefs, as well as higher rates of treatment adherence and better physical HRQL. In the context of disease, health insurance may foster perceptions of control, because individuals with insurance have greater access to the resources necessary to follow through with treatment recommendations (e.g., surgery; medications; Theofilou & Panagiotaki, 2012; Wallston, 2001). As well, having health insurance is associated with fewer self-reported chronic health conditions and better HRQL (Lasser, Himmelstein, & Woolhandler, 2006), consistent with our bivariate correlations. Yet, many potential correlates of health insurance were nonsignificant in our study and it may be that other related factors, unexamined in the present study, such as the amount of coverage (e.g., copays; deductibles) or type of insurance (e.g., public; private), exert a stronger influence on control beliefs, engagement in health behaviors, or quality of life (MacIntosh & Blades, 2001).

Correlations in Subgroups of Participants

Cancer remission. In our bivariate results for persons with remitted cancer, a noteworthy change was that general and symptom control were no longer significantly related to treatment adherence or physical role limitations. For cancer survivors, perceptions of control or a need for treatment adherence may be less relevant due, in part, to a reduction in severity, or complete absence, of illness symptoms following achievement of remission, with positive implications for fulfillment of daily roles and responsibilities. In support of this assertion, among colorectal

cancer survivors (N = 227), rates of endorsement for illness symptoms (e.g., pain) and functional difficulties (e.g., walking), as well as perceptions of general HRQL, were comparable to those obtained in the general population (Ramsey et al., 2002).

In the absence of symptoms or impairments, there may be less requirement or perceived need to exert control over disease via adherence to treatment-focused regimens. Even if symptoms persist, they may not be severe enough to significantly alter perceptions of health status; for instance, among head and neck cancer survivors, scores for general HRQL remained consistent with population norms, despite reports of continued chronic pain in bodily regions affected by cancer (Hammerlid & Taft, 2001). Thus, as evidenced by our failure to find significant associations between perceived internal control and health behaviors and outcomes, in our remitted sample, it may be that, as symptoms of and distress about active cancer dissipate, so does the magnitude and impact of internal control. This may also be the result of normal disease progression. As an example, in a sample of cancer patients assessed one year post-diagnosis, respondents reported lower scores for internal control beliefs than immediately following diagnosis (Ranchor et al., 2010), which the authors suggested may be due to limited opportunities to exert control (e.g., unsuccessful treatment; achievement of remission) and a simultaneous tendency to focus on non-disease aspects of life, such as the cultivation of social relationships.

Yet, there may also be an alternative understanding of our lack of findings, recognizing that not all cancer survivors report a symptom-free life following achievement of cancer remission. Some individuals may experience late effects of cancer treatment (e.g., urinary or bowel dysfunction) or unavoidable side effects of maintenance therapy (e.g., nausea) during cancer remission, as well as the threat of cancer recurrence, which have the potential to erode

perceptions of control over health and disease (Clark & Talcott, 2006). Furthermore, cancer survivors often attribute disengagement from household activities (e.g., cleaning) and social roles (e.g., employment) to the late effects of their cancer and treatment experience (e.g., pain, fatigue; Crist, 2013), indicating a persistent and broad lack of perceived control over health.

Another consideration is that - even in the context of perceived control and overcoming one's cancer diagnosis - it is common for former cancer patients to resume engagement in pre-diagnosis unhealthy behaviors, such as smoking, alcohol consumption, and lack of a well-balanced diet (Beesley, Eakin, Janda, & Battistutta, 2008). Survivors may credit themselves for achieving cancer remission (e.g., full treatment adherence) while failing to recognize the extent to which their personal health behaviors exert an influence on late effects of cancer and its treatment, risk for cancer recurrence, or overall health status; that is, as a survivor, perceptions of control over illness may not manifest uniformly to other areas of health functioning. Lack of a significant association between control beliefs and physical HRQL may also be due to external factors that influence subjective ratings of health status, such as the well-established association between length of survivorship and positive physical HRQL (Ramsey, Berry, Moinpour, Giedzinski, & Andersen, 2002).

Thus, in the context of cancer remission, where a degree of uncontrollability regarding potential cancer recurrence often persists, the absence of significant associations between control beliefs, treatment adherence, and role limitations may require a multi-faceted explanation. For some individuals, the remission period following cancer may be characterized by relatively few illness-related symptoms or impairments, requiring less need to implement internal control beliefs as motivation toward treatment adherence and, perhaps, making perceptions of positive physical HRQL less dependent on a sense of control. For other cancer survivors, persistence of

symptoms and late effects of cancer treatment may erode perceptions of control (e.g., helplessness), or discourage continued efforts to maintain control (e.g., hopelessness), over illness and health via engagement in proactive health behaviors (Stein et al., 2008). Furthermore, individuals in cancer remission may discount the degree to which they can exert control over potential cancer recurrence (Park & Gaffey, 2007), perhaps leading to engagement in unhealthy lifestyle behaviors rather than following suggested guidelines for post-cancer health (Burris, Jacobsen, Loftus, & Andrykowski, 2013; O'Neill et al., 2013; WHO, 2003). Each of these possibilities may help to explain a weakening of the influence of perceived internal control on health behavior and health-related quality of life outcomes, for persons with remitted cancer.

Current cancer diagnosis. Similarly, in our bivariate results for persons living with a current cancer diagnosis, internal perceived control was not significantly associated with treatment adherence or physical HRQL. This pattern of results has occurred in previous research; for example, among advanced cancer patients, perceptions of internal control were unrelated to physical well-being (Brown et al., 2017). It may be that cancer patients, despite belief in their ability to control health or illness, and regardless of engagement in health behaviors, concurrently experience poor physical HRQL (Norton et al., 2005), thus weakening the association between variables. Cancer is unique relative to many other chronic illnesses, in that it is often viewed as an "uncontrollable disease" and, consequently, perceptions of external control may be more pervasive in the cancer population, with negative implications for HRQL (Carver et al., 2000; Ranchor et al., 2010). Yet another possibility is that persons living with cancer have contradictory beliefs of control; for instance, they may perceive an ability to successfully engage in treatment while lacking beliefs of control over disease prognosis or death (Volker & Wu, 2011).

We also found that self-compassion was not significantly associated with treatment adherence or physical HRQL in our respondents with cancer, highlighting potential limitations of self-compassion as a resiliency trait. A simple explanation might be that, for persons currently experiencing cancer symptoms, instances of suffering (e.g., illness symptoms; functional impairments) are more salient than for those in remission, thus limiting the degree to which self-compassion can beneficially contribute to engagement in proactive health behaviors or positive ratings of health (Gillanders et al., 2015). Additionally, even well-meaning engagement in some of the elements of self-compassion may have unintended negative effects; for example, some persons with cancer may seek common humanity via participation in online chronic illness support groups, which can lack oversight by trained medical professionals and, as such, may result in the receipt of inaccurate medical information or treatment advice that can deleteriously impact quality of life (White & Dorman, 2001). Finally, as in our subsample of persons in cancer remission, there are many factors known to influence subjective ratings of health status. For cancer patients, it may be that stage of disease or type of treatment (e.g., first compared to third round of chemotherapy) differentially impacts perceptions of health status (Chean, Zang, Lim, & Zulkefle, 2016) or, perhaps, weakens the beneficial effects of self-compassion.

Despite the numerous nonsignificant correlations in our study, the association between self-compassion and internal control beliefs remained significant across both of our subgroups and our total sample. Thus, self-compassion does appear to have a consistently adaptive role in the context of cancer, given its relation to greater perceptions of internal control over health and illness, regardless of cancer status.

Taken together, our bivariate hypotheses regarding associations between study variables were largely supported and consistent with previous research conducted with similar constructs

and measures. Beyond these basic linkages, multiple regression analyses are needed to provide greater knowledge of the associations and interactions between constructs. In the following section, we discuss our serial mediation findings, and the interrelations between self-compassion, control beliefs, treatment adherence, and physical HRQL, with recognition and consideration of how these variables function, perhaps differentially, among persons with a past or present cancer diagnosis.

Serial Mediation Associations in Persons with Current and Remitted Cancer

In serial mediation models, conducted in our full sample of both those living with a current diagnosis of cancer and those in remission, greater self-compassion was associated with better physical HRQL. This positive association is consistent with existing research indicating a linkage between self-compassion, physical symptoms (e.g., headaches) and quality of life, in both community (Dunne et al., 2016, Terry et al., 2013) and clinical samples (Wren et al., 2012). We extend these findings, however, by examining these associations across the cancer disease process (i.e., remitted versus current symptoms), which is marked by perceptions of limited controllability such as the unpredictability of disease progression, treatment effectiveness, and recurrence.

As well, perceived control emerged as a possible pathway through which self-compassion exerts an influence on HRQL; there was a significant specific indirect effect through some types of perceived internal locus of control, in five of the eight serial mediation models. Broadly, our finding converges with previous research demonstrating an association between perceived control over illness and HRQL, including in persons living with Celiac disease (Dowd & Jung, 2017) and a diverse sample of persons living with pulmonary disease, psoriasis, or rheumatoid arthritis (Scharloo et al., 1998), although it has not been previously investigated as a mechanism

of action for self-compassion. In the sections below, we discuss these main findings; that is, the relation between self-compassion and health-related quality of life, and the role of perceived control in this association.

Self-Compassion and Health-Related Quality of Life

To begin, as noted throughout our manuscript, and as indicated by our findings, there is robust support for the positive association of self-compassion and physical HRQL, including within the context of chronic illness. For instance, among obese patients living with musculoskeletal pain, self-compassion was associated with less pain catastrophizing and disability, which was attributed to taking a mindful and accepting attitude toward day-to-day limitations and emotional experiences (e.g., anxiety) related to disability (Wren et al., 2012). Additional research highlights the importance of mindfulness; for example, among breast cancer patients, participation in a mindfulness-based stress reduction program was associated with higher energy levels, feeling "strong," and perceptions of better physical health (Bisseling, Schellekens, Jansen, van Laarhoven, Prins, & Speckens, 2017). Similarly, in a sample of breast and prostate cancer patients, engagement in routine mindfulness meditation was associated with fewer cardiopulmonary and gastrointestinal symptoms, sleep improvements, and better overall quality of life (Matchim & Armer, 2007), which the authors suggest may be due to the ameliorative effect of mindfulness on physiological (e.g., high blood pressure) and psychological stress (e.g., worry, loss of perceived control). Thus, associations between self-compassion and health outcomes, including HRQL, are well-supported by existing literature, and we observed similar patterns in both of our sub-samples, of persons living with active or remitted cancer.

Effects of Control Beliefs

As suggested by our findings, engagement in self-compassion may be an underlying motivational factor in the development of a perceived ability to exert control over health and illness symptoms, with associated health behavior and quality of life changes. In our study, specific indirect effects were observed through general control, symptom control, and mastery/efficacy. Although we are the first to investigate the role of control beliefs in the context of self-compassion, there is a well-established linkage between perceived control and health outcomes in the literature that must be acknowledged, including among those with cancer. For instance, in ovarian cancer patients (N = 143), lower perceived internal control was associated with higher impairment, including restrictions in physical functioning and an inability to engage in usual activities of daily living (Norton et al., 2005). In a sample of breast cancer patients (N = 219), perceived control over illness symptoms was associated with lower scores on the physical subscale of the Cancer Rehabilitation Evaluation System – Short Form, indicating fewer difficulties related to activities such as engagement in recreation or employment (Beckjord et al., 2009). The positive effects of mastery/self-efficacy are also evident in a study of middle-aged females living with late stage cancer (N = 214); mastery was predictive of lower severity of fatigue and pain, perhaps due to engagement in proactive health behaviors rather than denial or behavioral disengagement (Kurtz et al., 2008).

Our findings suggest that, to the extent one can draw upon self-compassion and its subcomponents, they may experience greater perceived control over illness or health, and better subjective health status ratings. Further, our results align with and expand upon Julian Rotter's social learning theory, which states that cognitive appraisals of situations (e.g., degree of controllability, self-blame) play a role in behaviors (e.g., treatment adherence), and that

experienced outcomes (e.g., better physical functioning, fewer illness symptoms) shape expectancies about the effectiveness of similar behaviors in the future (De Valack & Vinck, 1996; Scharloo et al., 1998; Wallston, 1992). Self-compassion may be another important factor to consider within this theory.

Beginning with the component of self-kindness, among persons who receive a cancer diagnosis, there may also be a tendency to blame the self for past health-related actions (e.g., smoking, not going to the doctor) or to self-criticize for current functional limitations (e.g., impaired walking) or illness-related changes (e.g., spread of cancer; Terry & Leary, 2011). Self-kindness, as a form of self-soothing, may be associated with positive changes during these times; for example, the process of growth and change may involve acknowledging past wrongdoings and accepting an appropriate degree of personal responsibility, rather than being overly self-critical (Zhang & Chen, 2016).

It is during such times of distress, however, that persons with chronic illness may also seek to regain control over their health, a change of thought and behavior that can be construed as an act of self-kindness and which may unfold in the form of lifestyle changes (e.g., smoking cessation) or compliance to treatment regimens (Terry & Leary, 2011). Indeed, self-compassion has been linked to an intentional process of taking steps to develop and change as a person (i.e., personal growth initiative), which requires possession of relevant skills and knowledge (i.e., perceived competence) as well as the ability to overcome setbacks and failures (i.e., resilient self-appraisals; Barnard & Curry, 2011). In our study, self-compassion appears to have similar downstream effects, as it is beneficially associated with feelings of mastery and control over symptoms and health and, in turn, a willingness to engage in proactive health behaviors,

including adherence to treatment recommendations, consistent with observed patterns in community-based research studies (Sirois et al., 2015).

For other individuals, self-kindness may serve a different purpose, by helping to assuage the numerous worries and fears about the future that can emerge during and after the cancer experience, including the possibility of permanent impairments in functioning, cancer recurrence, and death (Burman & Weinert, 2007). Positive self-talk (e.g., "I beat cancer, so I can deal with these side effects too"; "I'm lucky this was detected early") and self-affirmations (e.g., "staying alive for my family is important") may ameliorate negative thoughts about current or future health status (Creswell et al., 2007). As well, among those who remind themselves of the value and importance of good health and staying alive, theory suggests they will also display stronger intentions and desire to exert control over health and engage in proactive health behaviors that align with their personal values (Harris & Epton, 2009).

Yet another consideration is the role of self-kindness among persons for whom death is imminent. Although we did not assess this directly, persons with terminal cancer may hold regrets about personal behaviors (e.g., lack of accomplishments, poor self-care) or the status of current relationships (e.g., loss of connection with friends). For these persons, self-kindness may offset feelings such feelings of shame or guilt, and may motivate attempts to address such issues; this may also unfold in the form of compliance to a provider's recommendations to enhance physical HRQL or longevity of life (Tancredi et al., 2017), so as to increase resources (e.g., time, energy) to address pertinent end-of-life issues (e.g., reparation of relations, achievement of goals; Steinhauser et al., 2000). In sum, self-kindness may be related to perceived control and may influence health perceptions and behaviors, in a variety of ways.

Mindfulness, the second component of self-compassion, may encourage a reappraisal of one's circumstances and health (e.g., "I am fortunate to have limited treatment side effects") and a desire to maintain or enhance health and current levels of functioning which, ultimately, necessitates some degree of control or sense of personal responsibility (L'Estrange et al., 2016; Neff et al., 2007). As but one example, cancer patients' participation in mindfulness-based group therapy was associated with greater acceptance of negative inner experiences (e.g., dysfunctional attitudes regarding illness; Mehdipour, Rafiepoor, & Alizadeh, 2017) and, as such, may reduce the impact of negative automatic thoughts, allowing patients to experience greater illness-related self-efficacy and motivation to overcome current symptoms and functional limitations. Consistent with this assertion, the positive implications of psychological flexibility were also demonstrated in a study of prostate cancer patients (Chambers et al., 2016), in which the mindfulness facets of awareness, non-judgment, and non-reactivity were predictive of better HRQL, a change due, perhaps, to a shift away from stoicism or rumination about illness and impairment toward adaptive health-focused perspectives (e.g., "family and friends will help me overcome this disease") and behaviors (e.g., exercise regardless of pain).

Furthermore, awareness and acceptance of the inevitability of some illness symptoms and functional limitations may be associated with adaptive cognitive schemas and beliefs regarding one's ability to challenge or overcome a life characterized by suffering (Hamilton, Kitzman, & Guyotte, 2006). Among cancer patients, for instance, a willingness to live with chronic pain was associated with lower risk for catastrophic thoughts (e.g., "I cannot do anything for myself because of the pain"; Gauthier et al., 2009). In another study, of persons with chronic pain, a common symptom of cancer, participation in mindfulness activities was predictive of greater self-efficacy for continued and successful activity engagement, regardless of pain severity

(Turner et al. 2016). Finally, in cancer patients, participation in a meditation and yoga program was associated with a beneficial shift in illness-related cognitions and attitudes; individuals reported greater compassion toward the self, more gratitude for life, and stronger beliefs of self-control over illness (Carlson, 2013). Taken together, existing research suggests that mindfulness may contribute to shifts in perspective about current or future illness experiences, including perceptions of control, with implications for health behaviors and quality of life.

Common humanity, the third element of self-compassion, involves development of a sense of connectedness with others (e.g., to others with or who have survived cancer) and may be especially important given that loneliness is a common presenting concern among persons living with cancer; they report feeling "different" from others due to their cancer and often experience unsupportive or critical interactions with others (Adams, Mosher, Winger, Abonour, & Kroenke, 2018). Specifically, patients report dismissal of their feelings or refusal to talk about the diagnosis, and a pressure to always be a "cancer hero," holding back difficult or unpleasant details of their illness (e.g., treatment side effects; Ussher, Kirsten, Butow, & Sandoval, 2006). As well, cancer patients who report loneliness are more likely to experience low self-efficacy for symptom management and a greater number of illness symptoms (Adams et al., 2018).

However, to the extent persons with cancer can find and relate to others with similar life experiences, they may perceive greater control over their illness and better HRQL. As but one example, in an online support group for persons living with breast cancer, fibromyalgia, or arthritis (van Uden-Kraan et al., 2008), group members provided one another with health-related information, emotional support, and assurance of not being "crazy" regarding illness-related thoughts and symptoms. In turn, participants reported greater perceived control over their future, were more accepting of their cancer diagnosis and current symptoms and had an enhanced sense

of self-efficacy related to treatment (e.g., making decisions, inquiring about alternative options) and health management (e.g., asking doctor questions, seeking information). Taken together, existing literature and the current study indicate that one or more of the self-compassion elements may be pertinent to beliefs of control among persons in the cancer population.

Role of Treatment Adherence

Despite providing evidence for potential pathways of influence from self-compassion to perceptions of personal control and health, our results also illustrate potential barriers to the influence of self-compassion; that is, a self-compassionate attitude does not necessarily translate into a sense of control over illness or symptoms and does not automatically generate motivation or ability to engage in treatment recommendations. More explicitly, using our full sample, a specific indirect effect through treatment adherence was observed in only one of eight models and no serial mediation effects were significant, suggesting that self-compassion may not result in overt changes to treatment adherence. This could be because there are translational barriers to the effects of self-compassion, but it is also likely that persons with cancer are already adhering to treatment to a maximal degree; thus, the effects of self-compassion may be more impactful on psychosocial than behavioral outcomes, in this context.

Despite a lack of statistically significant serial mediation across models, and the identification of only one specific indirect effect through treatment adherence (i.e., model assessing chance control and HRQL-PF), individual linkages between study variables were often significant, including the association between self-compassion and perceived control and treatment adherence. Such associations have been previously demonstrated in the disease groups of diabetes (O'Hea et al., 2005), heart disease, and HIV (Salmoirago-Blotcher & Carey, 2017). Similar results have been obtained in a qualitative study of cancer patients (Wells et al., 2014);

connectedness to other persons living with a past or current cancer diagnosis (i.e., common humanity) was associated with better well-being, including fewer negative reactions to diagnosis (e.g., self-blame) and treatment, and the acquisition of control-enhancing health advice that improved perceptions of ability to successfully cope with and overcome illness.

As well, to the extent that individuals in our study reported greater overall adherence to their provider's recommendations, they also noted better physical functioning and ability to complete daily roles and activities, consistent with other cancer-related research (DiBonaventura et al., 2014; Inoue-Choi et al., 2013; Song et al., 2015). Yet, in our serial models, treatment adherence was not a linkage in the pathway between self-compassion and HRQL, nor the pathway between self-compassion, perceived control and HRQL. This lack of findings may reflect the numerous factors known to deleteriously influence treatment adherence, many of which were not examined in the present study, such as the time since diagnosis, complexity of treatment regimens, patient perspectives of treatment (e.g., risk benefit analysis), and psychopathology (Bender et al., 2014; Patridge et al., 2002).

Another consideration is the differing experiences and expectations of treatment for persons with a current diagnosis versus those in remission from cancer, with the former group typically undergoing complex medical procedures (e.g., surgeries) or treatment regimens (e.g., chemotherapy) and the latter making behavioral or lifestyle changes (e.g., regular exercise) to minimize long-lasting treatment effects and risk of recurrence (ACS, 2017; WHO, 2003). As a result, ability and motivation to adhere to treatment recommendations, as well as self-compassion and perceived control, may function differently relative to cancer status. To determine such differences, we examined these same serial models within our sub-sample groups of persons with active cancer and remitted cancer, which we discuss in the following sections.

Serial Mediation Associations in Persons with Active Cancer Diagnosis

In our sub-sample of persons with a current cancer diagnosis, our hypotheses were not supported. Across all models, no significant specific indirect or serial mediation effects were observed, though a few of the individual pathways between study variables were significant. Specifically, there was a significant positive association between self-compassion and mastery (on the a^1 pathway), as well as significant positive associations (on the a^3 pathway) between internal control beliefs (i.e., general control; mastery) and treatment adherence. Lack of significant findings at the multivariate level may be due, in part, to nonsignificant bivariate associations in this subgroup of participants, but there are likely other factors to consider in the interpretation of our results. We discuss our pattern of findings in the sections below, to contribute to an understanding of how, and under what circumstances, individual level characteristics (e.g., self-compassion, control beliefs) and proactive health behaviors (e.g., treatment adherence) are positively associated with physical HRQL in the context of cancer.

Self-Compassion and Health-Related Quality of Life

Contrary to our hypothesis, self-compassion was not significantly associated with self-reported physical HRQL among persons living with a current cancer diagnosis. Our findings may be understood within the context of self-compassion theory, which suggests that self-compassion is more salient in times of distress and suffering (e.g., physical or mental), helping to foster resiliency and protecting against perceived loneliness, overidentification with negative thoughts and feelings, and self-judgment and criticism (Germer & Neff, 2013; Reyes, 2012). Although it is unfortunate, some form of suffering must occur before self-compassion is enacted and, at times, the suffering may outweigh the benefits of self-compassion. In support of this assertion, among cancer patients in Scotland, greater engagement in each of the self-compassion elements

was associated with worse physical HRQL, including greater severity of illness symptoms (e.g., nausea) and poorer functional well-being (e.g., employment, recreational activities; Gillanders et al, 2015).

Another factor to consider is that concerns about disease, illness symptoms and treatment-related side effects may disrupt any beneficial effects of self-compassion, being, perhaps, too severe and overwhelming for any form of self-soothing to be effective in promoting role engagement. For example, it may be difficult to engage in self-kindness in the context of cancer. Characterological self-blame (i.e., "I got cancer because of who I am") tends to be difficult to change because it is an internal, global, and stable attribution, and is also esteem-based (Label et al., 2013). As well, behavioral self-blame (e.g., I got cancer because of what I did") may be a challenge to overcome, as not all behaviors are modifiable, reversible, or even controllable (Malcarane, Compas, Epping-Jordan, & Howell, 1995).

More pragmatically, symptoms and side-effects (e.g., pain; fatigue) may hinder one's ability to attend in-person cancer support groups (e.g., to be able to benefit from common humanity) or engage in mindfulness activities that include a physical component (e.g., progressive muscle relaxation), perhaps due to pain (Bisseling et al., 2017). Similar translational difficulties may be experienced for other components of self-compassion; for example, development of a sense of common humanity may sometimes be counterproductive, perhaps resulting in lower perceptions of HRQL. In one study, with a Dutch online cancer support group, some participants reported disempowerment and a loss of perceived control over illness due to the presence of complaining group members and direct confrontation with negative side effects of the disease (e.g., death of group members; van Uden-Kraan et al., 2008).

Such examples suggest that self-compassion, even when present, may not be a panacea, and that stressors and disease-related experiences, including the often-accompanying emotional distress, may preclude application or utilization of self-compassion, or may dampen or negate its beneficial effects. As our findings highlight, these types of implementation barriers may have downstream effects on cognitive-behavioral functioning, including perceptions of control and treatment adherence, and, ultimately, health-related quality of life.

Effects of Control Beliefs

Additionally, no specific indirect effects were observed for the association of self-compassion and physical HRQL through control beliefs, in contrast to previous research and our hypotheses. For persons with cancer, this may suggest that a perceived sense of internal control over health is not a necessary or sufficient condition for positive perceptions of health. However, the benefits of internal control for health in persons with cancer has been previously documented and, in our current study, is reflected by significant associations (a^3 pathway) for the relations between subtypes of control beliefs (i.e., general control; mastery) and treatment adherence. For example, in colorectal cancer patients, an internal locus of control has been linked to physical HRQL via assumption of an active role in the management of treatment-related side effects, such as re-dressing surgical wounds, and making judgments about the need to use pain medications (Kidd et al., 2009).

Despite the observed effects of perceived control on HRQL, limitations may exist in the degree to which a sense of control translates into significantly better physical HRQL among those living with current cancer. Some extant literature corresponds with our non-significant findings; for instance, in a study of advanced cancer patients (N = 100), internal control was not significantly associated with physical or mental well-being scores on the Functional Assessment

of Cancer Therapy – General (FACT – G; Brown et al., 2017). Furthermore, one may hold internal beliefs of control and *simultaneously* experience poor physical HRQL. In a study of ovarian cancer patients (N = 143), higher scores on the Cancer Rehabilitation Evaluation System – Functional Status subscale, indicative of greater perceived impairment, were associated with low perceived control (Norton et al., 2005); thus, it may be that one's sense of control or mastery is eroded by a physical inability to complete tasks or engage in daily activities.

Other previous research has focused on the linkage between external locus of control (e.g., fate; belief in God) and physical HRQL. In a sample of patients with advanced cancer (N = 20), for instance, persons who reported belief in God as a source of control had, on the one hand, high rates of adherence to appointments and lab testing, yet reported that current illness symptoms (e.g., pain) and the timing of their death were outside of their immediate control (Volker & Wu, 2011). It may be that persons with a current cancer diagnosis receive mixed messages or have contradictory experiences that weaken the oft-found linkage between control beliefs and physical HRQL, as in our study. Furthermore, although a greater sense of internal control, and low levels of chance control, may increase the probability of experiencing better physical HRQL, there may also be other factors that impact the association between perceptions of control and health, such as disease (e.g., comorbidities) or treatment characteristics (e.g., regimen complexity; Bender et al., 2014; Denois et al., 2011); however, this information was not available for analysis in our current study. Despite these considerations regarding our lack of significant findings, perceived control often appears to have some benefit in the context of chronic illness, yet it is not a sole determinant of physical HRQL in cancer.

Role of Treatment Adherence

Inconsistent with our hypotheses, across all models, treatment adherence did not emerge as a significant indirect pathway for the relation between self-compassion and physical HRQL, nor was there a significant association between treatment adherence and physical HRQL. Although past research suggests that following medical recommendations and actively engaging in treatment regimens may increase likelihood of recovery and achievement of cancer remission, such adherence does not necessarily result in significantly better subjective reports of physical HRQL at any given moment, given the rigor and discomfort of cancer treatment. In one study, for instance, women with early-stage breast cancer (*N*=91) who were engaged in endocrine therapy, also reported impairments in physical functioning associated with a wide array of treatment-related symptoms including cognitive difficulties (e.g., forgetfulness), pain, weight changes, and gynecological symptoms (Bender et al., 2014).

Yet, despite our lack of significant findings, the extant literature largely suggests that positive health outcomes may be experienced to the extent one can adhere to a provider's recommendations (Patterson et al., 2003). For instance, in lung cancer patients, engaging in low-impact walking and balance exercises was associated with less fatigue, better fatigue management, and improved mental and physical health-related quality of life, as assessed by the PCS and MCS of the SF-36 (Hoffman, Brintnall, Given, von Eye, Jones, & Brown, 2017).

In sum, our findings suggest that, among persons with a current cancer diagnosis, self-compassion is positively associated with physical HRQL, although the exact mechanisms through which self-compassion translate to better self-rated health remain uncertain, given the lack of serial mediation and significant specific indirect effects via control beliefs and treatment adherence. Furthermore, a self-compassionate attitude does not guarantee adherence to treatment

recommendations or significant changes in perceptions of health status. Yet, our results may not be representative of *all* subgroups of cancer patients and may vary relative to the types of constructs assessed or models proposed; therefore, future research utilizing alternative modeling and cancer-specific measures, and with persons with homogenous diagnoses (e.g., only one type of cancer, for instance), is needed to substantiate our findings. Thus, despite these differential patterns of association, therapeutic promotion of study variables may still have clinical value for some persons with cancer. In future research, it will be important to assess the potentially protective effects of our study variables as they manifest during the transition across stages of the illness experience, as self-compassion, control beliefs and treatment adherence may have differential psychological value and health benefits at different points in the illness trajectory. In the current study, we address this possibility, to some extent, by examining our hypotheses in the context of cancer remission, which we discuss below.

Serial Mediation Associations Among Persons in Cancer Remission

In our subgroup of persons who self-reported being in cancer remission, our hypotheses were partially supported. Consistent with previous literature, our findings demonstrate a positive association between self-compassion and physical HRQL, and we extend this relation to persons living in remission from cancer (Dowd & Jung, 2017; Dunne et al., 2016; Wren et al., 2012). As well, our results lend support for perceived control as a possible mechanism of action linking self-compassion and physical HRQL, as there was a significant specific indirect effect through perceived control (i.e., general, symptoms, mastery/self-efficacy) in three of eight serial mediation models. No specific indirect effects were observed through treatment adherence, and no serial mediation effects were found. Our findings suggest, therefore, that for persons in cancer remission, self-compassion is associated with better physical HRQL due, in part, to its positive

association with perceived sense of control over health. In the following sections, we examine this pattern of results and the interrelations between self-compassion, control beliefs, treatment adherence, and physical HRQL among persons in remission from cancer.

Self-Compassion and Health-Related Quality of Life

Beginning with the basic association of self-compassion and physical HRQL, we found a significant, positive relation between these variables across all serial mediation models. Cancer survivors may benefit from drawing upon one or more elements of self-compassion in the months and years following successful achievement of cancer remission, to provide self-soothing for what can often be an arduous recovery and healing process; in turn, this ability to be kind to the self may increase likelihood of better HRQL. Our findings support previous research suggesting that self-compassion, and its individual components, can be helpful during the post-operative, post-treatment and remission stages of cancer. For example, in a study of female breast cancer survivors (N = 152), participating in a self-compassion writing exercise was associated with greater acceptance of, and less negative affect about, treatment-related bodily changes (e.g., mastectomy, weight changes). This compassion-based writing paradigm also promoted mindfulness; survivors reported greater likelihood of looking at themselves in the mirror and accepting their appearance, rather than engaging in harsh personal judgment (e.g., "I am ugly"), suggesting that self-compassion may help to restore emotional balance in the aftermath of cancer (Przezdziecki & Sherman, 2016).

Other research has also focused on mindfulness and the extent to which it allows one to overcome physical symptoms and impairment or adjust to post-treatment bodily changes. For instance, in a study of the effects of participation in either a mindfulness meditation program (e.g., body scans, breath awareness, forgiveness meditation) or a mind-body bridging program,

which involved helping cancer survivors understand how thought patterns (e.g., rumination) are linked to various bodily states (e.g., muscle tension, fatigue), participants in both groups reported better sleep quality, and the authors posited that such a change may be predictive of other markers of HRQL, such as improved physical functioning (Nakamura, Lipschitz, Kuhn, Kinney, & Donaldson, 2013). Similar effects were found in a study of breast cancer survivors who participated in either dance/movement therapy or a mindful movement program (Crane-Okada et al., 2012); participants reported fewer self-judgments or worries about their appearance and improvements in physical, psychological, social, and spiritual well-being.

Establishing a sense of common humanity may also be important for persons recovering from chronic illness, including those in cancer remission. For example, in a qualitative study of persons with a history of breast cancer, participants reported numerous positive aspects of membership in a survivors' network (Rosedale, 2009), including connectedness with others based on shared physical reminders of their cancer diagnosis, such as visible scars, chronic fatigue, and hot flashes. Group members also expressed satisfaction at not having to maintain a "heroic survivor narrative," which is often expected among family and friends, and requires concealment of ongoing symptoms and fears and a quick return to pre-diagnosis levels of functioning. To the extent that a cancer survivor can understand the common humanity of their recovery process, including interacting with others with cancer, and receiving tangible or emotional support, they may be more likely to experience better HRQL.

Our current results suggest that cancer survivors may benefit from self-compassion, with translational impact on HRQL. Through engagement in mindfulness-based activities, cancer survivors may develop a more accepting attitude toward long-lasting illness or treatment-related symptoms, and through self-kindness may be less self-critical in the face of those changes. As

well, development of a sense of common humanity, acknowledging the shared experience of illness, may be valuable in the adjustment process, lessening the perceived impact of disease after achievement of a cancer-free status. Although self-compassion tends to be most salient in difficult times, our results lend support for its continued importance and benefits after a pinnacle point of distress, that being one's initial cancer diagnosis and the treatment process.

Effects of Control Beliefs

In our subsample of persons in remission from cancer, we examined perceptions of internal and external control over illness and health as potential mediators of the association between self-compassion and HRQL. In models containing HRQL-PF as an outcome variable, specific indirect effects were observed through general and symptom control, and for HRQL-RP, a specific indirect effect was observed in the mastery model. As discussed in the previous sections, these linkages can manifest in a variety of ways; however, the process or meaning of these associations may be somewhat different for those with active compared to remitted cancer.

As we have noted, to the extent that cancer survivors can recognize the common humanity aspect of their illness experience, they may also believe in their ability to exert control over their recovery and maintenance of good health functioning. For example, among persons in a survivors' network, a sense of connectedness to others allowed participants to openly share their experiences of symptom burden (e.g., fatigue) and provided social support, during their attempts to regain control of health and in overcoming social pressures to "get back to normal" following cancer remission (Rosedale, 2009). These linkages between common humanity, perceived control and HRQL can be conceptualized within the context of Fredrickson's broaden-and-build model (2004), which suggests that, through both independent and social engagement in emotionally-rewarding activities, a sense of empowerment and additional positive emotions will

arise, which can be drawn upon in times of hardship, thus allowing for resiliency, growth, and longevity (Fredrickson, 2004). Across chronic illness samples (e.g., HIV, cardiovascular disease), engagement in social activities or emotional disclosure was predictive of higher levels of humor, gratitude, and optimism, as well as better immune system functioning, less risk for cardiovascular problems and hospital readmission, and lower mortality rates (Tugade, Fredrickson, & Barrett, 2004). During the difficult process of survivorship, a sense of common humanity may help to promote such positive emotionality and, in turn, can strengthen interpersonal resources, motivation and adaptive skills. As an example, in a study of cancer survivors' participation in a Trail to Recovery (CTR) program, which involved group hikes twice weekly, individuals reported greater likelihood of "choosing to respond for the future" and perceived capability of taking control of their health (Harmon, 2018), which they attributed to their connectedness with others in the support group and a normalization of the illness experience. In this same study, survivors also attributed changes in perspective to their immersion in natural and transcendent environments; separation from stressors of the "real world" or "real life" helped to restrict negative thoughts (e.g., "I have no control over my health") and encouraged attentiveness to the here-and-now of the hiking experience, somewhat like mindfulness, although this was not explicitly assessed.

Additional research supports this association between engagement in emotionally rewarding activities, mindfulness, and perceived control; for example, breast cancer survivors' participation in an adventure-based activity (e.g., dragon boat racing) was associated with numerous positive outcomes including establishment of a common bond to other women (i.e., common humanity), regaining a sense of control and embracing life, and a tendency to live in the moment rather than thinking about the past or future (Ray & Jakubec, 2014). Furthermore, the

process of engaging in mindfulness activities may, itself, be an exertion of control, whether it is a physiological (e.g., progressive muscle relaxation) or cognitive (e.g., letting go of judgmental thoughts) action. Upon completion of mindfulness-based exercises, individuals may have "evidence" of their ability to control some aspects of mind-body functioning, increasing probability of positive perceptions of health and quality of life (Nakamura et al., 2013). Thus, in general, our study and previous research suggest that, to the extent cancer survivors are able to engage in mindfulness, they may also experience enhanced perceptions of control that function as an inner resource and guide future health behaviors and outcomes.

Finally, in the context of remission from illness, self-kindness may also play a role in the development and maintenance of an enhanced sense of control. For example, if a cancer diagnosis is attributable to personal health behaviors (e.g., smoking), an individual may experience punitive and recriminating feelings toward the self; however, engaging in self-kindness may allow transcendence of these feelings, providing motivation to assert control over future health-related actions, such as regular exercise or nutritious eating, with positive implications for HRQL (Neff, 2003; Neff et al., 2007). Consistent with this idea of enhanced motivation, in a study of five diverse medical samples, including persons with a past or present cancer diagnosis, dispositional self-compassion was associated with higher rates of treatment adherence (Sirois & Hirsch, 2018).

Despite evidence for several linkages between self-compassion, control and HRQL, it must be acknowledged that perceived control did not emerge as a significant specific indirect pathway across all proposed serial mediation models, suggesting that, as we have previously noted, self-compassion may not always be associated with higher perceptions of control and HRQL. This may be due, in part, to the persistence of physiological and psychological symptoms

even during periods of remission; for example, in a study of prostate cancer survivors (N = 235), although participants reported their cancer to be "controlled" or resolved, they simultaneously reported the persistence of urinary, bowel, and sexual dysfunction (Clark & Talcott, 2006). By its very nature, cancer has some degree of unpredictability and uncontrollability, such that one can never predict with certainty, nor control, whether cancer will recur, thus increasing perceptions of vulnerability and decreasing perceptions of physical HRQL among persons in remission (Barak et al., 2008).

Role of Treatment Adherence

Contrary to our hypotheses, and despite well-established health correlates, self-compassion was not serially related, via control and treatment adherence, to physical HRQL, and no specific indirect effects were observed through treatment adherence. Broadly, our lack of findings may reflect the difficulty of engaging in the process of change and treatment, and the propensity for individuals to continue to engage in maladaptive health behaviors despite recommendations from a healthcare provider. Treatment adherence may also be less relevant or applicable to persons in cancer remission compared to those with an active diagnosis.

Upon achievement of cancer remission, general lifestyle changes and proactive health behaviors are recommended, including, but not limited to, consumption of a balanced diet, regular exercise, smoking cessation, minimal alcohol consumption, yearly physicals, and routine cancer check-ups (WHO, 2003). These recommendations can be thought of as the "treatment" component of cancer remission; yet, despite such recommendations, existing literature suggests low rates of positive health behaviors and poor physical HRQL, in persons in remission from cancer. In a sample of cancer survivors (N = 775), only 15% met the recommendation of five daily servings of vegetables and 32% - 38% reported regular physical activity, with additional

concerns about subgroups of participants, including 71% of endometrial cancer survivors being overweight or obese, and current smoking behaviors reported by 21% of cervical cancer survivors (Beesley et al., 2008); importantly, those who adhered to the suggested guidelines were most likely to experience better HRQL.

As well, other factors may interfere with one's ability to adhere to lifestyle recommendations, thereby increasing risk for poor HRQL. In a study of cancer survivors (N = 16), assessing a broader range of late effects (e.g., neuropathy, chronic pain, respiratory problems), an association existed between lingering illness symptoms, physical functioning, and role limitations, with a particularly noteworthy deterioration in the domain of employment (Crist, 2013). Persistence of symptoms has also been demonstrated among breast cancer survivors, with symptoms such as pain, fatigue, and loss of upper extremity movement interfering with employment, participation in recreational activities, and childcare responsibilities (Binkley et al., 2012).

Despite such results, it is not the case that all persons living with a cancer history, or a history of illness, always report low rates of adherence or poor physical HRQL. For instance, in a study of long-term cancer survivors compared to a control group, there were no significant group differences in rates of engagement in proactive health behaviors (e.g., smoking, physical activity, diet), suggesting some equivalency of health behaviors between persons in remission from cancer and the population at large (Bishop et al., 2010). Finally, perceptions of good physical HRQL have been identified among persons in remission from cancer; for example, in a sample of colorectal cancer survivors (N = 227), 47% of participants rated their general health as "very good" or "excellent," with longer survivorship associated with HRQL ratings consistent with

persons in the general population without a history of serious medical illness (Ramsey et al., 2002).

Overall, and taken together, our findings and the existing literature suggest a relation between intrapersonal processes (e.g., self-compassion, control beliefs), treatment adherence, and health status among persons in cancer remission. Our study contributes to an enhanced understanding of the relations between these constructs, and highlights self-compassion as a potential predictive factor for these and other beneficial health outcomes in persons remitted from cancer, and as a factor that can be targeted therapeutically.

Clinical Implications

Our findings may have clinical implications. To begin, therapeutically promoting one or more elements of self-compassion may have positive effects on physical well-being and quality of life for persons with a past or present cancer diagnosis. Indeed, as we discuss below, within community-based and chronic illness samples, including persons with cancer, compassion-based interventions have demonstrated effectiveness in increasing perceived control over health and higher subjective ratings of health status, as well as greater engagement in proactive health behaviors.

Given the well-established positive relation between mindfulness and HRQL in clinical samples, including the cancer population, one suggested intervention is Mindfulness-Based Stress Reduction (MBSR), which involves participation in a variety of mindfulness activities (e.g., gentle yoga, walking meditation), psychoeducation about stress symptoms and the mind-body connection, and use of relaxation strategies to modify maladaptive stress responses (Birnie, Speca, & Carlson, 2010). In a sample of breast cancer survivors, MBSR was associated with improvements in physical and emotional HRQL (measured by SF-12v2), with maintenance of

gains at a six-month follow-up (Lengacher et al., 2009). Such approaches are predicated on the assertion that, by adaptively altering the way one physically or cognitively responds to the illness experience, subjective perceptions of health may also be improved.

More focused on compassion than mindfulness, and often a component of other interventions, loving-kindness meditation has also been utilized as a stand-alone technique for the promotion of self-compassion. This approach involves recalling a feeling of connection to a loved one, remaining focused on feelings of love and kindness in the present moment, and use of silent mental phrases (e.g., "may you be healthy and strong"; "may I be happy") to direct positive feelings toward the self and other person (Kirby, 2017). Among individuals living with chronic back pain, engagement in loving-kindness meditation was associated with a reduction in same-day pain severity and negative affect (e.g., anger; Carson et al., 2005), and such changes in perceptions of symptoms and HRQL may extend to the cancer population, given the frequency and severity of pain experienced by many persons during treatment and remission phases of illness (Adams et al., 2018; Bender et al., 2014).

Other strategies for the promotion of self-compassion tend to integrate traditional elements of cognitive and behavioral therapies. For instance, in a sample of cancer patients, Mindfulness-Based Cognitive Therapy (MBCT) was associated with less psychopathology (e.g., depression) and stress, and improvements in quality of life, as measured by scores on the FACT–G, with proposed mechanisms of change being awareness of negative thinking and ability to disengage from illness-related rumination (Foley, Baillie, Huxter, Price, & Sinclair, 2010). Another example is Cognitively Based Compassion Training (CBCT), which has several components, including: non-judgmental awareness of thoughts, bodily states, and environmental surroundings; developing a realization of how mental states contribute to well-being;

perspective-taking and realization of the shared human experience of a desire for happiness and freedom from suffering; and, fostering appreciation and gratitude for social interconnections (Kirby, 2017). Across samples of breast cancer survivors, CBCT has been associated with increases in compassion and kindness toward the self and others (Gonzalez-Hernandez et al., 2018), as well as less cognitive avoidance, enhanced present-moment awareness and processing, and improvements on the SF-12v2 subscales of vitality/fatigue and physical functioning (Dodds et al., 2015).

Yet another potential therapeutic direction is Acceptance and Commitment Therapy (ACT; Luoma, Hayes, Walser, 2017), a derivative of CBT that involves fostering psychological flexibility, encouraging participation in mindfulness activities, and helping individuals to clarify their personal values and act accordingly. Through participation in ACT, individuals may experience gains in self-compassion, develop an adaptive sense of perceived control over health, and may draw connections between engagement in proactive health behaviors (e.g., treatment adherence) and personal values (e.g., family). In a theory driven, hypothetical application to a cancer patient, defusion exercises were used to overcome critical self-talk (e.g., "I am at fault for this diagnosis because I did not go to the doctor") that had become a self-fulfilling prophecy, and mindfulness exercises helped to overcome rumination about past wrongful actions (e.g., smoking) and instead focus on the present moment (Angiola & Bowen, 2013). Regarding health outcomes, previous research demonstrates the benefits of ACT, including less psychosocial disability among persons in chronic pain (Buhrman et al., 2013) and quality of life improvements in cancer patients (Feros, Lane, Ciarrochi, & Blackledge, 2013).

Another specific aspect of self-compassion, common humanity, has an important role in the experience of, and recovery from, chronic illness. More broadly, the availability of support

systems, including family, friends and others experiencing or recovering from illness, has numerous benefits. Among breast cancer patients, the size of one's network and level of closeness within those relationships was associated with greater perceived instrumental and emotional support, with positive implications for physical and mental well-being (Bloom, Stewart, Johnston, Banks, & Fobair, 2001). As well, despite a lack of significant improvements in quality of life, head and neck cancer patients reported high levels of comfort and satisfaction associated with having other persons with whom they could discuss illness-related fears and concerns (Mowry & Wang, 2011); this process of realization may be conceptualized as the development of a sense of common humanity, and may promote beneficial downstream cognitive-emotional changes such as greater perceptions of control over health.

Of note, therapeutic interventions to improve perceptions of control over health, adherence to treatment and HRQL, are also important targets when working with persons with chronic illness. As one example, greater perceived control over illness symptoms was fostered, in a sample of breast cancer patients, through a nurse-led intervention that included several components: a five-minute video of survivors talking about self-care behaviors for the management of treatment side effects, receipt of a "Self-Care Behaviors" booklet, and five one-on-one in-person counseling sessions within the medical setting (Lev et al., 2001). In another study, of patients in an oncology clinic, the personal qualities of the physician, including empathy and attentiveness, were predictive of greater perceived control and self-efficacy (Zachariae et al., 2003). Thus, by enhancing a provider's interpersonal communication skills (e.g., good eye contact, validation) and encouraging a patient-centered focus among oncologists, beliefs of control may be altered among persons in the cancer population.

Furthermore, self-efficacy interventions may increase one's perceived control and personal ability to engage in proactive health behaviors. Among a community sample with unhealthy eating habits, participation in a combined self-efficacy and planning intervention was associated with increased consumption of fruits and vegetables at six-months post-intervention (Luszczynska, Tryburcy, & Schwarzer, 2007); such beneficial effects may also be applicable to the cancer population. For example, among cancer patients, deliberate instruction and supervised participation in physical activities (e.g., group sports, aerobic bicycles) was related to enhanced self-efficacy for engaging in regular physical activity and to improvements in physical role limitations, physical functioning, and vitality, as measured by the SF-12v2 (Korstjens et al., 2008). In another study of cancer patients, participation in a meaning-making intervention, guided by Albert Bandura's self-efficacy theory, was associated with significant improvements in self-esteem and self-efficacy, despite ongoing chemotherapy (Lee, Cohen, Edgar, Laizner, & Gagnon, 2006). This intervention utilized a narrative, story-telling approach that addressed past life events and coping strategies, current emotional and cognitive responses to one's diagnosis, and life goals, despite the possibility of mortality, and participation was associated with greater perceived control over the management of illness symptoms and treatment. Finally, in another nurse-led educational intervention, conducted in hospital oncology wards, participants received in-person counseling on pharmacological (e.g., medication regimens), non-pharmacological (e.g., relaxation), and post-discharge (e.g., prescriber of medication) pain management (Jahn et al., 2014), and reported better pain management than a control group at one-month post-discharge. Thus, our findings, and previous research, suggest that interventions oriented toward development of self-efficacy may be particularly helpful for enhancing perceived control over health behaviors, including treatment adherence, and the overall illness experience.

In fact, additional techniques may be used to directly address treatment adherence among cancer patients and survivors, and general guidelines have been proposed to inform the development of adherence-promoting interventions (McNicholl, 2008). For patients, strategies include: patient education tailored to one's literacy level; information on dosing, side effects, and food requirements; involvement of patient, friends, and family members in the treatment process; and, simplification of the regimen. Clinic-based and health care team strategies to improve adherence may include: establishment of a trusting relationship with the patient; communication between clinic visits; timely responses to adverse events or illnesses; medication counseling; and, continuous monitoring of adherence.

Several interventions guided by these recommendations have demonstrated effectiveness in the cancer population. In a randomized controlled trial (RCT) of standard chemotherapy education compared to a tailored intervention group (e.g., chemotherapy education, follow-up phone calls during treatment; needs assessment), adherence rates were higher for the intervention group (self-report: 95.1%; pharmacy records: 73.7%) than the control group (self-report: 82.4%; pharmacy records: 68.8%) at a four-month follow-up (Schneider, Adams, & Gosselin, 2014).

Other research highlights technology as a useful way of increasing treatment adherence. In one study (Spoelstra et al., 2016), participants were assigned to either a control group (N = 26), which involved written instructions and information about chemotherapy (e.g., side effects, dosage timing), or an intervention group (N = 49) that involved receipt of text messages (e.g., "It's time to take your [medication]. Doing so is an important step in managing your cancer. Reply `Taken` when you've taken it."). Across an eight-week timespan, recipients of the intervention consistently reported fewer and less-severe illness and treatment-related symptoms, and less interference with daily activities of living. At the study's conclusion, 86.7% of

intervention participants reported adherence compared to 79.2% in the control group, lending support for text messaging as one viable option for increasing rates of compliance among cancer patients and survivors.

Whether technology-based or delivered as traditional educational/counseling interventions, existing evidence suggests that it is possible to foster greater self-compassion, beliefs of control, and treatment adherence among persons with a chronic medical condition. Although continuing psycho-oncological research is needed, our findings and review of the literature suggest that cancer patients and survivors can benefit from such interventions, with salutogenic implications for HRQL. Given the country's rapid growth in the number of cancer survivors, as well as the lack of a known cure for cancer, our results and associated clinical implications may hold value at all stages of the illness experience, beginning with the initial diagnosis, during treatment, and in the years following achievement of cancer remission.

Limitations and Future Directions for Research

Our study is not without limitations. First, there may be limited generalizability of our findings due to sample characteristics. Most participants were female and White, and existing literature suggests there may be differences in the lived experiences of individuals based on sex and racial or ethnic identity, such as one's ability to draw upon the self-compassion elements (e.g., higher self-criticism in females and minority groups) or the influence of religious beliefs (e.g., fatalism in African American community; ACS, 2016; CDC, 2016b; O'Hea et al., 2005; Yarnell et al., 2015).

Additionally, our sample was comprised, primarily, of persons in remission from cancer, rather than persons with a current diagnosis, and our subgroup analyses (e.g., active versus remitted cancer) revealed differential findings, suggesting the existence of group differences.

However, such differences are supported by the extant literature on self-compassion (Neff, 2003), perceived control and HRQL (Ramsey et al., 2002; Richardson, Morton, & Broadbent, 2016). Furthermore, our constructs of interest may manifest differently across disease populations, potentially yielding different patterns of results. For instance, among persons living with fibromyalgia, stigma regarding etiology may pose barriers to engaging in self-compassion or achievement of perceived control (Kool, van Middendorp, Roeije, & Geenen, 2009), and the waxing and waning of symptoms (e.g., pain, fatigue) may contribute to lack of perceived control and changes in HRQL (Arnold et al., 2008).

Next, our use of cross-sectional data precludes the examination of causality, and bi-directionality of variables is a possibility. As but one example, poor health functioning, including physical impairments, may contribute to a perceived loss of control among cancer patients and survivors, with symptoms or functional limitations viewed as "evidence" of loss of control over health (Norton et al., 2005). Future studies, using diverse samples, including other illness groups, and employing alternative research designs, are needed to substantiate our findings, and to clarify the manifestations of, and interrelations between, our study variables

A third limitation is our use of self-report measures, with their potential for various types of respondent bias. Social desirability is one consideration; for instance, respondents may have overreported treatment adherence, to avoid embarrassment or shame associated with noncompliance (Stirratt et al., 2015). Medical professionals and individuals in the cancer population may also have different standards of what it means to be "adherent" (Horne et al., 2005). Given the subjectivity of self-report measures, it is also difficult to know what unassessed factors (e.g., personal values, specific symptoms) influenced ratings of physical HRQL across participants (Cella & Stone, 2015; Wilson & Clearly, 1995). Yet another consideration is that

online administration of self-report measures does not permit clarification or explanation in cases of participant confusion, and the extent to which participants understood the meaning of questions or response options remains unknown (Demetriou, Ozer, & Essau, 2015).

Future research, replicating our serial mediation models, could use alternative forms of measurement for study variables. Biomarkers (e.g., heart rate) may be used as measures of the effectiveness of self-compassion interventions and therapies, providing an indication of reductions in negative emotional states (e.g., stress, anxiety) and increases in positive affect (e.g., happiness; Sirois & Rowse, 2016). Alternative measures of treatment adherence may also be desirable, such as physiological indicators (e.g., blood draws), a review of pharmacy or medical records, and even proxy reports from health care providers and family members (Atkins & Fallowfield, 2006; Martin et al., 2005). Focus groups or in-person interviews at cancer treatment centers or survivorship support groups would also be desirable in order to gather additional details from participants regarding their illness experiences. At present, some researchers have taken this approach (O'Hea et al., 2005; Ussher et al., 2006; van Uden-Kraan et al., 2008) to their study design, albeit none have examined all of the present study's variables within a single context or integrated qualitative and quantitative data for all of these variables within the cancer population specifically.

Yet another limitation is our exclusive focus on physical HRQL and lack of significant findings across many analyses. Limited examination of constructs may have contributed to our null findings, especially given the prevalence of mental health problems (e.g., anxiety, depression) experienced by those with cancer and the extent to which psychopathology influences illness perspectives and health behaviors (Magai et al., 2007; Theofilou & Panagiotaki, 2012). In future research, it will be important to include measures of both mental

(e.g., emotional distress) and physical (e.g., illness symptoms, role limitations) HRQL, and to assess their interrelations, to provide clarification on the cognitive-emotional and mind-body functioning of persons enduring the experience of cancer.

Other disease (e.g., co-morbidities, recurrent diagnosis) or treatment characteristics (e.g., complexity, cost), which were not assessed in the present study, may have also influenced patterns of results, especially among those living with a current diagnosis (Bender et al., 2014; Denois et al., 2011; Dimatteo et al., 1992; Patridge et al., 2002). Future research would benefit from advanced assessment of disease and treatment histories, to guide hypotheses; for example, classifying patients into alternative diagnostic categories (e.g., first diagnosis compared to recurrent cancer) may yield novel clinical insights about the effects of our study variables as they occur within different manifestations of the disease. Use of qualitative techniques, such as open-ended questions and in-person interviews, could also be utilized, to gain a subjective and patient-centered reporting of factors influencing engagement in treatment and successful control and coping with illness.

Furthermore, both the significant and nonsignificant findings of our study should be interpreted with caution, due to our small sample size and the possibility of low statistical power to detect effects. Bootstrapping, which is a resampling strategy, was utilized to account for this potential limitation (Preacher & Hayes, 2008). In future research, utilization of alternative software programs (e.g., R Studio) or advanced sample size planning analyses (e.g., Monte Carlo simulation) can help to insure recruitment of a sample large enough to obtain adequate statistical power (Anderson, Kelley, & Maxwell, 2017).

Another area to be targeted in future research, is the development of self-compassion interventions tailored specifically for persons in the cancer population, with acknowledgement of

their unique experiences (e.g., self-blame for diagnosis) and the difficulties they may encounter while engaging in traditional mindfulness activities, such as pain interference in progressive muscle relaxation or psychological avoidance of cancer sites during body scan exercises (Foley et al., 2010). At present, very few existing self-compassion interventions have been tested among persons in the cancer population (Kirby, 2017); however, given our findings, and those from previous studies, indicating a beneficial relation between self-compassion and HRQL, additional clinical research is warranted.

As well, we could find no intervention studies which examined the enhancement of self-efficacy and perceived control as a means of altering rates of adherence to specific WHO (2003) guidelines for the cancer population. By developing interventions which align with these recommendations, it may be possible to overcome some of the current barriers to treatment adherence among persons in the cancer population (Denois et al., 2011; Patridge et al., 2002; Puts et al., 2014; Theofilou & Panagiotaki, 2012), with implications for physical HRQL.

Despite such limitations and the need for continued scientific exploration, our study represents an important first step toward an enhanced understanding of the associations between self-compassion, control beliefs, treatment adherence, and HRQL in a vulnerable sample. With advancements in patient-centered research as predictors of health outcomes, and a growing body of evidence regarding the therapeutic promotion of resiliency traits, researchers and clinicians may be able to address the uncertainty and fears associated with cancer, thereby promoting better subjective health throughout the illness experience.

Conclusion

Our findings illustrate the positive direct effects of self-compassion on physical HRQL among persons living with a past or present cancer diagnosis. As well, our study lends support to

the role of control beliefs as a mediator of this association, and highlights the importance of treatment adherence for health status in the cancer population.

In our overall sample, including those with a current diagnosis and remitted cancer, perceived illness/health control emerged as a significant mediator of the relation between self-compassion and physical HRQL. In our subsamples, a similar pattern of results was obtained for persons with remitted cancer, but no mediating effects were found for persons with a current cancer diagnosis. This pattern of differential findings across diagnostic groups draws attention to the circumstantial nature and impact of individual-level resiliency characteristics on health functioning and quality of life. Disease status may influence the degree to which one can draw upon self-compassion elements or a sense of control, with consequences for engagement in health behaviors and perceptions of health.

Yet, with the exception of one model (out of 24), treatment adherence did not emerge as a significant mediator of the relation between self-compassion and physical HRQL but, at the bivariate level, was positively associated with self-compassion, control beliefs, and perceptions of health. Our findings suggest that, while treatment adherence is important for health, other factors likely play a role in the linkage between self-compassion and HRQL. Given that the trajectory of cancer is often tenuous, adherence to a healthcare provider's recommendations does not guarantee perceptions of good health status and, therefore, there is a need to identify additional psychosocial or treatment-related factors that can be leveraged to improve patient-centered health ratings.

Finally, the absence of any significant serial mediation models highlights the need for additional research on the association of self-compassion, control beliefs, treatment adherence, and physical HRQL in the cancer population. In the future, research with diverse samples and

prospective, longitudinal research designs, is necessary, and which includes multi-method assessment approaches (e.g., interview-based, biomarkers) of a wider array of potential contributing factors, including psychopathology and characteristics of one's disease and treatment.

Nonetheless, our study is an important first step toward understanding the mechanisms involved in the linkage of self-compassion and physical HRQL in a vulnerable, medical population. Additionally, our findings can begin to inform clinical work with cancer patients and survivors, as they indicate, broadly, that subjective health may benefit from interventions which foster a sense of self-compassion, perceptions of control over illness, and motivation to adhere to the recommendations of healthcare providers.

REFERENCES

Abu-Bader, S.H. (2011). Canonical correlation analysis. *Advanced and multivariate statistical methods for social science research with a complete SPSS guide* (pp. 318-356). Chicago, IL: Lyceum Books, Inc.

Adams, C.E., & Leary, M.R. (2007). Promoting self-compassionate attitudes toward eating among restrictive and guilty eaters. *Journal of Social and Clinical Psychology, 26*(10), 1120-1144. doi: 10.1521/jscp.2007.26.10.1120

Adams, R.N., Mosher, C.E., Winger, J.G., Abonour, R., & Kroenke, K. (2018). Cancer-related loneliness mediates the relationships between social constraints and symptoms among cancer patients. *Journal of Behavioral Medicine, 41*(2), 243 – 252. doi: 10.1007/s10865-017-9892-5

Alfano, C.M., Smith, A.W., Irwin, M.L., Bowen, D.J., Sorensen, B., Reeve, B.B., . . . McTiernan, A. (2007). Physical activity, long-term symptoms, and physical health-related quality of life among breast cancer survivors: A prospective analysis. *Journal of Cancer Survivorship, 1*(2), 116-128. doi: 10.1007/s11764-007-0014-1

American Cancer Society (ACS). (2017). Treatment types [Web log post]. Retrieved from https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types.html

American Cancer Society (ACS). (2016). Cancer facts & figures 2016 [Fact sheet]. Retrieved from: https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2016/cancer-facts-and-figures-2016.pdf

American Society of Clinical Oncology (ASCO). (2017). Long term side effects of cancer treatment [Web log post]. Retrieved from: http://www.cancer.net/survivorship/long-term-side-effects-cancer-treatment

Anderson, S.F., Kelley, K., & Maxwell, S.E. (2017). Sample-size planning for more accurate statistical power: A method adjusting sample effect sizes for publication bias and uncertainty. *Psychological Science, 28*(11), 1547 – 1562. https://doi.org/10.1177/0956797617723724

Angiola, J.E., & Bowen, A.M. (2013). Quality of life in cancer: An acceptance and commitment therapy view. *The Counseling Psychologist, 41*(2), 313 – 335. doi: 10.1177/0011000012461955.

Arnold, L.M., Crofford, L.J., Mease, P.J., Burgess, S.M., Palmer, S.C., Abetz, L., & Martin, S.A. (2008). Patient perspectives on the impact of fibromyalgia. *Patient Education and Counseling, 73*(1), 114 – 120. doi: 10.1016/j.pec.2008.06.005.

Atkins, L., & Fallowfield, L.J. (2006). Intentional and non-intentional non-adherence to medication amongst breast cancer patients. *European Journal of Cancer, 42*(14), 2271-2276. doi: 10.1016/j.ejca.2006.03.004.

Barak, A., Boniel-Nissim, M., & Suler, J. (2008). Fostering empowerment in online support groups. *Computers in Human Behavior, 24*(5), 1867 – 1883. doi: 0.1016/j.chb.2008.02.004.

Barnard, L.K., & Curry, J.F. (2011). Self-compassion: Conceptualizations, correlates, & interventions. *Review of General Psychology, 15*(4), 289-303. doi: 10.1037/a0025754289.

Beckjord, E.B., Glinder, J., Langrock, A., & Compas, B.E. (2009). Measuring multiple dimensions of perceived control in women with newly diagnosed breast cancer. *Psychology and Health, 24*(4), 423-438. doi: 10.1080/08870440701832634.

Beesley, V.L., Eakin, E.G., Janda, M., & Battistutta, D. (2008). Gynecological cancer survivors' health behaviors and their associations with quality of life. *Cancer Causes & Control, 19*(7), 775 – 782. doi: 10.1007/sl 0552-008-9 140-y.

Bellizzi, K.M., Rowland, J.H., Jeffery, D.D., & McNeel, T. (2005). Health behaviors of cancer survivors: Examining opportunities for cancer control intervention. *Journal of Clinical Oncology, 23*(34), 8884 – 8893. doi: 10.1200/JCO.2005.02.2343.

Bender, C.M., Gentry, A.L., Brufsky, A.M., Casillo, F.E., Cohen, S.M., Dailey, M.M., . . . Sereika, S.M. (2014). Influence of patient and treatment factors on adherence to adjuvant endocrine therapy in breast cancer. *Oncology Nursing Forum, 41*(3), 274-285. doi: 10.1188/14.ONF.274-285.

Bhandari, N.R., & Payakachat, N. (2016). Reliability and validity of the Medical Outcomes Study Short-Form Health Survey Version 2 (SF-12v2) among adults with self-reported cancer using Medical Expenditures Panel survey (2003-04). *Research in Social and Administrative Pharmacy, 12*(4), e11-e17. http://dx.doi.org/10.1016/j.sapharm.2016.05.029

Binkley, J.M., Harris, S.R., Levangie, P.K., Pearl, M., Guglielmino, J., Kraus, V., & Rowden, D. (2012). Patient perspectives on breast cancer treatment side effects and the prospective surveillance model for physical rehabilitation for women with breast cancer. *Cancer, 118*(8 Suppl.), 2207 – 2216. doi: 10.1002/cncr.27469.

Birnie, K., Speca, M., & Carlson, L.E. (2010). Exploring self-compassion and empathy in the context of mindfulness-based stress reduction (MBSR). *Stress and Health, 26*(5). doi: 10.1002/smi.1305.

Bishop, M.M., Lee, S.J., Beaumont, J.L., Andrykowski, M.A., Rizzo, J.D., Sobocinski, K.A., & Wingard, J.R. (2010). The preventative health behaviors of long-term survivors of cancer and hematopoietic stem cell transplantation compared with matched controls. *Biology of Blood and Marrow Transplantation, 16*(2), 207 – 214. doi: 10.1016/j.bbmt.2009.09.015.

Bisseling, E.M., Schellekens, M.P.J., Jansen, E.T.M., van Laarhoven, H.W.M., Prins, J.B., & Speckens, A.E.M. (2017). Mindfulness-based stress reduction for breast cancer patients: A mixed method study on what patients experience as a suitable stage to participate. *Support Care Cancer, 25*(10), 3067 – 3074. doi: 10.1007/s00520-017-3714-8.

Blanchard, C.M., Courneya, K.S., & Stein, K. (2008). Cancer survivors' adherence to lifestyle behavior recommendations and associations with health-related quality of life: Results from the American Cancer Society's SCS-II. *Journal of Clinical Oncology, 26*(13), 2198-2204. doi: 10.1200/JCO.2007.14.6217.

Bloom, J.R., Stewart, S.L., Johnston, M., Banks, P., & Fobair, P. (2001). Sources of support and the physical and mental well-being of young women with breast cancer. *Social Science & Medicine, 53*(11), 1513 – 1524. https://doi.org/10.1016/S0277-9536(00)00440-8

Bray, F., Ren, J.-S., Masuyer, E., & Ferlay, J. (2013). Global estimates of cancer prevalence for 27 sites in the adult population in 2008. *International Journal of Cancer, 132*, 1133-1145. doi: 10.1002/ijc.27711

Brion, J.M., Leary, M.R., & Drabkin, A.S. (2014). Self-compassion and reactions to serious illness: The case of HIV. *Journal of Health Psychology, 19*(2), 218-229. doi: 10.1177/1359105312467391.

Broadbent, E., Donkin, L., & Stroh, J.C. (2011). Illness and treatment perceptions are associated with adherence to medications, diet, and exercise in diabetic patients. *Diabetes Care, 34*(2), 338-340. doi: 10.2337/dc10-1779

Brown, A.J., Thaker, P.H., Sun, C.C., Urbauer, D.L., Bruera, E., Bodurka, D.C., & Ramondetta, L.M. (2017). Nothing left to chance? The impact of locus of control on physical and mental quality of life in terminal cancer patients. *Support Cancer Care, 25*(6), 1985 – 1991. doi: 10.1007/s00520-017-3605-z.

Buhrman, M., Skoglund, A., Husell, J., Bergström, K., Gordh, T., Hursti, T., . . . Andersson, G. (2013). Guided internet-delivered acceptance and commitment therapy for chronic pain patients: A randomized controlled trial. *Behaviour Research and Therapy, 51*(6), 307 – 315. doi: 10.1016/j.brat.2013.02.010.

Burman, M.E., & Weinert, C. (2007). Rural dwellers' cancer fears and perceptions of cancer treatment. *Public Health Nursing, 14*(5), 272 – 279. https://doi.org/10.1111/j.1525-1446.1997.tb00375.x

Burris, J.L., Jacobsen, P.B., Loftus, L.S., & Andrykowski, M.A. (2013). Breast cancer recurrence risk reduction beliefs in breast cancer survivors: Prevalence and relation to behavior. *Psychooncology, 21*(4), 427 – 435. doi: 10.1002/pon.1925.

Carlson, L.E. (2013). Mindfulness-based cancer recovery: The development of an evidence-based psychosocial oncology intervention. *Oncology Exchange, 12*(2), 21 – 25.

Carson, J.W., Keefe, F.J., Lynch, T.R., Carson, K.M., Goli, V., Fras, A.M., & Thorp, S.R. (2005). Loving-kindness meditation for chronic low back pain. *Journal of Holistic Nursing, 23*(3), 287 – 304. doi: 10.1177/0898010105277651.

Carver, S.C., Harris, S.D., Lehman, J.M., Durel, L.A., Antoni, M.H., Spencer, S.M., & Pozo-Kaderman, C. (2000). How important is the perception of personal control? Studies of early stage breast cancer patients. *Personality and Social Psychology Bulletin, 26*(2), 139-149.

Casida, J., Wu, H.-S., Harden, J., Chern, J., & Carie, A. (2015). Development and initial evaluation of the psychometric properties of self-efficacy and adherence scales for patients with a left ventricular assist device. *Progress in Transplantation, 25*(2), 107-115. http://dx.doi.org/10.7182/pit2015597

Castilho, P., Pinto-Gouveia, J., & Duarte, J. (2015). Evaluating the multifactor structure of the long and short versions of the self-compassion scale in a clinical sample. *Journal of Clinical Psychology, 71*(9), 856-870. doi: 10.1002/jclp.22187.

Cella, D., & Stone, A.A. (2015). Health-related quality of life measurement in oncology. *American Psychologist, 70*(2), 175-185. http://dx.doi.org/10.1037/a0037821

Centers for Disease Control and Prevention [CDC]. (2016a). Cancer among men [Web log post]. Retrieved from https://www.cdc.gov/cancer/dcpc/data/men.htm

Centers for Disease Control and Prevention [CDC]. (2016b). Racial or ethnic variations [Web log post]. Retrieved from https://www.cdc.gov/cancer/dcpc/data/ethnic.htm

Centers for Disease Control and Prevention [CDC]. (2016c). Well-being concepts [Web log post]. Retrieved from https://www.cdc.gov/hrqol/wellbeing.htm#three

Chambers, S.K., Foley, E., Clutton, S., McDowall, R., Occhipinti, S., Berry, M., . . . Smith, D.P. (2016). The role of mindfulness in distress and quality of life for men with advanced prostate cancer. *Quality of Life Research, 25*(12), 3027 – 3035. doi: 10.1007/s11136-016-1341-3.

Cheak-Zamora, N.C., Wyrwich, K.W., & McBride, T.D. (2009). Reliability and validity of the SF-12v2 in the medical expenditure panel survey. *Quality of Life Research, 18,* 727-735. doi: 10.1007/s11136-009-9483-1

Chean, D.C., Zang, W.K., Lim, M., & Zulkefle, N. (2016). Health related quality of life (HRQoL) among breast cancer patients receiving chemotherapy in Hospital Melaka: Single centre experience. *Asian Pacific Journal of Cancer Prevention, 17*(12), 5121 – 5126. doi: 10.22034/APJCP.2016.17.12.5121.

Cheville, A.L., Alberts, S.R., Rummans, T.A., Basford, J.R., Lapid, M.I., Sloan, J.A., . . . Clark, M.M. (2015). Improving adherence to cancer treatment by addressing quality of life in patients with advanced gastrointestinal cancers. *Journal of Pain and Symptom Management, 50*(3), 321-327. doi: 10.1016/j.jpainsymman.2015.03.005.

Chisholm-Burns, M.A., Erickson, S.R., Spivey, C.A., Gruessner, R.W.G., & Kaplan, B. (2011). Concurrent validity of kidney transplant questionnaire in U.S. renal transplant recipients. *Patient Preference and Adherence, 5,* 517-522. doi: 10.2147/PPA.S24261

Christensen, A.J., Moran, P.J., Ehlers, S.L., Raichle, K., Karnell, L., & Funk, G. (1999). Smoking and drinking behavior in patients with head and neck cancer: Efforts of behavioral self-blame and perceived control. *Journal of Behavioral Medicine, 22*(5), 407-418. doi:10.1023/A:1018669222706

Clark, J.A., & Talcott, J.A. (2006). Confidence and uncertainty long after initial treatment for early prostate cancer: Survivors' views of cancer control and treatment decisions they made. *Journal of Clinical Oncology, 24*(27), 4457 – 4463. doi: 10.1200/JCO.2006.06.2893.

Conaghan, P.G., Serpell, M., McSkimming, P., Junor, R., & Dickerson, S. (2016). Satisfaction, adherence, and health-related quality of life with transdermal buprenorphine compared with oral opioid medications in the usual care of osteoarthritis pain. *Patient, 9*(4), 359-371. doi: 10.1007/s40271-016-0181-0

Costa, J., & Gouveia, J.P. (2011). Acceptance of pain, self-compassion, and psychopathology: Using the chronic pain acceptance questionnaire to identify patients' subgroups. *Clinical Psychology and Psychotherapy, 18*(4), 292-302. doi: 10.1002/cpp.718.

Crane-Okada, R., Kiger, H., Sugerman, F., Uman, G.C., Shapiro, S.L., Wyman-McGinty, W., & Anderson, N.L.R. (2012). Mindful movement program for older breast cancer survivors. *Cancer Nursing, 35*(4), 1 – 13. doi: 10.1097/NCC.0b013e3182280f73.

Creswell, J.D., Lam, S., Stanton, A.L., Taylor, S.E., Bower, J.E., & Sherman, D.K. (2007). Does self-affirmation, cognitive processing, or discovery of meaning explain cancer-related health benefits of expressive writing? *Personality and Social Psychology Bulletin, 33*(2), 238 – 250. doi: 10.1177/0146167206294412

Crist, P. (2013). Functional challenges among late effects cancer survivors: A preliminary report on work engagement issues. *Work, 46*(4), 369 – 379. doi: 10.3233/WOR-131673.

Crocetti, E., De Angelis, R., Buzzoni, C., Mariotto, A., Storm, H., Colonna, M., . . . Dal Maso, L. (2013). Cancer prevalence in United States, Nordic countries, Italy, Australia, and France: An analysis of geographic variability. *British Journal of Cancer, 109,* 219-228. doi: 10.1038/bjc.2013.311

Demetriou, C., Ozer, B.U., & Essau, C.A. Self-report questionnaires. In R.L. Cautin & S.O. Lillienfeld (Eds.), *The Encyclopedia of Clinical Psychology.* Hoboken, NJ: John Wiley & Sons. doi: 10.1002/9781118625392.wbecp507.

de Moor, J.S., Mariotto, A.B., Parry, C., Alfano, C.M., Padgett, L., Kent, E.E., . . . Rowland, J.H. (2013). Cancer survivors in the United States: Prevalence across the survivorship trajectory and implications for care. *Cancer, Epidemiology, Biomarkers, & Prevention, 22*(4), 561-570. doi: 10.1158/1055-9965.EPI-12-1356

De Smedt, D., Clays, E., Doyle, F., Kotseva, K., Prugger, C., Pajak, A., . . . De Bacquer, D. (2013). Validity and reliability of three commonly used quality of life measures in a large European population of coronary heart disease patients. *International Journal of Cardiology, 167*(5), 2294-2299. doi: 10.1016/j.ijcard.2012.06.025

Denois, V.R., Poirson, J., Nourissat, A., Jacquin, J.P., Gustalla, J.P., & Chauvin, F. (2011). Adherence with oral chemotherapy: Results from a qualitative study of the behaviour and representations of patients and oncologists. *European Journal of Cancer Care, 20*(4), 520-527. doi: 10.1111/j.1365-2354.2010.01212.x.

DeSantis, C.E., Lin, C.C., Mariotto, A.B., Siegel, R.L., Stein, K.D., Kramer, J.L., . . . Jemal, A. (2014). Cancer treatment and survivorship statistics, 2014. *CA: A Cancer Journal for Clinicians, 64*(4), 252-271. doi: 10.3322/caac.21235.

De Valck, C., & Vinck, J. (1996). Health locus of control and quality of life in lung cancer patients. *Patient Education and Counseling, 28*(2), 179-186. doi: https://doi.org/10.1016/0738-3991(96)00897-X

DiBonaventura, M.D., Copher, R., Basurto, E., Faria, C., & Lorenzo, R. (2014). Patient preferences and treatment adherence among women diagnosed with metastatic breast cancer. *American Health & Drug Benefits, 7*(7), 386-396.

Dimatteo, M.R., Hays, R.D., & Sherbourne, C.D. (1992). Adherence to cancer regimens: Implications for treating the older patient. *Oncology, 6*(2), 50-57s.

Dimeo, F.C. (2001). Effects of exercise on cancer-related fatigue. *Cancer, 92*(Suppl. 6), 1689-1693. doi: 10.1002/1097-0142(20010915)92:6+<1689::AID-CNCR1498>3.0.CO;2-H. 508-512.

Dit, L., Baban, A., & Dumitrascu, D.L. (2012). Diabetes's adherence to treatment: The predictive value of satisfaction with medical care. *Procedia – Social and Behavioral Sciences, 33,* 508-512. https://doi.org/10.1016/j.sbspro.2012.01.173

Dodds, S.E., Pace, T.W.W., Bell, M.L., Fiero, M., Negi, L.T., Raison, C.L., & Weihs, K.L. (2015). Feasibility of cognitively-based compassion training (CBCT) for breast cancer survivors: A randomized, wait list controlled pilot study. *Support Care Cancer, 23*(12), 3599 – 3608. doi: 10.1007/s00520-015-2888-1.

Dowd, A.J., & Jung, M.E. (2017). Self-compassion directly and indirectly predicts dietary adherence and quality of life among adults with celiac disease. *Appetite, 113,* 293-300. doi: 10.1016/j.appet.2017.02.023.

Dunne, S., Sheffield, D., & Chilcot, J. (2016). Brief report: Self-compassion, physical health, and the mediating role of health-promoting behaviours. *Journal of Health Psychology.* doi: 10.1177/1359105316643377.

Eakin, E.G., Youlden, D.R., Baade, P.D., Lawler, S.P., Reeves, M.M., Heysworth, J.S., & Fritschi, L. (2006). Health status of long-term cancer survivors: Results from an Australian population-based sample. *Cancer, Epidemiology, Biomarkers, & Prevention, 15*(10), 1969-1976. doi: 10.1158/1055-9965.EPI-06-0122.

Faller, H., Schilling, S., & Lang, H. (1995). Causal attributions and adaptation among lung cancer patients. *Journal of Psychosomatic Research, 39*(5), 619-627. http://dx.doi.org/10.1016/0022-3999(94)00002-6

Feros, D.L., Lane, L., Ciarrochi, J., & Blackledge, J.T. (2013). Acceptance and commitment therapy (ACT) for improving the lives of cancer patients: A preliminary study. *Psycho-Oncology, 22*(2), 459 – 464. doi: 10.1002/pon.2083.

Ferrari, M., Cin, M.D., & Steele, M. (2017). Self-compassion is associated with optimum self-care behaviour, medical outcomes and psychological well-being in a cross-sectional sample of adults with diabetes. *Diabetic Medicine.* Advanced online publication. doi: 10.1111/dme.13451

Fodeh, S.J., Lazenby, M., Bai, M., Ercolano, E., Murphy, T., & McCorkle, R. (2013). Functional impairments as symptoms in the symptom cluster analysis of patients newly diagnosed with advanced cancer. *Journal of Pain and Symptom Management, 46*(4), 500-510. http://dx.doi.org/10.1016/j.jpainsymman.2012.09.011

Foley, E., Baillie, A., Huxter, M., Price, M., & Sinclair, E. (2010). Mindfulness-based cognitive therapy for individuals whose lives have been affected by cancer: A randomized controlled trial. Journal of Counseling and Clinical Psychology, 78(1), 72 – 79. doi: 10.1037/a0017566.

Fredrickson, B.L. (2004). The broaden-and-build theory of positive emotions. *Philosophical Transactions of the Royal Society of London B: Biological Sciences, 359*(1449), 1367 – 1377. doi: 10.1098/rstb.2004.1512.

Fuertes, J.N., Boylan, L.S., & Fontanella, J.A. (2009). Behavioral indices in medical care outcome: The working alliance, adherence, and related factors. *Journal of General Internal Medicine, 24*(1), 80-85. doi: 10.1007/s11606-008-0841-4

Ganz, P.A. (2006). Monitoring the physical health of cancer survivors: A survivorship-focused medical history. *Journal of Clinical Oncology, 24*(32), 5105-5111. doi: 10.1200/JCO.2006.06.0541.

Gauthier, L.R., Rodin, G., Zimmermann, C., Warr, D., Moore, M., Shepherd, F., & Gagliese, L. (2009). Acceptance of pain: A study in patients with advanced cancer. *Pain, 143*(1-2), 147 – 154. doi: 10.1016/j.pain.2009.02.009.

Germer, C.K., & Neff, K.D. (2013). Self-compassion in clinical practice. *Journal of Clinical Psychology: In Session, 69*(8), 856-867. doi: 10.1002/jclp.22021

Gilbert, S.M., Miller, D.C., Hollenbeck, B.K., Montie, J.E., & Wei, J.T. (2008). Cancer survivorship: Challenges and changing paradigms. *The Journal of Urology, 179,* 431-438. doi: 10.1016/j.juro.2007.09.029

Gillanders, D.T., Sinclair, A.K., MacLean, M., & Jardine, K. (2015). Illness cognitions, cognitive fusion, avoidance, and self-compassion as predictors of distress and quality of life in a heterogenous sample of adults, after cancer. *Journal of Contextual Behavioral Science, 4*(4), 300-311. https://doi.org/10.1016/j.jcbs.2015.07.003

Gonzalez-Hernandez, E., Romero, R., Campos, D., Burichka, D., Diego-Pedro, R., Baños, R., . . . Cebolla, A. (2018). Cognitive-based compassion training (CBCT) in breast cancer survivors: A randomized clinical trial study. *Integrative Cancer Therapies.* https://doi.org/10.1177/1534735418772095

Hamilton, G.A. (2003). Measuring adherence in a hypertension clinical trial. *European Journal of Cardiovascular Nursing, 2*(3), 219-228. doi: 10.1016/S1474-5151(03)00058-6

Hamilton, N.A., Kitzman, H., & Guyotte, S. (2006). Enhancing health and emotion: Mindfulness as a missing link between cognitive therapy and positive psychology. *Journal of*

Cognitive Psychotherapy: An International Quarterly, *20*(2), 123 – 134. http://dx.doi.org/10.1891/jcop.20.2.123

Hammerlid, E., & Taft, C. (2001). Health-related quality of life in long-term head and neck cancer survivors: A comparison with general population norms. *British Journal of Cancer, 84*(2), 149-156. doi: 10.1054/ bjoc.2000.1576

Harmon, J. (2018). Celebrate the trail to recovery: Power of the positive post-diagnosis of cancer. *International Journal of the Sociology of Leisure*. https://doi.org/10.1007/s41978-018-0014-x

Harris, P.R., & Epton, T. (2009). The impact of self-affirmation on health cognition, health behaviour, and other health-related responses: A narrative review. *Social and Personality Psychology Compass*, *3*(6), 962 – 978. doi:10.1111/j.1751-9004.2009.00233.x

Hayes, A.F. (2013). Multiple mediator models. *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (pp. 123-163). New York, NY: The Guilford Press.

Hays, R.D. (1994). *The Medical Outcomes Study (MOS) measures of patient adherence.* Retrieved from https://www.rand.org/health/surveys_tools/mos/patient-adherence.html

Hays, R.D., Kravitz, R.L., Mazel, R.M., Sherbourne, C.D., DiMatteo, M.R., Rogers, W.H., & Greenfield, S. (1994). The impact of patient adherence on health outcomes for patients with chronic disease in the medical outcomes study. *Journal of Behavioral Medicine, 17*(4), 347-360. doi: 10.1007/BF01858007.

Hewitt, M., Rowland, J.H., & Yancik, R. (2003). Cancer survivors in the United States: Age, health, and disability. *Journal of Gerontology Series A: Biological Sciences & Medical, 58*(1), 82-91. doi: 10.1093/gerona/58.1.M82

Hoffman, A.J., Brintnall, R.A., Given, B.A., von Eye, A., Jones, L.W., & Brown, J.K. (2017). Using perceived self-efficacy to improve fatigue and fatigability in postsurgical lung cancer patients. *Cancer Nursing, 40*(1), 1 – 12. doi: 10.1097/NCC.0000000000000378.

Holt, E.W., Muntner, P., Joyce, C.J., Webber, L., & Krousel-Wood, M.A. (2010). Health-related quality of life and antihypertensive medication adherence among older adults. *Age and Ageing, 39*(4), 481-487. doi: 10.1093/ageing/afq040

Homan, K.J., & Sirois, F.M. (2017). Self-compassion and physical health: Exploring the roles of perceived stress and health-promoting behaviors. *Health Psychology Open*, *4*(2), 1-9. https://doi.org/10.1177/2055102917729542

Horne, R., Weinman, J., Barber, N., Elliott, R., Morgan, M., Cribb, A., & Kellar, I. (2005). *Concordance, adherence and compliance in medicine taking: Report for the National Co-ordinating Centre for NHS Service Delivery and Organisation R & D (NCCSDO).* Retrieved from https://www.researchgate.net/profile/Ian_Kellar/publication/271443859_Concordance_Adherence_and_Compliance_in_Medicine_Taking/links/54cfdb790cf298d65665b4d4.pdf

Inoue-Choi, M., Lazovich, D., Prizment, A.E., & Robien, K. (2013). Adherence to the World Cancer Research Fund / American Institute for Cancer Research recommendations for cancer prevention is associated with better health-related quality of life among elderly female cancer survivors. *Journal of Clinical Oncology, 31*(14), 1758-1766. doi: 10.1200/JCO.2012.45.4462

Jahn, P., Kuss, O., Schmidt, H., Bauer, A., Kitzmantel, M., Jordan, K., . . . Landenberger, M. (2014). Improvement of pain-related self-management for cancer patients through a modular transitional nursing intervention: A cluster-randomized multicenter trial. *Pain, 155*(4), 746 – 754. doi: 10.1016/j.pain.2014.01.006.

Jane, H.S., Singh, S., King, J., Wilson, R., & Ryerson, B. (2014). Invasive cancer incidence – United States, 2010. *Morbidity and Mortality Weekly Report, 63*(12), 253-259.

Jemal, A., Murray, T., Ward, E., Samuels, A., Tiwari, R.C., Ghafoor, A., . . . Thun, M.J. (2005). Cancer statistics, 2005. *CA: A Cancer Journal for Clinicians, 55*(1), 10-30. doi: 10.3322/canjclin.55.1.10

Jerant, A., Franks, P., Tancredi, D.J., Saito, N., & Kravitz, R.L. (2011). Tendency to adhere to provider-recommended treatments and subsequent pain severity among individuals with cancer. *Patient Preference and Adherence, 16*(5), 23-31. doi: 10.2147/PPA.S16236

Jones, J.M., Olson, K., Catton, P., Catton, C.N., Fleshner, N.E., Krzyzanowska, M.K., . . . Howell, D. (2016). Cancer-related fatigue and associated disability in post-treatment cancer survivors. *Journal of Cancer Survivorship, 10*(1), 51 – 61. doi: 10.1007/s11764-015-0450-2.

Keating, N.L., Nørredam, M., Landrum, M.B., Huskamp, H.A., & Meara, E. (2005). Physical and mental health status of older long-term cancer survivors. *Journal of the American Geriatrics Society, 53*(12), 2145-2152. doi: 10.1111/j.1532-5415.2005.00507.x.

Kelly, A.C., Vimalakanthan, K., & Carter, J.C. (2014). Understanding the roles of self-esteem, self0compassion, and fear of self-compassion in eating disorder pathology: An examination of female students and eating disorder patients. *Eating Behaviors,* 15(3), 388-391. http://dx.doi.org/10.1016/j.eatbeh.2014.04.008

Kendall, A.R., Mague-Giangreco, M., Carpeter, C.L., Ganz, P.A., & Berstein, L. (2005). Influence of exercise activity on quality of life in long-term breast cancer survivors. *Quality of Life Research, 14*(2), 361-371. doi: 10.1007/s11136-004-1468-5.

Kidd, L., Hubbard, G., O'Carroll, R., & Kearney, N. (2009). Perceived control and involvement in self-care in patients with colorectal cancer. *Journal of Clinical Nursing, 18*(16), 2292-2300. doi: 10.1111/j.1365-2702.2009.02802.x.

Kirby, J.N. (2017). Compassion interventions: The programmes, the evidence, and implications for research and practice. *Psychology and Psychotherapy: Theory, Research, and Practice, 90*(3), 432 – 455. doi: 10.1111/papt.12104.

Kool, M.B., van Middendorp, H., Roeije, H.R., & Geenen, R. (2009). Understanding the lack of understanding: Invalidation from the perspective of the patient with fibromyalgia. *Arthritis & Rheumatism, 61*(12), 1650 – 1656. doi: 10.1002/art.24922.

Korstjens, I., May, A.M., van Weert, E., Mesters, I., Tan, F., Ros, W.J.G., . . . van den Borne, B. (2008). Quality of life after self-management cancer rehabilitation: A randomized controlled trial comparing physical and cognitive-behavioral training versus physical training. *Psychosomatic Medicine, 70*(4), 422 – 429. doi: 10.1097/PSY.0b013e31816e038f.

Kroenke, C.H., Rosner, B., Chen, W.Y., Kawachi, I., Colditz, G.A., & Holmes, M.D. (2004). Functional impact of breast cancer by age at diagnosis. *Journal of Clinical Oncology, 22*(10), 1849-1856. doi: 10.1200/JCO.2004.04.173.

Kurtz, M.E., Kurtz, J.C., Given, C.W., & Given, B.A. (2008). Patient optimism and mastery – do they play a role in cancer patients' management of pain and fatigue. *Journal of Pain and Symptom Management, 36*(1), 1-10. doi: 10.1016/j.jpainsymman.2007.08.010.

Laffrey, S.C., & Isenberg, M. (2003). The relationship of internal locus of control, value placed on health, perceived importance of exercise, and participation in physical activity during

leisure. *International Journal of Nursing Studies, 40,* 453-459. doi: 10.1016/S0020-7489(03)00061-0.

Lasser, K.E., Himmelstein, D.U., & Woolhandler, S. (2006). Access to care, health status, and health disparities in the United States and Canada: Results of a cross-national population-based survey. *American Journal of Public Health, 96*(7), 1300 – 1307. doi: 10.2105/AJPH.2004.059402.

Lengacher, C.A., Johnson-Mallard, V., Post-White, J., Moscoso, M.S., Jacobsen, P.B., Klein, T.W., . . . Kip, K.E. (2009). Randomized controlled trial of mindfulness-based stress reduction (MBSR) for survivors of breast cancer. *Psycho-Oncology, 18*(12), 1261 – 1272. doi: 10.1002/pon.1529.

Lee, C.E., Browell, L.M., & Jones, D.L. (2008). Measuring health in patients with cervical and lumbosacral spinal disorders: Is the 12-item Short-Form Health Survey a valid alternative for the 36-item Short-Form Health Survey. *Archives of Physical Medicine and Rehabilitation, 89*(5), 829-833. doi: 10.1016/j.apmr.2007.09.056

Lee, V., Cohen, S.R., Edgar, L., Laizner, A.M., & Gagnon, A.J. (2006). Meaning-making intervention during breast or colorectal cancer treatment improves self-esteem, optimism, and self-efficacy. *Social Science & Medicine, 62*(12), 3133 – 3145. doi: 10.1016/j.socscimed.2005.11.041.

L'Estrange, K., Timulak, L., Kinsella, L., & D'Alton, P. (2016). Experiences of changes in self-compassion following mindfulness-based intervention with a cancer population. *Mindfulness, 7*(3), 734-744. doi: 10.1007/s12671-016-0513-0.

Lev, E.L., Daley, K.M., Conner, N.E., Reith, M., Fernandez, C., & Owen, S.V. (2001). An intervention to increase quality of life and self-care self-efficacy and decrease symptoms

in breast cancer patients. *Scholarly Inquiry for Nursing Practice: An International Journal, 15*(3), 277 – 294.

Link, L.B., Robbins, L., Mancuso, C.A., & Charlson, M.E. (2004). How do cancer patients who try to take control of their disease differ from those who do not? *European Journal of Cancer Care, 13*(3), 219-226. doi: 10.1111/j.1365-2354.2004.00456.x.

Luoma, J.B., Hayes, S.C., & Walser, R.D. (2017). *Learning ACT: An acceptance and commitment therapy skills training manual for therapists.* Oakland, CA: New Harbinger Publications.

Luszczynska, A., Tryburcy, M., & Schwarzer, R. (2007). Improving fruit and vegetable consumption: A self-efficacy intervention compared with a combined self-efficacy and planning intervention. *Health Education Research, 22*(5), 630 – 638. doi: 10.1093/her/cyl133.

MacIntosh, R., & Blades, C. (2001, June). *A Study of Health Insurance Coverage and Quality of Life in the Sacramento Region.* Sacramento, CA: California State University Sacramento Institute for Social Research. Retrieved from https://www.csus.edu/news/HealthReport2.PDF

Magai, C., Consedine, N., Neugut, A.I., & Hershman, D. (2007). Common psychosocial factors underlying breast cancer screening and breast cancer treatment adherence: A conceptual review and synthesis. *Journal of Women's Health, 16*(1), 11-23. doi: 10.1089/jwh.2006.0024.

Magnus, C.M.R., Kowalski, K.C., & McHugh, T.L.F. (2010). The role of self-compassion in women's self-determined motives to exercise and exercise-related outcomes. *Self and Identity, 9*(4), 363-382. doi: 10.1080/15298860903135073.

Malcarane, V.L., Compas, B.E., Epping-Jordan, J.E., & Howell, D.C. (1995). Cognitive factors in adjustment to cancer: Attributions of self-blame and perceptions of control. *Journal of Behavioral Medicine, 18*(5), 401 – 417. doi: 10.1007/BF01904771.

Marijnen, C.A.M., Velde, C.J.H., Putter, H., Brink, M., Maas, C.P., Martijn, H., . . . Stiggelbout, A.M. (2005). Impact of short-term preoperative radiotherapy on health-related quality of life and sexual functioning in primary rectal cancer: Report of a multicenter randomized trial. *Journal of Clinical Oncology, 23*(9), 1847-1858. doi: 0.1200/JCO.2005.05.256.

Martin, L.R., Williams, S.L., Haskard, K.B., & DiMatteo, M.R. (2005). The challenge of patient adherence. *Therapeutics and Clinical Risk Management, 1*(3), 189-199.

Matchim, Y., & Armer, J.M. (2007). Measuring the psychological impact of mindfulness meditation on health among patients with cancer: A literature review. *Oncology Nursing Forum, 34*(5), 1059 – 1066. doi: 10.1188/07.ONF.1059-1066

McCullagh, P., & Nelder, J.A. (1989). Selection of covariates. *Generalized linear models* (2nd ed., p. 89). Boca Raton, FL: CRC Press, Inc.

McNicholl, I.R. (2008). Strategies to enhance adherence, reduce costs, and improve patient quality of life. *Journal of Managed Care Pharmacy, 14*(5), S12 – S16.

Mehdipour, F., Rafiepoor, A., & Alizadeh, K.H. (2017). The effectiveness of mindfulness-based cognitive group therapy in reducing negative automatic thoughts and dysfunctional attitudes in cancer patients. *Zahedan Journal of Research in Medical Sciences, 19*(6). doi: 10.5812/zjrms.10609.

Miller, D.C., Sanda, M.G., Dunn, R.L., Montie, J.E., Pimentel, H., Sandler, H.M., . . . Wei, J.T. (2005). Long-term outcomes among localized prostate cancer survivors: Health-related

quality of life changes after radical prostatectomy, external radiation, and brachytherapy. *Journal of Clinical Oncology, 23*(12), 2772-2780. doi:10.1200/JCO.2005.07.116.

Mowry, S.E., & Wang, M.B. (2011). The influence of support groups on quality of life in head and neck cancer patients. *Otolaryngology.* doi: 10.5402/2011/250142.

Nakamura, Y., Lipschitz, D.L., Kuhn, R., Kinney, A.Y., & Donaldson, G.W. (2013). Investigating efficacy of two brief mind-body intervention programs for managing sleep disturbance in cancer survivors: A pilot randomized controlled trial. *Journal of Cancer Survivorship, 7*(2), 165 – 182. doi: 10.1007/s11764-012-0252-8.

National Cancer Institute (NCI). (2017). Surveillance, epidemiology, and end results program (SEER) cancer stat facts [Fact sheet]. Retrieved from: https://seer.cancer.gov/statfacts/

Neff, K.D. (2003). Self-compassion: An alternative conceptualization of a health attitude toward oneself. *Self and Identity, 2*(2), 85-101. doi: 10.1080/15298860390129863.

Neff, K.D., & Germer, C.K. (2013). A pilot study and randomized controlled trial of the mindful self-compassion program. *Journal of Clinical Psychology, 69*(1), 28 – 44. doi: 10.1002/jclp.21923.

Neff, K.D., Rude, S.S., & Kirkpatrick, K.L. (2007). An examination of self-compassion in relation to positive psychological functioning and personality traits. *Journal of Research in Personality, 41*(4), 908-916. doi: 10.1016/j.jrp.2006.08.002.

Ness, K.K., Wall, M.M., Oakes, J.M., Robison, L.L., & Gurney, J.G. (2006). Physical performance limitations and participation restrictions among cancer survivors: A population-based study. *Annals of Epidemiology, 16*(3), 197-205. doi: 10.1016/j.annepidem.2005.01.009

Norton, T.R., Manne, S.L., Rubin, S., Hernandez, E., Carlson, J., Bergman, C., & Rosenblum, N. (2005). Ovarian cancer patients' psychological distress: The role of physical impairment, perceived unsupportive family and friend behaviors, perceived control, and self-esteem. *Health Psychology, 24*(2), 143-152. doi: 10.1037/0278-6133.24.2.143.

O'Hea, E.L., Grothe, K.B., Bodenlos, J.S., Boudreaux, E.D., White, M.A., & Brantley, P.J. (2005). Predicting medical regimen adherence: The interactions of health locus of control beliefs. *Journal of Health Psychology, 10*(5), 705-717. doi: 10.1177/1359105305055330.

O'Neill, S.C., DeFrank, J.T., Vegella, P., Richman, A.R., Henry, L.R., Carey, L.A., . . . Brewer, N.T. (2013). Engaging in health behaviors to lower risk for breast cancer recurrence. *PLOS One, 8*(1). https://doi.org/10.1371/journal.pone.0053607

Paice, J.A., Toy, C., & Shott, S. (1998). Barriers to cancer pain relief: Fear of tolerance and addiction. *Journal of Pain and Symptom Management, 16*(1), 1-9. http://dx.doi.org/10.1016/S0885-3924(98)00025-6

Park, C.L., & Gaffey, A.E. (2007). Relationships between psychosocial factors and health behavior change in cancer survivors: An integrative review. *Annals of Behavioral Medicine, 34*(2), 115 – 134. https://doi.org/10.1007/BF02872667

Patridge, A.H., Avorn, J., Wang, P.S., & Winer, E.P. (2002). Adherence to therapy with oral antineoplastic agents. *Journal of the National Cancer Institute, 94*(9), 652-661. doi: 10.1093/jnci/94.9.652.

Patterson, R.E., Neuhouser, M.L., Hedderson, M.M., Schwartz, S.M., Standish, L.J., & Bowen, D.J. (2003). Changes in diet, physical activity, and supplement use among adults diagnosed with cancer. *Journal of the American Dietic Association, 103*(3), 323-328. doi: 10.1053/jada.2003.50045.

Pertl, M., Hevey, D., Thomas, K., Craig, A., Chuinneagáin, N., & Maher, L. (2010). Differential effects of self-efficacy and perceived control on intention to perform skin cancer-related health behaviours. *Health Education Research, 25*(5), 769-779. doi: 10.1093/her/cyq031.

Perwitasari, D.A., & Urbayatun, S. (2016). Treatment adherence and quality of life in diabetes mellitus patients in Indonesia. *SAGE Open, 6*(2). https://doi.org/10.1177/2158244016643748

Preacher, K. J. & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879-891. doi: 10.3758/BRM.40.3.879. 287-588.

Przezdziecki, A., & Sherman, K.A. (2016). Modifying affective and cognitive responses regarding body image difficulties in breast cancer survivors using a self-compassion-based writing intervention. *Mindfulness, 7*(5), 1142 – 1155. doi: 10.1007/s12671-016-0557-1.

Przezdziecki, A., Sherman, K.A., Baillie, A., Taylor, A., Foley, E., & Bilinski, K.S. (2013). My changed body: Breast cancer, body image, distress, and self-compassion. *Psycho-Oncology, 22*(8), 1872-1879. doi: 10.1002/pon.3230.

Puts, M.T.E., Tu, H.A., Tourangeau, A., Howell, D., Fitch, M., Springal, E., & Alibhai, S.M.H. (2014). Factors influencing adherence to cancer treatment in older adults with cancer: A systematic review. *Annals of Oncology, 25*(3), 564-577. doi: 10.1093/annonc/mdt433.

Raes, F., Pommier, E., Neff, K.D., & Gucht, D.V. (2011). Construction and factorial validation of a short form of the self-compassion scale. *Clinical Psychology and Psychotherapy, 18*(3), 250-255. doi: 10.1002/cpp.702.

Ramsey, S.D., Berry, K., Moinpour, C., Giedzinska, A., & Andersen, M.R. (2002). Quality of life in long term survivors of colorectal cancer. *The American Journal of Gastroenterology, 97*(5), 1228 – 1234. doi: 10.1111/j.1572-0241.2002.05694.x.

Ranchor, A.V., Wardle, J., Steptoe, A., Henselmans, I., Ormel, J., & Sanderman, R. (2010). The adaptive role of perceived control before and after cancer diagnosis: A prospective study. *Social Science & Medicine, 70*(11), 1825-1831. doi: 10.1016/j.socscimed.2009.10.069.

Ray, H., & Jakubec, S.L. (2014). Nature-based experiences and health of cancer survivors. *Complementary Therapies in Clinical Practice, 20*(4), 188 – 192. https://doi.org/10.1016/j.ctcp.2014.07.005

Reeve, B.B., Stover, A.M., Jensen, R.E., Chen, R.C., Taylor, K.L., Clauser, S.B., . . . Potosky, A.L. (2012). Impact of diagnosis and treatment of clinically localized prostate cancer on health-related quality of life for older Americans. *Cancer, 118*(22), 5679-5687. doi: 10.1002/cncr.27578

Reyes, D. (2012). Self-compassion: A concept analysis. *Journal of Holistic Nursing, 30*(2), 81-89. doi: 10.1177/0898010111423421.

Richardson, A.E., Morton, R.P., & Broadbent, E.A. (2016). Changes over time in head and neck cancer patients' and caregivers' illness perceptions and relationships with quality of life. *Psychology & Health, 31*(10), 1203 – 1219. http://dx.doi.org/10.1080/08870446.2016.1203686

Rose, C.D., Webel, A., Sullivan, K.M., Cuca, Y.P., Wantland, D., Johnson, M.O., . . . Holzemer, W.L. (2014). Self-compassion and risk behavior among people living with HIV/AIDS. *Research in Nursing and Health, 37*(2), 98-106. doi: 10.1002/nur.21587.

Rosedale, M. (2009). Survivor loneliness of women following breast cancer. *Oncology Nurse Forum, 36*(2), 175 – 183. doi: 10.1188/09.ONF.175-183.

Salmoirago-Blotcher, E., & Carey, M.P. (2017). Can mindfulness training improve medication adherence? Integrative review of the current evidence and proposed conceptual model. *EXPLORE: The Journal of Science and Healing.* https://doi.org/10.1016/j.explore.2017.09.010

Sangeeta, S., & Rana, S.S. (2015). Health locus of control as correlate of health promoting behaviors. *Indian Journal of Health and Wellbeing, 6*(6), 580-584.

Scharloo, M., Kaptein, A.A., Weinman, J., Hazes, J.M., Willems, L.N.A., Bergman, W., & Rooijmans, H.G.M. (1998). Illness perceptions, coping, and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease, and psoriasis. *Journal of Psychosomatic Research, 44*(5), 573-585. doi: 10.1016/S0022-3999(97)00254-7.

Schellekens, M.P.J., Karremans, J.C., van der Drift, M.A., Molema, J., van den Hurk, D.G.M., Prins, J.B., & Speckens, A.E.M. (2017). Are mindfulness and self-compassion related to psychological distress and communication in couples facing lung cancer? A dyadic approach. *Mindfulness, 8*(2), 325-336. doi: 0.1007/s12671-016-0602-0

Schneider, S.M., Adams, D.B., & Gosselin, T (2014). A tailored nurse coaching intervention for oral chemotherapy adherence. *Journal of the Advanced Practitioner in Oncology, 5*(3), 163 – 172.

Sherbourne, C.D., Hays, R.D., Ordway, L., DiMatteo, M.R., & Kravitz, R.L. (1992). Antecedents of adherence to medical recommendations: Results from the medical outcomes study. *Journal of Behavioral Medicine, 15*(5), 447-468. doi: 10.1007/BF00844941.

Siegel, R., DeSantis, C., Virgo, K., Stein, K., Mariotto, A., Smith, T., . . . Ward, E. (2012). Cancer treatment and survivorship statistics, 2012. *CA: A Cancer Journal for Clinicians, 62*(4), 220-241. doi: 10.3322/caac.21149.

Siegel, R., Ma, J., Zou, Z., & Jemal, A. (2014). Cancer statistics, 2014. *CA: A Cancer Journal for Clinicians, 64*(1), 9-9. doi: 10.3322/caac.21208

Sirois, F.M. (2003a). *Beyond health locus of control: A multidimensional measure of health-related control beliefs and motivations.* (Doctoral dissertation). Retrieved from Carleton University Research Virtual Environment. (PH.D. 2003.S57).

Sirois, F.M. (2003b). *The Control Beliefs Inventory.* (Unpublished manual). Carleton University, Ottawa, Ontario, Canada.

Sirois, F.M., Davis, C.G., & Morgan, M.S. (2006). Learning to live with what you can't rise above: Control beliefs, symptom control, and adjustment to illness. *Health Psychology, 25*(1), 119-123. doi: 10.1037/0278-6133.25.1.119

Sirois, F.M., & Hirsch, J.K. (2018). Self-compassion and adherence in five medical samples: The role of stress. *Mindfulness.* doi: 10.1007/s12671-018-0945-9.

Sirois, F.M., Kitner, R., & Hirsch, J.K. (2015). Self-compassion, affect, and health-promoting behaviors. *Health Psychology, 34*(6), 661-669. http://dx.doi.org/10.1037/hea0000158

Sirois, F.M., Molnar, D.S., & Hirsch, J.K. (2015). Self-compassion, stress, and coping in the context of chronic illness. *Stress and Identity, 14*(3), 334-347. doi: 10.1080/15298868.2014.996249.

Sirois, F.M., & Rowse, G. (2016). The role of self-compassion in chronic illness care. *Journal of Clinical Outcomes Management, 23*(11), 521-527.

Song, S., Hwang, E., Moon, H.-G., Noh, D.-Y., & Lee, J.E. (2015). Adherence to guidelines for cancer survivors and health-related quality of life among Korean breast cancer survivors. *Nutrients, 7*(12), 10307-10319. doi: 10.3390/nu7125532

Spiegel, D. (1997). Psychosocial aspects of breast cancer treatment. *Seminars in Oncology, 24*(1, Suppl. 1), 36-47.

Spoelstra, S.L., Given, C.W., Sikorskii, A., Coursaris, C.K., Majumder, A., DeKoekkoek, T., . . . Given, B.A. (2016). Proof of concept of a mobile health short message service test message intervention that promotes adherence to oral anticancer agent medications: A randomized controlled trial. *Telemedicine and e-Health, 22*(6), 497 – 506. doi: 10.1089/tmj.2015.0126.

Stein, K.D., Syrjala, K.L., & Andrykowski, M.A. (2008). Physical and psychological long-term and late effects of cancer. *Cancer Survivorship: Embracing the Future,* 112(11), 2577-2592. doi: 10.1002/cncr.23448.

Steinhauser, K.E., Christakis, N.A., Clipp, E.C., McNeilly, M., McIntyre, L., & Tulsky, J.A. (2000). Factors considered important at the end of life by patients, family, physicians, and other care providers. *Journal of the American Medical Association, 284*(19), 2476 – 2482. doi: 10.1001/jama.284.19.2476.

Stirratt, M.J., Dunbar-Jacob, J., Crane, H.M., Simoni, J.M., Czajkowski, S., Hilliard, M.E., . . .& Nilsen, W.J. (2015). Self-report measures of medication adherence behavior: Recommendations for optimal use. *Translational Behavioral Medicine, 5*(4), 470 – 482. doi: 10.1007/s13142-015-0315-2.

Tancredi, R., Stefani, S., Gervaso, L., Fregoni, V., Poojary, P., Cefalî, M., . . . Riccardi, A. (2017). End-of-life chemotherapy and adherence to ASCO's top five list

recommendations: A single-center retrospective review. *Journal of Clinical Oncology, 35*(15).

Terry, M.L., & Leary, M.R. (2011). Self-compassion, self-regulation, and health. *Self and Identity, 10*(3), 352-362. http://dx.doi.org/10.1080/15298868.2011.558404

Terry, M.L., Leary, M.R., Mehta, S., & Henderson, K. (2013). Self-compassionate reactions to health threats. *Personality and Social Psychology Bulletin, 39*(7), 911-926. doi:10.1177/0146167213488213.

Theofilou, P., & Panagiotaki, H. (2012). A literature review to investigate the link between psychosocial characteristics and treatment adherence in cancer patients. *Oncology Reviews, 6*(5), 37-44. doi: 10.4081/oncol.2012.e5.

Tugade, M.M., Fredrickson, B.L., & Barrett, L.F. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality, 72*(6), 1161 – 1190. doi: 10.1111/j.1467-6494.2004.00294.x.

Turner, J.A., Anderson, M.L., Balderson, B.H., Cook, A.J., Sherman, K.J., & Cherkin, D.C. (2016). Mindfulness-based stress reduction and cognitive-behavioral therapy for chronic low back pain: Similar effects on mindfulness, catastrophizing, self-efficacy, and acceptance in a randomized controlled trial. *Pain, 157*(11), 2434 – 2444. doi: 10.1097/j.pain.0000000000000635.

Ussher, J., Kirsten, L., Butow, P., & Sandoval, M. (2006). What do cancer support groups provide which other supportive relationships do not? The experience of peer support groups for people with cancer. *Social Science & Medicine, 62*(10), 2565 – 2576. doi: 10.1016/j.socscimed.2005.10.034.

van Uden-Kraan, C.F., Drossaert, C.H.C., Taal, B.R., Seydel, E.R., & van de Laar, M.A.F.J. (2008). Empowering processes and outcomes of participation in online support groups for patients with breast cancer, arthritis, or fibromyalgia. *Qualitative Health Research, 18*(3), 405 – 417. doi: 10.1177/1049732307313429.

Volker, D.L., & Wu, H.-L. (2011). Cancer patients' preferences for control at the end of life. *Qualitative Health Research, 21*(12), 1618 – 1631. doi: 10.1177/1049732311415287.

Wallston, K.A. (1992). Hocus-pocus, the focus isn't strictly on locus: Rotter's social learning theory modified for health. *Cognitive Therapy and Research, 16*(2), 183-1933. doi:10.1007/BF01173488.

Wallston, K.A. (2001). Conceptualization and operationalization of perceived control. In A. Baum, T. Revenson, & J.E. Singer (Eds.) *The handbook of health psychology* (pp. 49-58). Mahawh, NJ: Erlbaum.

Ware, J.E., Kosinski, M., & Keller, S.D. (1995). *SF-12: How to score the SF-12 physical and mental health summary scales* (2nd ed.). Boston, MA: The Health Institute, New England Medical Center.

Weaver, K.E., Forsythe, L.P., Reeve, B.B., Alfano, C.M., Rodriguez, J.L., Sabatino, S.A., . . . Rowland, J.H. (2012). Mental and physical health-related quality of life among US cancer survivors: Population estimates from 2010 national health interview survey. *Cancer Epidemiology, Biomarkers, & Prevention, 21*(11), 2108-2117. doi: 10.1158/1055-9965.EPI-12-0740.

Wells, A.A., Gulbas, L., Sanders-Thompson, V., Shon, E.-J., & Kreuter, M.W. (2014). African American breast cancer survivors participating in a breast cancer support group:

Translating research into practice. *Journal of Cancer Education, 29*(4), 619-625. doi: 10.1007/s13187-013-0592-8

Wendel, C.S., Grant, M., Herrinton, L., Temple, L.K.F., Hornbrook, M.C., McMullen, C.K., . . . Krouse, R.S. (2014). Reliability and validity of a survey to measure bowel function and quality of life in long-term rectal cancer survivors. *Quality of Life Research, 23*(10), 2831-2840. doi: 10.1007/s11136-014-0724-6.

White, M., & Dorman, S.M. (2001). Receiving social support online: Implications for health education. *Health Education Research, 16*(6), 693 – 707. https://doi.org/10.1093/her/16.6.693

White, K., Lehman, D.R., Hemphill, K.J., Mandel, D.R., & Lehman, A.M. (2006). Causal attributions, perceived control, and psychological adjustment: A study of chronic fatigue syndrome. *Journal of Applied Social Psychology, 36*(1), 75-99. doi: 10.1111/j.0021-9029.2006.00004.x

Wilson, I.B., & Cleary, P.D. (1995). Linking clinical variables with health-related quality of life. *Journal of the American Medical Association, 273*(1), 59-65. doi: 10.1001/jama.273.1.59

World Health Organization (WHO). (2003). Adherence to long-term therapies: Evidence for action [Web log post]. Retrieved from http://www.who.int/chp/knowledge/publications/adherence_report/en/

Wren, A.A., Somers, T.J., Wright, M.A., Goetz, M.C., Leary, M.R., Fras, A.M., . . . Keefe, F.J. (2012). Self-compassion in patients with persistent musculoskeletal pain: Relationship of self-compassion to adjustment to persistent pain. *Journal of Pain and Symptom Management, 43*(4), 759- 770. doi: 10.1016/j.jpainsymman.2011.04.014

Yarnell, L.M., Stafford, R.E., Neff, K.D., Reilly, E.D., Knox, M.C., & Mullarkey, M. (2015). Meta-analysis of gender differences in self-compassion. *Self and Identity, 14*(5), 499 – 520. https://doi.org/10.1080/15298868.2015.1029966

Zachariae, R., Pedersen, C.G., Jensen, A.B., Rossen, P.B., & von der Maase, H. (2003). Association of perceived physician communication style with patient satisfaction, distress, cancer-related self-efficacy, and perceived control over the disease. *British Journal of Cancer, 88*(5), 658 – 665. doi: 10.1038/sj.bjc.6600798.

Zhang, J.W., & Chen, S. (2016). Self-compassion promotes personal improvement from regret experiences via acceptance. *Personality and Social Psychology Bulletin, 42*(2), 244 – 258. https://doi.org/10.1177/0146167215623271

VITA

MORGAN KATE TREASTER, B.A.

Education:	M.A. Psychology, Concentration in Clinical Psychology, East Tennessee State University, Johnson City, TN, 2018 B.A. Psychology, Susquehanna University, Selinsgrove, PA, 2016 High School Diploma, East Juniata High School, McAlisterville, PA, 2012
Professional Experience:	2018. Behavioral Health Consultant. ETSU Family Medicine Associates. Externship. Johnson City, TN. 2018. Clinician. ETSU Behavioral Health and Wellness Clinic. Practicum. Johnson City, TN. 2016-2018. Graduate/Research Assistant. East Tennessee State University, Department of Psychology, Johnson City, TN. 2015. Drug and Alcohol Counselor. Conewago-Snyder, Firetree, Ltd. Practicum. Beavertown, PA. 2015. Research Assistant. Geisinger Medical Center. Geisinger Medical Center. Externship. Danville, PA.
Honors and Awards:	ETSU Department of Psychology Research Travel Award (2017) American Psychological Association – Division 38 (Health Psychology) Research Award (2017)
Professional Affiliations:	American Psychological Association (2018) Honor Society of Phi Kappa Phi – ETSU Chapter (2017-2018) Association for Psychological Science (2016)